6. Uluslararası Temel ve Uygulamalı Bilimlerdeki İlerlemeler Konferansı

6th International Conference on Advence in Natural and Applied Sciences

BOOK of ABSTRACTS & PROCEEDINGS

Ekim / October 11-13, 2022, Ağrı, Türkiye

ICANAS 2022

Intenational, Interdisciplinary, Online

6th International Conference on
ADVANCES IN
NATURAL & APPLIED SCIENCES

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October 11-13, 2022 │ Ağrı, Türkiye

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Dear ICANAS 2022 participants!

Thank you all for your interest in attending the International Conference on Developments in Nature and Applied Sciences (ICANAS 2022), which will be held online by Ağrı İbrahim Çeçen University on 11-13 October 2022.

This year we are happy to organize the 6th International Conference on Advances in Natural and Applied Sciences on the international platform in collaboration with Ağrı İbrahim Çeçen University, Kyrgyz-Turkish Manas University, Kyrgyzstan and Osh State University, Kyrgyzstan.

Our Conference aims to provide an atmosphere for colleagues from all over the world to share expertise, experience and scientific studies and industrial experiences that describe significant advances in the following areas, but are not limited to; Chemistry, Physics and Biology, Mathematics and Statistics, Agricultural and Aquatic Sciences, Biotechnology and Nanotechnology, Engineering, Computers Sciences, Physics, Chemistry, Biology and Mathematics Education. The conference program includes invited speakers, online paper presentations, poster presentations and virtual presentation.

ICANAS 2022 is an international meeting for International Conference on Advances in Natural and Applied Sciences from all over the world working in Natural and Applied Sciences to present their latest research results, to exchange new ideas and application experiences face to face, to discuss challenging issues, to establish research relations and to find global partners for future collaboration.

This year, within the scope of the Conference, nearly 140 oral and poster abstracts accepted by the Scientific Committee and Editorial Board were presented.

Selected papers from the ICANAS2022 recommended by the scientific committee will be published in special issues of following journals: International Journal of Education, Ağrı İbrahim Çeçen University Journal of Social Sciences Institute, Yüzüncü Yıl University Journal of the Institute of Natural and Applied Sciences, Turkish Journal of Nature and Science, Eastern Anatolian Journal of Science; International Journal of Scientific & Engineering Research (IJSER).

I would like to thank honorary chairs Prof. Dr. Abdulhalik KARABULUT (The Rector of Ağrı İbrahim Çeçen University, Türkiye), Prof. Dr. Alpaslan CEYLAN (The Rector of Kyrgyz-Turkish Manas University, Kyrgyzstan), Prof. Dr. Kudaiberdi KOZHOBEKOV (The Rector of Osh State University, Kyrgyzstan) and İbrahim ÇEÇEN (The Chairman of IC Holding) who contributed to making this conference a great success.

Also, I would like to thank all conference participants who supported the conference with their knowledge, invited speakers, session chairs, authors / presenters, colleagues, conference secretariat, technical team that contributed to the online conference, sponsors and everybody who has all contributed to this conference with great efforts for months.

I wish every success and fruitful results in their academic lives for all participants of ICANAS 2022 organized Ağrı İbrahim Çeçen University.

Hope to see you in face at the next ICANAS conferences...

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INVITED TALKS

ID: 01-IOP

Plasmas in Nanotechnology

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Plasma is widely used in high tech industry especially in thin film and nanotechnology applications. However it has some advantegous and disadvantageus. One advantage is excellent uniformity in coatings but disadvantage is expensive and some problems in 3-d geometry and also on liquid samples. Recently, research on liquid plasma gain attention due to its some excellent characteristics such as cheap and excellent results on nanoparticle coating and production.
The plasma and liquid plasma properties and applications will be discussed.

ID: 02-IOP

Genetic Therapy Approaches

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Although there are about seven thousand rare diseases diagnosed; only less than 5% of these are thought to be curable. For this reason, it is indisputable how high the need for gene therapy methods is for individuals with rare diseases caused by genetic disorders that reduce their quality of life and shorten their lifespan. gene therapy; It is accepted as a technique that changes a part of a person's genetics to repair a defective gene in the genome of a person suffering from hereditary/familial rare diseases or to maintain their functional characteristics. With the revelation of the healthy human genome code in the early 2000s, the genetic disorders underlying many diseases came to light and the development of gene therapy methods to repair these damaged DNA sequences gained momentum. The gene therapy method, which can be defined as 'the ability to transfer synthetic gene copies that will replace mutated genes and fulfill their natural function to the target cells of the patient with viral or non-viral transfer methods', is very important in achieving single-shot therapy compared to drugs or alternative medicine treatments. It can be said to have an advantage. For this reason, pharmaceutical and biotechnology companies have focused their treatment research in recent years, especially on the field of gene therapy. With this presentation, you will be informed about the current gene therapy technologies and the approaches you can use for the rare disease you are targeting. Gene augmentation therapy, CRISPR gene editing, suicide gene (suicide gene), human artificial chromosome, and anti-sense oligonucleotide (ASO) based approaches will be discussed among genetic treatment approaches. At the same time, approaches used within the scope of currently approved genetic therapies, Luxturna (Retinitis Pigmentosa), Zolgensma and Spinraza (SMA), and other treatments will be examined in detail.

Keywords: CRISPR, Genetic Therapy, Virus, Recombinant Biology

ID: 03-IOP

Fast Al^{3+} Ion Diffusion in $W_{18}O_{49}$ Nanowires-Graphene Nanocomposite: Towards High-Performance Energy Storage Device

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Electrochemical energy storage systems, such as supercapacitors and batteries, are considered essential technologies that offer environmentally friendly and sustainable solutions to rapidly growing global energy demands. Supercapacitors have gained increasing attention in recent years thanks to their fast charge-discharge times, long-term cycle life, and high-power density. However, they have relatively low energy density, making them unsuitable for real-life applications. Graphene material is commonly used to provide a conductive network for electrochemical enhancement in supercapacitors application. It has a large surface area, high electrical conductivity and superior electrochemical stability, making it an ideal support material for nanocomposites. We designed an asymmetric supercapacitor (ASC) device to achieve high electrochemical performance based on W18O49 nanowires-graphene nanocomposite and graphene sheets as the negative and positive electrodes, respectively. The ASC device delivers a high energy density of 29.0 Wh kg^{-1} at a power density of 751 W kg^{-1}. It achieves excellent long-term stability with 97.0% capacitance retention at 12,000 cycles. The above satisfactory performance exhibits that mesoporous $W_{18}O_{49}$ nanowires on graphene sheets present great potential to meet ASC's energy/power characteristics in practical application. Besides, graphene material provides a powerful platform for $W_{18}O_{49}$ growth and enhances composites' electrochemical performance by accelerating Al^{3+} ions diffusion and charge transfer.

Keywords: Tungsten oxide; Graphene; Intercalation pseudocapacitance; Asymmetric supercapacitor; Energy density.

ID: 04-IOP

Rhizo-Microbiome for Sustenance of Agro-ecosystem

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Abiotic stress (drought, salinity, and heavy metal ions) is the major abiotic factor limiting crop production. Co-inoculating crops with nitrogen-fixing bacteria and plant growth-promoting rhizobacteria (PGPR) improves plant growth and increases drought tolerance in arid or semiarid areas. The co-inoculation of salinity and drought-stressed plants with PGPR improves the root and shoot growth, formation of nodules, and nitrogen fixation capacity in sunflowers, providing mineral nutrition to the plant. We report the usefulness of single inoculation and co-inoculation of various PGPR strains in plant growth promotion, mitigation of salinity and drought, and biocontrol of various fungal phytopathogens. PGPR cultures promoted plant growth and crop yield under salinity, drought, and heavy metal ion stress conditions and helped mitigate salt, water deficit, and heavy metal contamination. Their application resulted in more root and shoot length, chlorophyll content, and improved mineral nutrient uptake under these stress conditions. The study showed that co-inoculation with *B. japonicum* and *P. putida* gave more benefits to the nodulation and growth of plants than single inoculation. Co-inoculation with *B. japonicum* and *P. putida* significantly enhanced plant and soil nutrients and soil enzymes compared to control under every day and drought stress and salinity stress conditions. The synergistic use of *B. japonicum* USDA110 and *P. putida* NUU8 improves plant growth and nodulation of sunflowers and groundnut under drought and salinity stress conditions. Here, we report induction of the induced systemic resistance by six strains of rhizosphere fluorescent Pseudomonas possessing 2,4-DAPG antibiotic genes against fungal phytopathogen. *P. putida* NUU8 showed 76.5% inhibition of fungal pathogens. Challenge inoculation with fungal pathogens gave higher activity of peroxidase (PO), polyphenol oxidases (PPO), phenylalanine ammonia-lyase (PAL), and transcinnamic and caused induction of induced systemic resistance. These cultures also exhibited more antifungal activities against fungal pathogens than chemical fungicides such as Kitazine and tilt. The results suggested that these strains could be used to formulate a consortium of biofertilizers and biocontrol agents for sustainable sunflower production under drought-stressed field conditions.

Keywords: Abiotic stress; biocontrol; fungicide; PGPR; plant growth promotion

ID: 05-IOP

Impressions of A Biologist on the Turkish Antarctic Expedition

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Antarctica is one of the unique ecosystems that has the most extreme conditions known on earth. Therefore, it has become one of the most popular research centers of recent years with its unique biodiversity. In addition, the special mechanisms of adaptations developed by Antarctic communities that are adapted to living in this ecosystem has been increasing the curiosity of the biodiversity of this ecosystem [1-3].

In this regard, the present study was conducted to explore Antarctic biodiversity, valuable for astrobiology, cryobiology and biotechnology. For this aim, the field study was performed in Horseshoe Island during the 6th Turkish Antarctic Expedition (TAE-VI) in February 2022. For determination of microbial diversity, some water, soil and sediment samples were collected from the Horseshoe Island and aseptically transferred to research laboratories of Atatürk University for further investigations. Moreover, a great part of the biodiversity including phytoplankton, zooplankton, lichen, bird, and mammalian species were scientifically observed and their natural habitats were recorded.

With this study, the biodiversity of the Horseshoe Island was investigated and a significant information was added to the literature.

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ID: 06-IOP

Different Glass Technologies - develop a Shield Against Gamma Radiation for Different Applications

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Radiation can be found in the everyday environment of humans. Both natural and man-made sources can be a contributor to the production of radiation. Nuclear scientists and engineers have focused their study on determining what radiation is and how we may utilize it to our advantage while also protecting ourselves from the dangers it poses. Workers in the nuclear energy sector are held to the highest international safety standards, and these same requirements are used to safeguard the environment from radiation exposure. The goal of radiation protection is to safeguard human health, given that radiation exposure may be harmful to the tissues and organs of the body. Glass is often regarded to be one of the most potential material for use in radiation protection applications among all of the traditional shielding materials. This is because glass is a transparent material for visible light, which gives it its unique features. Glass also has other advantages. Glass is simple to produce at a cheap cost, possesses good optical qualities, and its density can be adjusted by the addition of heavy components. Glass may be used in a variety of applications. These characteristics influence the specifics of the technical applications that demand for the usage of glass in our life. In this work, we will focus on the basic types of radiation shielding glasses and their applications in different nuclear technologies.

ID: 07-IOP

Large Area Transparent Electrodes and Applications

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Transparent conductive electrodes (TCEs) such as Indium Tin Oxide (ITO), Indium Zinc Oxide (IZO), and Aluminum Zinc Oxide (AZO), due to their high optical transmittance and good electrical conductivity properties, as well as their stability in the air, they are widely used in many applications such as displays, smart windows, solar cells, photodetectors, electroluminescent devices, organic light emitting diodes (OLEDs) and *infrared* (IR) reflective coatings. ITO is the most widely used TCEs in commercial devices. However, recently, the increase in the cost of ITO coatings with the increase in indium prices and also the scarcity of indium reserves has led researchers to search for alternative conductive electrode materials with low cost, high optical transmittance, and electrical conductivity. Sometimes a single transparent conductive oxide (TCO) layer is not enough to provide the desired properties. One of the most effective ways to increase optical transmittance and electrical conductivity is to use sandwich-type structures such as dielectric/metal/dielectric (D/M/D) multilayer thin film electrodes. Among the multilayer thin film electrodes, the zinc tin oxide (ZTO or Zn_2SnO_4)/Ag/ZTO (ZAZ) layered structure is promising due to its low surface resistance and high optical transmittance in the visible region of the spectrum. In our studies, ZAZ electrodes were deposited on substrates such as glass, polycarbonate (PC), and acrylic (PMMA) in the form of flat surfaces. The large area magnetron sputtering system were used to coat PET substrates of 60 cm width using roll-to-roll magnetic sputtering system. ZAZ multilayer thin films grown on glass, PET, and PC substrates were found to have high optical transmittance and low surface resistance (~8 ohms/square). In addition, it has been determined that ZTO/Ag/ZTO multilayer thin films grown on polymer substrates improved optical transmittance by causing lower reflection due to the higher absorption originating from the Ag layer in the ZAZ structure. These results show that ZTO/Ag/ZTO multilayer thin films on any substrate can be a promising alternative to ITO thin films as optically transparent and conductive electrodes for various applications. In addition, as a result of electromagnetic designs, it was determined that ZAZ thin films coated on polymer surfaces showed Salisbury-type absorber properties, briefly low radar visibility, and electromagnetic wave shielding.

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ID: 08-IOP

Design and Fabrication of Heterojunction Photocatalysts for Green Energy and Chemistry

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One of the most important challenging problems of world is the extensive use of *i)* fossil fuels as primary energy source which emits CO_2 into the atmosphere and *ii)* unsustainable chemical transformation to produce variety of products to meet the requirements of human beings. To solve these two main problems, photocatalysis that utilizes the inexhaustible and free sunlight as the energy source is the key technology. Therefore, the development of visible light active photocatalysts with high efficiency, high photocatalytic activity and stability is highly demanded. Two basic features sought in such a photocatalyst are; i) high visible light absorption ability in a wide range of solar spectrum and ii) having a suitable and tunable band positions enabling different redox reactions. However, it is not possible to meet these two requirements with a single semiconductor. Therefore, the use of single-component photocatalysts is limited due to difficulties in finding suitable band positions and e^-*-h^+ recombination problems in photocatalytic applications. Therefore, the design of heterojunction photocatalysts in which at least two semiconductors with suitable band positions are combined to obtain superior photocatalytic properties can be considered as a promising solution [1]. Among all known semiconducting materials, graphic carbon nitride (gCN), a polymeric semiconductor, is of great interest owing to its easy preparation, high stability, low cost and visible light activity. However, bulk gCN synthesized by high temperature polycondensation has disadvantages such as low specific surface area, low quantum yield, and poor photoactivity [2]. On the other hand, black phosphorus (BP) with 2D folded honeycomb structure, which has been revalued with the development of its facile synthesis under relatively plausible conditions, has excellent optical, electrical, and thermal properties. In recent years, we have designed and fabricated gCN and/or BP based heterojunction photocatalysts for various energy and chemical transformations. In this talk, I will first talk about the fundamentals of semiconductor photocatalysis and heterojunction photocatalysts. Next, I will present the gCN and/or BP based hetereojunctions (7 examples) that my research group have developed in recent years for hydrogen generation from the chemical hydrogen storage materials and C-H arylation via photoredox C-H activation under visible light irradiation [3]. I believe that my talk will give insights to the participants about the design, fabrication, and application of heterojunction photocatalysts for the development of various sustainable energy and green chemical transformations. Thee financial support of TÜBİTAK for the synthesis and

photocatalytic applications of some of the photocatalysts in the context of 120Z622 project is highly acknowledged.

Keywords: Photocatalysis, Heterojunction photocatalysts, Graphitic carbon nitride, Black phosphorus, Hydrogen storage and production, Photoredox C-H activation.

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ID: 09-IOP

Machine Learning vs Deep Learning: Prospects and Applications in Natural Science

H. Okut

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The popularity of Artificial intelligence (AI), Machine learning (ML) and Deep learning (DL) in almost all areas of science have sharply risen in recent years. Despite their spike in popularity, the relationship of ML and DL algorithms to classical data analysis tools remains debated. ML includes algorithms that parse data, learn from that data, and then make generalizations to make informed decisions. DL is considered an evolution of machine learning. The DL algorithms use a programmable neural network that enables machines to make accurate decisions. The term ''deep" in DL refers to the number of hidden layers. Traditional neural networks (NNs) have 2-3 hidden layers. The flexibility in traditional NNs are achieved by the hidden layers in conjunction with the non-linear activation function: as a mimic of the human brain, a hidden neuron will only 'fire' if the accumulated signals of the previous layers surpass a certain threshold. They adaptively change the information received from layer to layer through a series of transformations. Each layer acts both as an input and output layer that allows the ANN to understand more complex objects. This structure allows ANNs to flexibly approximate practically any functional shape. On the other hand, the DL networks may have as many as two hundred layers for i) Identifying patterns including images, ii) making predictions and functional mapping, iii) making classification and clustering and, iv) learning sequence and tree structures in natural language processing. Prospects as applications of some DL algorithms such as Multilayer Artificial Neural Networks (MLNNs), Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs) and Long-Short Term Memory (LSTM) will be summarized during this presentation. MLP deep learning can easily be used for tabular datasets and classification prediction problems. CNN's are extremely powerful deep-learning approaches that can be used for image data (for features extraction, classification, and prediction) and for data that has a spatial relationship. On the other hand, the RNN and LSTM are the best for text data, speech data, and generative data. These DL algorithms emerged as an operative and scalable ANN model for several learning problems associated with sequential data. The advantage of LSTM over RNN is that LSTM overcomes the gradient vanishing problem in RNN which is an important issue in this type of NNs. Conclusions are i) Deep Learning has gained increasing attention in the Natural Sciences domain. Deep learning, unlike traditional machine learning and data mining algorithms, can produce extremely high-level data representations from enormous amounts of raw data. As a result, DL algorithms have provided an excellent solution to a variety of real-world problems, ii) Despite potential advantages, DL presents some difficulties with implementation; specifically, algorithms are prone to overfitting, iii) DL algorithms need

very large datasets for training, and these may not be available in all Natural Science data settings, iv) Despite the excellent predictive ability of DL, the interpretability of their results remain an important issue in the application and, v) CNNs in particular, appear as the most promising predictive tool for Natural Science Big Data. This could be due in part to the fact that convolutional filters may capture some functional sequence motifs.

Keywords: Machine Learning, Deep Learning, Deep Learning Algorithms

ID: 10-IOP

NeuroEngineering State of the Art and Challenges

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ID: 11-IOP

Flood Risk Assessment and Management in Slovakia

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Recent history has shown that extreme hydrological events as flood and droughts can create additional stress on water supplies essential for human and ecosystem health. Floods have caused immense economic and social losses, mainly as a result of unplanned urbanization, uncontrolled population density and not strictly inspected construction by authorities. The purpose of Directive 2007/60/EC is to establish a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods in the Community. The main aim of this presentation presents flood risk assessment and management in conditions of Slovak republic.

ID: 12-IOP

Proteomics As a Tool for Examining the Responses to Abiotic Stresses

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Stress can be defined as any environmental factor which adversely affects plant growth and development as well as crop quality and the final yield. Worldwide, the major abiotic stress factors including drought, high and low temperatures, heavy metals, and salinity lead to the major reductions in crop yield. The role of proteins in plant stress response is crucial since proteins are directly involved in shaping novel phenotype by adjustment of physiological traits to altered environment. Unlike genome which is a static structure inherited from parents and defining plant genotype, changes in plant transcriptome, proteome, and metabolome shape plant phenotype in response to both plant developmental and health stage as well as ambient environment. Proteins are directly involved in plant stress response both as structural proteins and also proteins involved in regulation of plant transcriptome and metabolome. Examining the effects of abiotic stresses on protein expression can be useful for gaining insight into the biomolecular mechanisms of toxicity and for identifying potential candidate stress-responsive protein markers. Plant stress proteomics is a dynamic discipline aimed at the study of plant proteome and protein biological functions in plants exposed to stress. The number of publications on plant proteome under stress has risen geometrically in the last years. This increase in proteomic studies is enabled by the advancements in high-throughput instrumentation techniques aimed at separation of complex protein mixtures and identification of the individual protein species as well as by advancements in genomics leading to publication of reference genome sequences for important crop species in recent years. The importance of protein functional studies following high-throughput proteome analyses is presented in a broader context of plant biology.

ID: 13-IOP

Natural Products as Versatile Regulators of Cell Signaling Pathways in Carcinogenesis and Metastasis

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Cancer is a complicated disease and scientists are working on the identification of natural products having maximum cancer inhibitory effects. Research over decades has unraveled myriad of cell signaling pathways. Apoptosis and autophagy have centralized roles in carcinogenesis and metastasis. Natural products mediated targeting of apoptosis and autophagy has remarkable potential.

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CHEMISTRY
ORAL PRESENTATIONS

ID: 146-COP

Conducted Methods in Lignocellulosic Biomass Extraction, Solvents and Their Usage Areas

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In recent years, the usage of lignocellulosic biomasses in food supplements has become popular. The studies about the development of reliable and short-term methods in the extraction of these active components in lignocellulosic biomasses and the usage of eco-friendly solvents have increased gradually. Traditional extraction methods take a long time and use a large amount of organic solvents. In addition, the damages of used organic solvents to environment are high considerably. Therefore, the requirement to technologies that are used solvents which reduce the extraction time, diminish the usage amount of organic solvents and which is also descrived as environment friendly "green chemistry" has been increasing day by day. Whereas the temperature, mass transport and solubility increase during pressurized liquid extraction (PLE), more matrix solubility is provided by decreasing the surface tensions and viscosities of the solvents and thus the yield increases by facilitating extraction. Supercritical fluids are in a structure between liquid and gas. They have zero surface tension like gases, low viscosity and high diffusion velocity for analytes, high resolving power and density like liquids. The ultrasonic-assisted extraction (UAE) method, which performes degradation in the cell wall of the plants by using ultrasonic waves and, provides the acquiring of bioactive components in a shorter time and with high productivity by expediting mass transport, is more advantageous than traditional extraction methods. Microwave-assisted extraction (MAE) method, which is preferred in the extraction of bioactive components, is advantageous compared to traditional methods due to low sample and solvent amounts, shorter heating time and high extraction yield. In addition, it is an eco-friendly extraction method owing to using of a small amount of solvent. In this review, novel extraction methods were examined and general application areas of these methods were introduced.

Keywords: Lignocellulosic biomass, Extraction, PLE, SFE, UAE, MAE

ID: 147-COP

Antioxidant and Antimicrobial Activities of Plant Extracts Obtained via Advanced Extraction Methods

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The usage of plants as drug is as old as history of humanity. Folk medicine initiated with the first person who applied the sap of a plant to the wound and saw that this application provided positive results. Nowadays, the tendency to natural herbal products is quite high in order to eliminate the damages caused by synthetic drugs. Many studies have been performed about the antioxidant and antimicrobial activities of plants used in different industries such as food, medicine and cosmetics, as well as beneficial results have been achieved. The studies demonstrate that plants have notably intense bioactive components in terms of antioxidant activity. Apart from the antioxidant activities of phenolic substances, it has been observed that they are also used in the treatment process of cancer and heart diseases. Plants with antimicrobial activity are used as anti-fungal, anti-helminthic, medical purpose and especially preservatives in foods. The extracts of plants that are effective with respect to antioxidant and antimicrobial activity can be obtained via different extraction methods. Conventional extraction methods, which have been used from past to present, have disadvantages such as low extract yield, degradation of some components as a result of high temperature, long extraction time and high energy consumption, and necessity for a large amount of sample and solvent that cause ecological pollution. Therefore, efficient extracts can be acquired in regard to bioactive components by using novel extraction methods. In this study, the researches about antioxidant and antimicrobial activities of plant extracts obtained through current extraction methods were examined and compiled.

Keywords: Novel extraction methods, Medicinal plants, Antioxidant, Antimicrobial

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Catalytic Use of Cobalt (II, III) Oxide Supported Platinum Nanoparticles

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Metal oxides have been extensively used to support metal nanoparticles (NPs). However, it is still a challenging issue to find the suitable metal oxide-metal NPs combination. Among the metal oxides, cobalt (II, III) oxide (Co_3O_4) is a promising alternative to stabilize metal NPs due to its reducible nature. In this work, platinum (Pt) nanoparticles were formed on the surface of Co_3O_4 and used as catalysts for the hydrogen generation from the hydrolysis of ammonia borane. The results show that Pt NPs with an average particle size of 3.6 nm provides a turnover frequency value of 4366 min^{-1} at room temperature for this reaction. In fact, platinum NPs on Co_3O_4 show higher activity as compared to Co_3O_4 supported rhodium, palladium and ruthenium NPs. Pt/Co_3O_4 catalyst provides also outstanding stability in hydrolytic dehydrogenation of ammonia borane. There is no catalytic activity loss even after the tenth use of the catalyst. The high activity and the stability of the catalyst can be ascribed to the favorable platinum-cobalt (II, III) oxide interaction, which was confirmed by X-ray photoelectron spectroscopy analysis.

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Preparation and Characterization of Bimetallic AgPd Nanoparticles Supported on WO₃

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Tungsten oxide, WO_{3-x}, based catalysts have attracted great interest in catalysis field. In fact, WO_{3-x} supported metal nanoparticles (NPs) were found to be very active catalysts in various reactions such as oxidation of alcohols and hydrogenation of aromatics. In this work, bimetallic AgPd NPs were successfully formed on the surface of tungsten oxide. The presence of metal NPs were confirmed by TEM, EDX, XPS analyses. The particle size of AgPd on WO_{3-x} was found in the range between 3.0 nm and 7.0 nm. The multiple oxidation states of W^{6+} and W^{5+} were observed by XPS analysis. The XRD analysis shows that there is no change in the framework of the tungsten oxide after the formation of AgPd NPs. The prepared $AgPd/WO_3$ catalyst was tested in dehydrogenation of formic acid at 50.0 ºC. The catalyst provides a turnover frequency value of 683 h^{-1} in hydrogen generation from the aqueous formic acid-sodium formate mixture. The high activity and the stability of $AgPd/WO_3$ catalyst can be attributed to the favorable metal-WO_{3-x} interaction.

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A Novel Thionine-Graphene Oxide Based Fluorescence Sensor to Detect Ascorbic Acid

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Abstract

A novel Thionine (TH)-Graphene oxide (GO) system was used to detect biomolecules/amino acids using absorption and fluorescence spectroscopy techniques. Firstly, TH-GO system at predetermined optimum conditions was prepared in aqueous solution [1]. Next, TH-GO system was separately investigated by absorption and fluorescence spectroscopy as a fluorescence sensor for sixteen different biomolecules/amino acids, respectively. Consequently, the TH-GO system was determined to be quenched with AA molecules selectively and sensitively. A detection limit (LOD) for AA was calculated as 5.70 μM. Furthermore, the selectivity of TH-GO for Ascorbic acid (AA) detection in the presence of interfering biomolecules/amino acids was investigated. The addition of the interfering molecules separately into the TH-GO system is determined to be caused no significant changes in its fluorescence spectra. Thus, it was proved to the TH-GO system could be used as a selective and sensitive "Turn-off" fluorescent sensor to detect AA.

Keywords: Thionine, Ascorbic acid, Graphene oxide, Fluorescence Sensor.

Introduction

Dye molecules have extensively studied applications of electronic, optoelectronic and fluorescence sensors due to their low cost and easy control of optical properties. Thionine (TH), which is a positively charged metachromatic dye compound. It is easily soluble in water and ethanol. TH in a small and planar structure has symmetrical -NH_2 groups on both sides (Fig. 1). TH dyes can interact with anionic structures with an electron donor site centred at the sulphur atom and can be subject to molecular aggregation [1, 2].
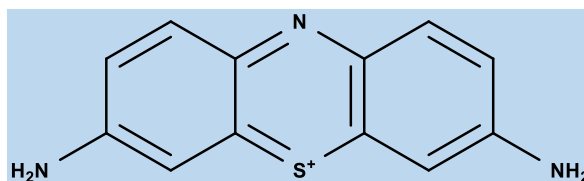
Figure 1. Molecular structure of Thionine dye

Graphene, which is a popular material in recent years, draws a lot of attention due to many applications including drug carriers, adsorption processes, sensors, energy storage, Li-ion batteries, supercapacitors, solar cells, and optoelectronic devices.

Graphene oxide is one of the most important derivatives of graphene, and the sizes of its layers can vary from a few nm to mm. GO is the oxidized form of graphene containing many oxygenated functional groups. GO is a single atomic layer material that is cheap and abundant, produced by the strong oxidation of graphite. Graphene oxide is an oxidized form of graphene bound by oxygen-containing groups (epoxy, hydroxyl, carbonyl, and carboxyl) (Fig. 2). Due to the oxygen-containing groups, GO can be functionalized by covalent and non-covalent, and its properties are tuned .
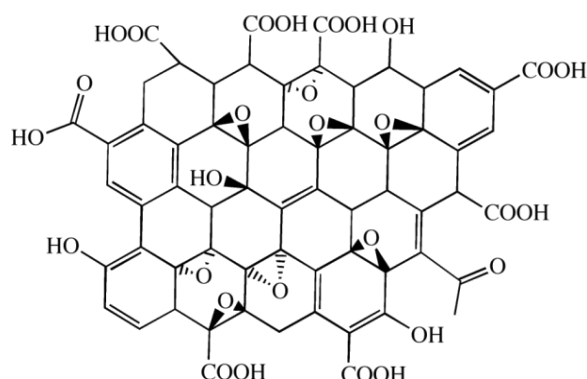
Figure 2. Molecular structure of GO

There are many routes in which GO can be functionalized depending on the desired application. GO can also easily interact with cationic dyes thanks to strong π-π and electrostatic interactions. The dye-GO nanocomposites can be readily prepared by noncovalent functionalization. The nanocomposites are used in optoelectronics, biodevices, or drug delivery material. Since there are many active anionic functional groups in graphene oxide, it can easily interact with cationic dyes [3-5].

Ascorbic acid (AA) which has a key role in biological functions is one of the most important antioxidants protecting our body by preventing their oxidation reactions with ROS. AA ensures that their crucial functions in living organisms continue in a balanced way. AA deficiency could lead to numerous diseases such as scurvy, cancer, neurological function and cardiovascular diseases while AA overloading does not cause to any side effects since it excretes from the body with sweat and urine. In addition, AA is used in the treatment of many diseases such as colds, mental illness, infertility and certain kind of cancer [6-8]. So, it is required to development of fast, facile, selective and sensitive sensors for determining AA. Fluorescence sensors compared to other methods have many advantages such as rapidity, easy applicability, cheapness, precision, selectivity, etc.
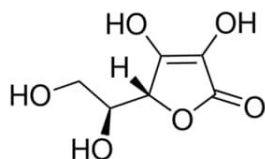
Figure 3. Molecular structure of AA

In this study, the TH-GO system was used for the first time to detect AA as a fluorescence sensor. Firstly, GO was synthesized according to the Modified Hummers' method. Dispersion of synthesized GO was prepared. The optimal conditions for TH-GO system in aqueous solution as a fluorescence sensor were determined in a previous study (TH=10 µM, GO=64 µg/ml) [9]. The TH-GO system was studied as a fluorescence sensor for amino acids/bio molecules by absorption and fluorescence spectroscopies. As a result of spectroscopic data, it was determined that TH-GO are quenched with AA molecules. Then, it was calculated a detection limit (LOD) for AA in the TH-GO system. In addition, interference experiments were carried out in the presence of other amino acids/biomolecules for the determination of ascorbic acid in the TH-GO system.

Materials and Methods

Materials: It was purchased L-Cysteine (Cys), L-Lysine (Lys), DL-Proline (Pro), Ascorbic acid (AA), Glucose (Glu), Glycine (Gly) from Sigma Aldrich; L-serine (Ser), L-alanine (Ala) from BLD Pharm; L-Valine (Val), L-Methionine (Met), L-Threonine (Thr), and L-Arginine (Arg) from Carl Roth; L-Leucine (Leu) and L-Isoleucine (Ile) from TCI; Glutathione (GSH) from Bioshop and L-(+)-Aspartic acid (Asp A) from Acros Organics.

Devices: UV-Vis. absorption and fluorescence spectra at room temperature were taken by a Perkin-Elmer (Model Lambda 35) spectrophotometer and a Shimadzu RF-5301 PC spectrofluorophotometer, respectively.

Preparation of GO dispersion: According to the modified Hummers method, GO were obtained and its procedure is given elsewhere [3, 5]. GO dispersion in distilled water (1mg/ml) was prepared by a sonication. GO dispersions in various concentrations were prepared by diluting this dispersion with pure water.

Preparation of dye: The stock solution of TH (1×10^{-3} M) was prepared in an ethanol. Samples were prepared by dilution from the stock solution. The ethanol was evaporated with Argon gas before dilution.

TH-GO based detection: To prepare a TH solution of 10 µM, a certain amount was taken from the stock solution and the solvent was removed with nitrogen gas. Next, the GO dispersion was added to have a concentration of 64 µg/ml in the TH-GO system. Then, biomolecules/aminoacids solution ($1*10^{-2}$ M) were added into each TH-GO system, separately. As-prepared solutions were properly mixed and their fluorescence and absorption spectra were immediately recorded at room temperature.

Methods:

The quenching efficiency is analyzed by the Stern–Volmer equation;

$$\frac{F_0}{F} = 1 + K_{SV}[Q]$$

Where; K_{SV} is the Stern–Volmer quenching constant, [Q] is the concentration of AA, and F_0 and F are the fluorescence intensity in the absence and presence of AA, respectively. As a result of the data, the limit of detection (LOD) values for AA of the fluorescent probe were determined.

Results and Discussions

The fluorescence and absorbance responses of the TH-GO (TH@GO) solution were investigated in the presence of 16 different amino acids/biomolecules to detect the selectivity of the TH-GO. In Fig. 4a, it indicated that AA molecules quenched the fluorescence intensity of TH-GO, while other biomolecules/amino acids caused little or no quenching effects.

The TH-GO are potentially used as a fluorescence sensor for determination of AA. As presented in Fig. 5a, the fluorescence intensity of the TH-GO was almost totally quenched when the AA concentration reached to 0.790 mM. Furthermore, the absorption spectra of these solutions are seen in Fig. 5b. When the AA concentration in TH-GO solutions is increased, the absorption intensity of these solutions is proportionally decreased.
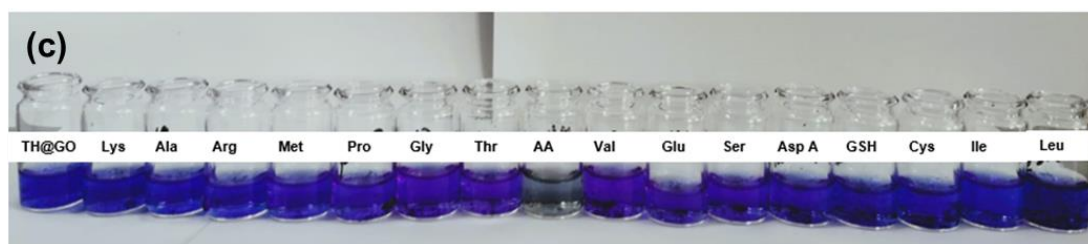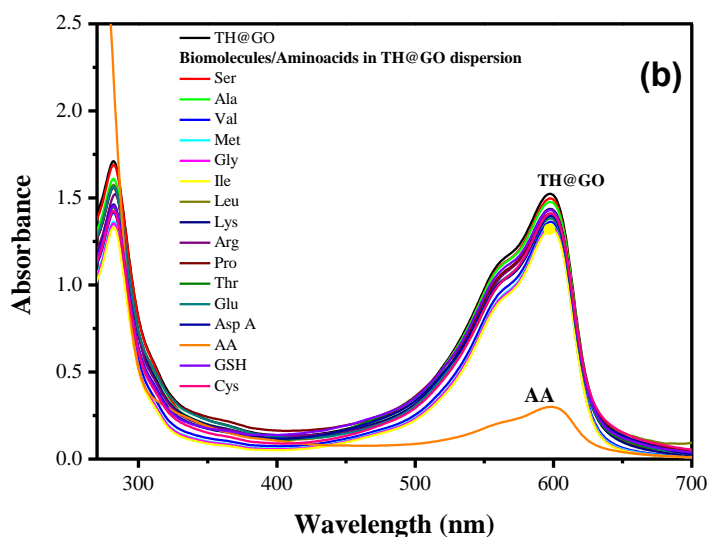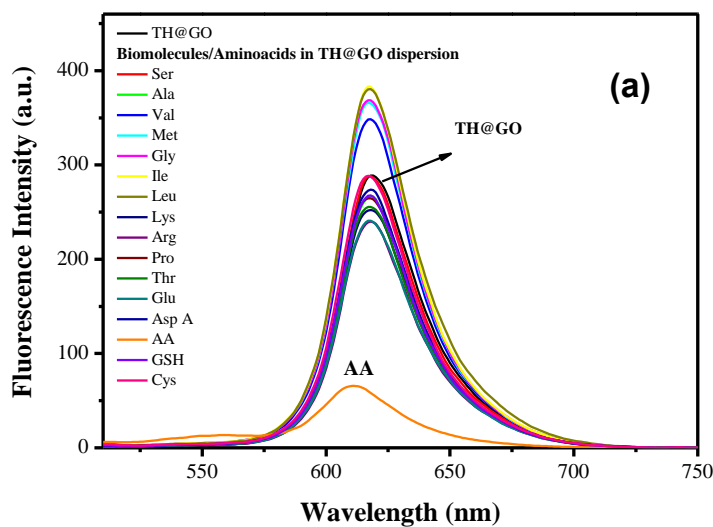
Figure 4. (a) The fluorescence spectra at excitation wavelength of 500 nm, **(b)** the absorption spectra and **(c)** a photograph seen with the naked eye for TH-GO system in the absence and presence of various biomolecules/aminoacids (0.666 mM) ([TH]=10 μM and [GO]=64 μg/mL)
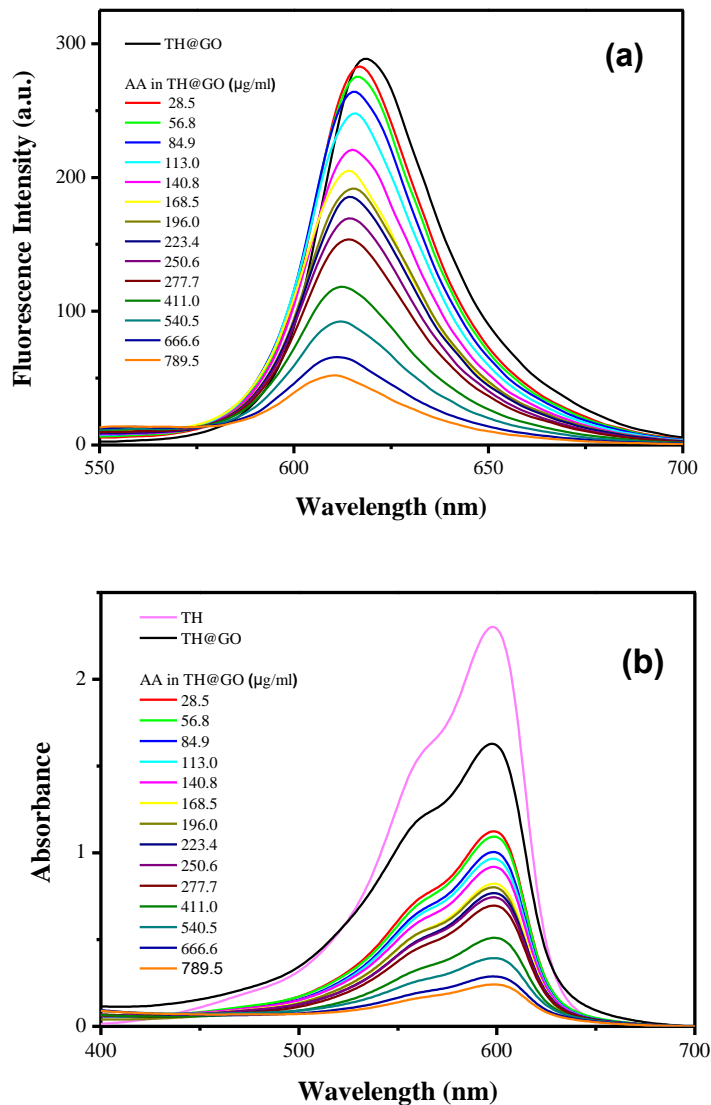
Figure 5. (a) The fluorescence spectra and (b) the absorption spectra including AA various concentrations in the range of 28.5 µM to 789.5 µM in TH-GO dispersions. ([TH]= 10 µM, [GO]= 64 µg/mL, λ_{exc}=500 nm).

The sensitivity of the TH-GO was evaluated by fluorescence measurements, which were taken in different concentrations of AA in TH-GO solution. According to the measurement results, the plot of F_0/F versus AA various concentrations in the range of 28.5 µM to 789.5 µM is seen in Fig. 6a. This plot is not linear. It was redrawn in a linear concentration range (Fig. 6b).
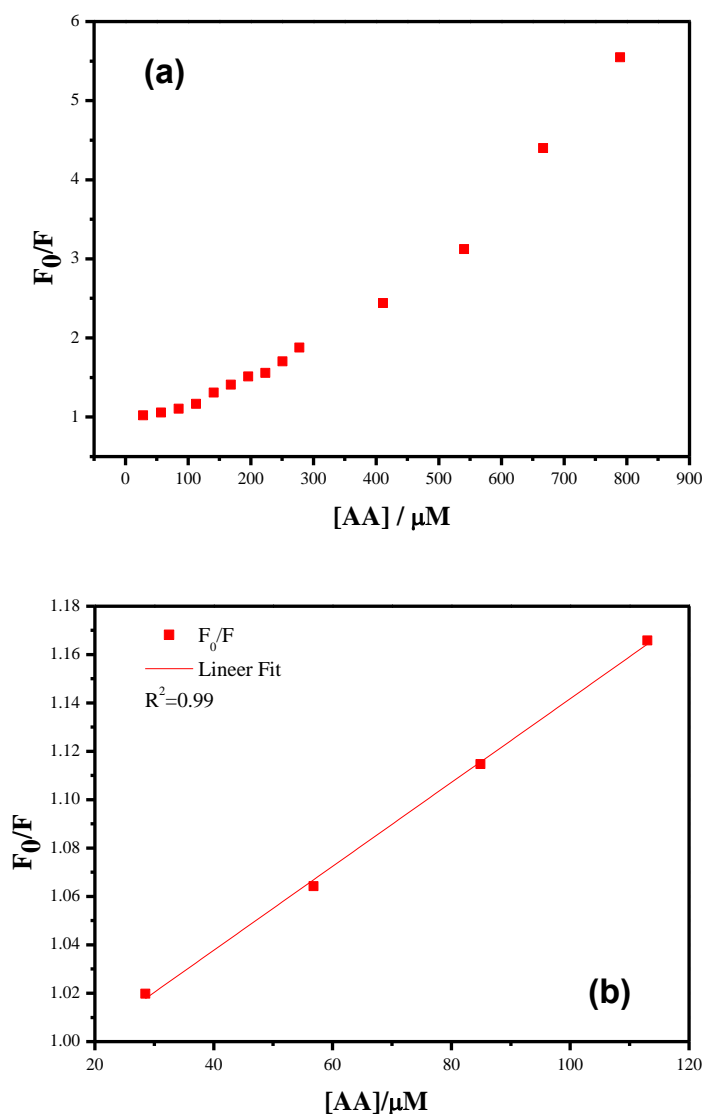
Figure 6. Plot of F_0/F versus AA various concentrations in the range of **(a)** 28.5 µM to 789.5 µM and (b) 28.5 µM to 113.0 µM.

The fluorescence intensity of TH-GO is sensitively and linearly decreased when AA molecules are gradually added to the TH-GO solution. LOD was calculated by using Fig. 6b and 3s/k equation, where k is slope and s is the standard deviation. LOD for AA was found to be 5.70 µM.

The selectivity of the TH-GO system for AA detection in the presence of competing biomolecules/amino acids was investigated. The competitive effects of these biomolecules/amino acids are given in Fig. 7. As seen in Fig. 7, the presence of the other fifteen molecules hardly affected the determination of AA in the TH-GO system. Thus, it is seen that AA in the TH-GO system is determined independently from these molecules.
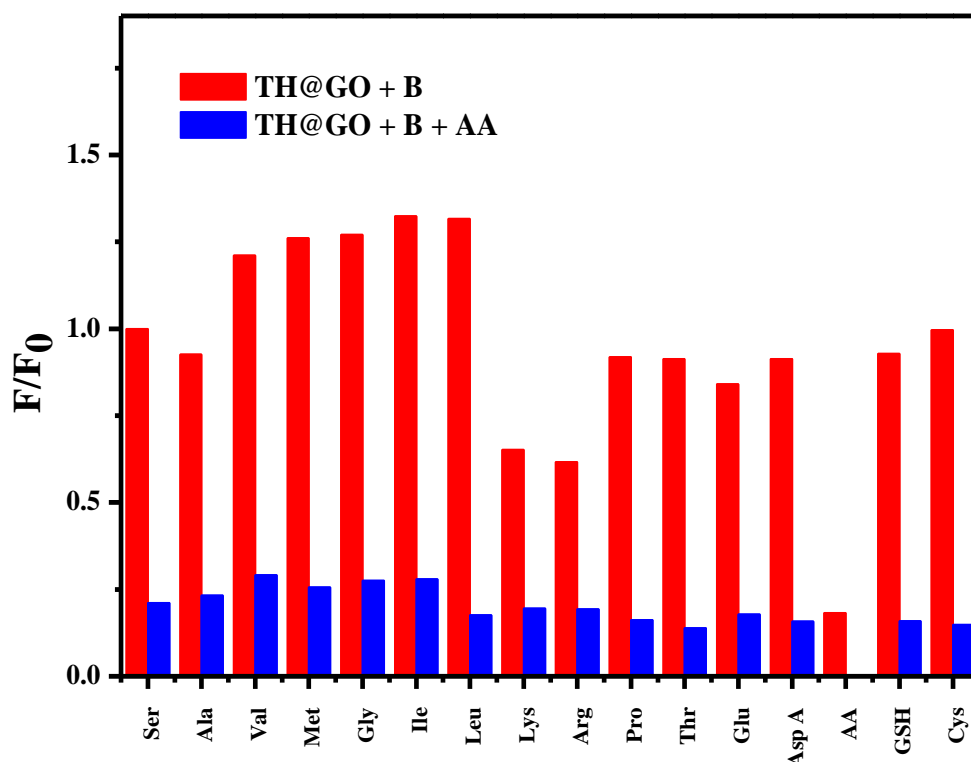
Figure 7. (a) Histograms of F/F_0, where F_0 and F are the fluorescence intensities of the TH-GO toward the various amino acids/biomolecules (B) in the absence and presence of AA molecules. ([TH]= 10μM, [GO]= 64 μg/mL, λ_{exc}=500 nm).

Conclusions

The selectivity of TH-GO dye system is investigated in presence of various biomolecules/amino acids by using UV-Vis. absorption and fluorescence spectroscopy techniques. The spectroscopic results reveal that the absorption and fluorescence properties of TH-GO are effectively quenched its interaction with AA in aqueous dispersion. The sensitivity of the TH-GO was evaluated by fluorescence measurements, which were taken in different concentrations of AA in TH-GO solution and the Stern-Volmer graph is plotted. The calculated LOD for AA from this graph was found to be 5.70 μM. Furthermore, interference experiments were performed and showed that TH-GO could be used to detect AA as a fluorescence sensor independently of 15 other competing molecules. Also, the color of TH-GO in the visible region has changed significantly in presence of AA. In summary, this novel "turn-off" fluorescent sensor to detect AA suggests a quite promising and unique alternative because of the many advantages including low cost, rapidity, easy applicability, high sensitivity and selectivity.

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ID: 212-COP

Anticancer Potentials of Ag(I)-HNP on MDA-MB-231 Cells

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The design of improved silver(I) complexes as antitumour agents occupies a significant place in cancer chemotherapy, as revealed from their remarkable therapeutic potential reflected in recent research reports [1]. Since the efficiency of Schiff bases as therapeutic agents is known, it is designed to increase the efficiency of Schiff bases with the silver complex. In this study, N,N'-bis(2-hydroxynaphthylmethylidene)-1,3-propanediamine (HNP) [2] as a schiff base and its Ag(I) complex were synthesized. Their the potential anticancer abilities on TNBC cells (MDA-MB-231) were compared to healthy mammary cells. Antiproliferative effects of the compounds were assessed by MTT and colony forming assays, and apoptotic induction was evaluated by ELISA method. Our findings showed that, Ag(I)-HNP had higher antiproliferative properties compare to HNP against MDA-MB-231 cells, and cancer cells (IC_{50}: 11.7 µg/mL) were affected more than healthy cells (IC_{50}: 74.5 µg/mL). Caspase 8 is a key initiator of death receptor-dependent apoptosis [3]. Besides that, the active caspase 8 levels were found to be elevated approximately 5-fold in treated cancer cells in comparison with untreated cells. According to the results, it can be debated that HNP and its Ag(I) complex have anticancer potential due to their strong antiproliferative and apoptotic effects against the drug-resistant and aggressive breast cancer cells.

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Evaluation of Cytotoxic And Apoptotic Effects of Cu(DPSA) On Breast Cancer Cells In Vitro

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Breast cancer is the most common malignant disease and second leading cause of death in women worldwide. The most lethal type of breast cancer is triple-negative (TNBC) subtype owing to aggressive nature [1]. In this study, it was aimed to evaluate the potential cytotoxic and apoptotic properties of Cu(DPSA) (DP= 1,3 diaminopropane, SA= Salicylaldehyde Cu= Copper) against TNBC cell line (MDA-MB-231) in comparison with healthy mammary epithelial cell line (CRL4010) in vitro.

Firstly, DPSA and its Cu (II) complex [Cu(DPSA)] were synthesized according to related publication [2]. The cytotoxic and cell survival effects were confirmed by MTT and colony forming assay, and apoptotic effects were evaluated by ELISA. DPSA and its Cu (II) complex showed a time-dependent cytotoxicity with increasing concentrations (0-100 µM) on the MDA-MB-231 cells. According to the results, the Cu (II) complex showed higher toxicity than DPSA and MDA-MB-231 cancer cells (IC50: 1.94 µg/mL) were more affected than healthy mammary cells (IC50: 4,7 µg/mL,). In addition, the compounds induced apoptosis through approximately 5-fold increased caspase-8 activation compared to control. Its well known that, caspase-8 is one of the main initiators of extrinsic apoptotic pathway [3]. Based on this result, we concluded that compounds hamper cell viability and induce apoptosis of TNBC cell line.

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Synthesis and Structure Elucidation of Potential Bioactive Some Novel Triterpene-Triazole-Arylidenehydrazide Hybrid Compounds

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Terpenes are some of the secondary metabolites that constitute very important defence mechanisms of plants. They are sub-classified into monoterpene, sesquiterpene, diterpene, sesterterpen and triterpenes. Many biological activities are known of α-amyrin, uvaol, ursolic acid, β-amyrin, erythrodiol, oleanolic acid as well as betulinic acid and lupeol [1]. Similar to triterpenes, triazoles and arylidenehydrazides have a lot of different biological activities [2].

In this study, potential bioactive 5 new hybrid compounds were synthesized starting from natural compound ursolic acid (UA) and their structures were elucidated NMR and HRMS techniques. Initially, C3-OH group of UA was converted to methoxy and the hybrid compounds were synthesized in six steps using 5 different aromatic aldehydes (Scheme 1).
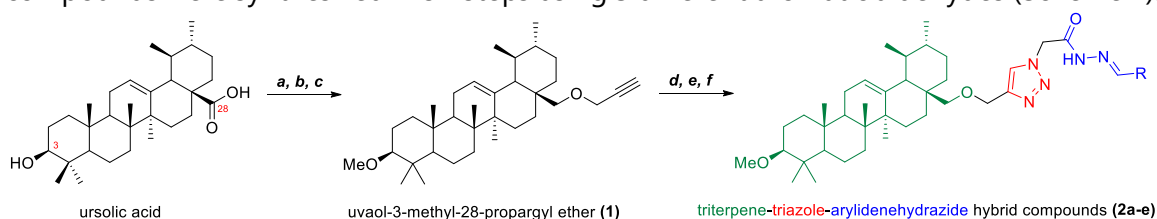
*Reagents and conditions: **a)** NaH, MeI, THF, N_2, Reflux; **b)** $LiAlH_4$, THF, N_2, Reflux; **c)** NaH, Propargyl Bromide, THF, N_2, Reflux; **d)** ethyl-2-azidoacetate, $Cu_2SO_4.5H_2O$, Sodium L-Ascorbat, THF-H_2O, Reflux; **e)** $NH_2NH_2.H_2O$, AcOH, MeCN, Reflux; **f)** RCHO, AcOH, MeCN-$CHCl_3$, Reflux*
***R: 2a**= phenyl, **2b**= 4-methylphenyl, **2c**= 4-chlorophenyl, **2d**= 4-nitrophenyl, **2e**= 4-methoxyphenyl*

Scheme 1: Synthesis of hybrid compounds starting from ursolic acid

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ID: 225-COP

Synthesis of New Hydrazide-Hydrazone Derivatives of Salicylic Acid as Potential Anti-Inflammatory Agents

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Today, due to the low bioavailability and side effects such as toxicity of many drugs used against cancer and other microorganisms, medical professionals require new and potent drugs in the treatment. Although increasing number of new anticancer, anti-inflammatory and antibiotic drugs are being developed day by day there is a significant need for the discovery of new, potent and selective agents to destroy or at least inhibit the proliferation of tumor cells or microorganisms. It is clearly stated that in the literature the hydrazide-hydrazone compounds have various biological activity such as anti-cancer, anti-inflammatory, anti-microbial, anti-viral, etc. [1].

In this study, starting from salicylic acid, 6 new hydrazide-hydrazone derivatives were synthesized as potential anti-inflammatory agents. Initially, OH group of salicylic acid was converted to n-butoxy and the target compounds were synthesized in four steps using 6 different aromatic aldehydes especially bearing one or more OH groups (Scheme 1). All the synthesized compounds were well characterized by NMR and HRMS techniques.

R:
a: phenyl
b: 4-hydroxyphenyl
c: 2,4-dihydoxyphenyl
d: 2,5-dihdroxphenyl
e: 3,4-dihydoxyphenyl
f: 4-hydroxy-3-methoxyphenyl
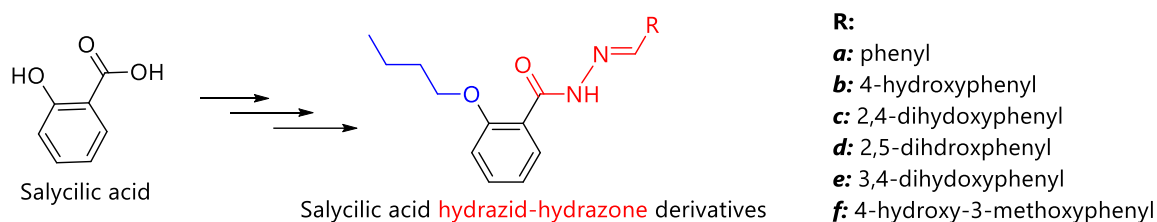
Scheme 1: Synthesis of arylidene-hydrazid derivatives of salicylic acid

References

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ID: 238-COP

Synthesis, Characterization And Metal Sensor Properties Of 2,5-Bis(N-[2-[(2-Hydroxyethyl)Amino]Ethyl]Acetamide) Thiazolo[5,4-D]Thiazole

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Various neutral and ionic species are widely used in physiology, medical diagnostics, catalysis and environmental chemistry. Since cations and anions are common both in heavy industry and in areas such as agriculture and the environment, chemosensors to detect them are starting to find many applications. The colorimetric chemosensing technique is a promising technique that enables the qualitative and quantitative detection of medically and environmentally important ionic or neutral species without any advanced instrumentation. As a test kit for in situ detection, short-term detection, simplicity, high selectivity and sensitivity combined with reversibility. Its use does not require any preprocessing for sampling and manual expertise, it is a desirable technique among researchers [1]. Thiazolothiazole compounds constitute an important class of contiguous ring aromatic species formed by the combination of two thiazole rings from carbon atoms [2-3]. In this study, the synthesis characterization and metal sensor properties of the 2,5-bis(N-[2-[(2-hydroxyethyl)amino]ethyl]acetamide) thiazolo[5,4-d]thiazole derivative compound were investigated. As a result of the spectrophotometric studies, it was determined that the compound showed selectivity against the Cr^{3+} cation.

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The First Synthesis of Benzamide Derivatives Via Transamidation

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Benzamide (**1**) is known as benzoic acid amide or benzoylamine. Many synthetic benzamide derivatives have been clinically tested for a long time, alone or in combination with other drugs, in different treatments [1]. Commercially used drug substances include antipsychotic Remoxipride (**2**), Sultoprid (**3**), antiemetic Amisulpride (**4**), gastroprokinetic effect Cisaprid (**5**), a chemotherapeutic Imatinib (**6**), and Procainamide (**7**) as an antiarrhythmic agent [2].
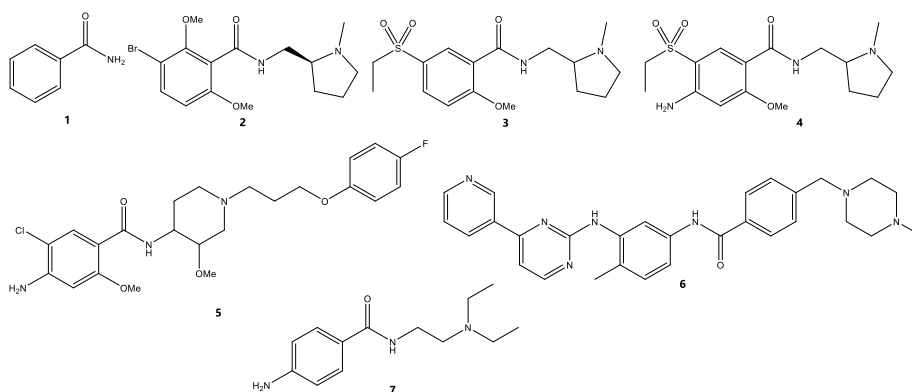
Here in, the first synthesized of 2-bromo-N-(tert-butyl)-4,6-dimethoxybenzamide (**9**) and 2-bromo-N-ethyl-4,6-dimethoxybenzamide (**10**) derivatives were performed starting from 2-bromo-4,6-dimethoxybenzamide (**8**) by using transamidation reaction.
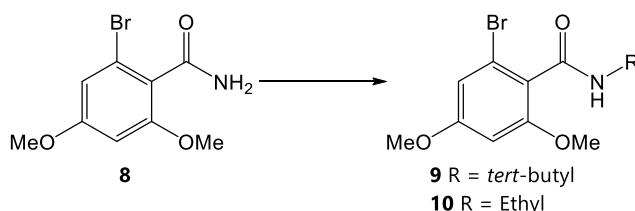
9 R = *tert*-butyl
10 R = Ethyl

Acknowledgement

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PHYSICS & NANOTECHNOLOGY ORAL PRESENTATIONS

ID:128-POP

Albedo numbers of Ag$_{72}$Cu$_{28}$ alloy Etched by Hydrofluoric Acid

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Abstract

In this work we studied the albedo numbers change of Ag$_{72}$Cu$_{28}$ alloy after etching in hydrofluoric acid (HF). As samples four groups of Ag$_{72}$Cu$_{28}$ alloy were prepared the first group is control group, second group was immersed at 25°C in 10% HF for 1, 2, 3, 6 and 14 h, third was immersed at 25°C in 40% HF for 1, 2, 3, 6 and 14 h and the fourth group was immersed at 80°C in 40% HF for 15, 30, 45 and 60 min. All the HF-etched Ag$_{72}$Cu$_{28}$ alloy samples were evaluated under EDXRF system with HPGe detector. The albedo numbers $\left(A_N\right)$ are determined using 59.54 keV energy emitted from ^{241}Am radioactive source. It was observed that the surface scattering and albedo numbers change with increasing the time of immersion and with high temperature of etching solution.

Keywords: Albedo number, Ag$_{72}$Cu$_{28}$ alloy, HF etching, Surface scattering.

Introduction

Bimetallic alloys such as Ag-Cu, Cu-Zn and Ag-Au attracts a growing interest in scientific studies. Bimetallic alloys have different physical, optical, magnetic and chemical properties and interesting scientific results can be obtained in materials containing two types of atoms. Zinc, silver and copper are the most popular member elements of the bimetallic alloy studies [1].

Gamma radiations are known as an uncharged flows of photons. The photons would be absorbed or scattered during the interaction of gamma radiation with material [2]. Scattering is one of the phenomena of interaction of electromagnetic radiation with matter. According to the energy of scattered photons there are two groups of scattering they are elastic and inelastic scattering. These scattering actions are also known as coherent and incoherent scattering. Coherent scattering is typically utilized in the equivalent sense of elastic or Rayleigh scattering. It is more observable in low radiation energies and elements which have high atomic number. If there is a difference between

the incident and scattered photons that come from the scattering, this kind of scattering is called incoherent scattering [3].

The backward scattering of gamma radiation from the surface of material is called backscattering (or reflection) of gamma radiation. Understanding the physical process of gamma ray transmission and reflection in material is of fundamental importance in calculation of the dose of gamma radiation, shielding of gamma radiation, designation of gamma ray detector and the nondestructive analysis of materials with gamma radiation [4]. To investigate the reflection at the interfaces one of the useful methods is the determination of the albedo factors. Reflectivity or reflecting power of a surface is called albedo. Albedo depends on the structure of a surface (roughness, flatness, etc.) color, area and thickness of material the spectral distribution of incident radiation (intensity, energy) and atomic properties.

The materials which reflect more electromagnetic radiation in various part of electromagnetic spectrum have a high albedo. Some materials reflect a very small part of electromagnetic radiation falling on it, but absorb more radiation, the albedo of such materials are low. Albedo has no specific unit, but we can define it in two ways. First way to express the value of albedo is percentage, second way, the range of albedo value is from 0 to 1. With respect to the first definition, the albedo of the materials which reflect all light falling on it is defined as 100% the albedo of the material that does not reflects is 0% and the albedo of material that reflects half of light is 50%. According to the second definition 0, 50 and 100 numbers can be replaced by 0, 0.5 and 1 respectively. Albedo factors are described as number albedo, dose albedo and energy albedo [5]. The ratio of the total number of backscattered photons to the total number of photons falling on the material is number albedo. Energy albedo is defined as the fraction of incident energy that escapes the target. Also, energy and albedo number can be used for calculating the dose albedo [6]. As far as the importance of albedo factors is concerned, it can be widely used in different studies, for instance, albedo factors can be used for environmental research [7], nuclear reactor [8], astronomy [9] and radiation protection dosimetry [10].

A lot of studies have been done about reflection of photons and albedo factors. Dependence of albedo factors on mean atomic number was studied by T. Akkuş et al., in their study, dependence of albedo factors on mean atomic number determined by using 662 keV gamma rays emitted from ^{137}Cs radioactive source for 180° scattering angle [6]. Albedo factors of 279, 320, 511 and 662 keV backscattered gamma photons was studied by A. D. Sabharwal et al., they obtained that the number and energy albedos increase with an increase in the target thickness and saturate at the saturation thickness of multiply-backscattered photons [4]. They also obtained that the energy albedos are decrease with the increase in the incident gamma-ray energy. Albedo factors of rare-earth oxides were studied by T. Ahmet, in this study 59.54 keV energy was used in 160° scattering angle [3]. This work shows that the albedo factors change with the increasing atomic number of target. With same incoming radiation energy and scattering angle, the reverse Compton scattering effect and changing of scattering centers cause the decrease in albedo factors. The effect of sample thickness on albedo factors were studied by D. Yılmaz et al., the

investigation of albedo factor was for 59.54 keV and 662 keV energy [11]. Albedo factors measurement was done by using Germanium (HPGe) detector which operated at a180° scattering angle.

Intermetallic compounds have complex and rigid structures, they can be used for the improvement of new substance systems. Bimetallic alloys of Ag and Cu are of extreme technological significance [12]. They can be used for different purposes. Bimetallic alloys have dissimilar catalytic, optical, surface, electric and magnetic properties [13].

In this study were determined the roughness created by hydrofluoric acid on the alloy surface by photon scattering. Albedo numbers change of $Ag_{72}Cu_{28}$ alloy were studied depend on immersion times and etching solution temperatures.

Approaches for calculating the albedo factors

Theoretical approach

In experiments the albedo is often described with a thin beam of gamma radiation, without considering build-up factors as they are insignificant in a narrow beam geometry. The albedo number is given as follow [4].

$$A_N = 2\pi \int_0^{\pi/2} \int_0^E N(\theta, E') sin\theta \, d\theta dE' \qquad (1)$$

In above equation $N(\theta, E')$ being the number of scattered photons at an angle θ relative to the incident beam direction. Albedo energy can be calculated by the following equation.

$$A_E = \frac{2\pi}{E} \int_0^{\pi/2} \int_0^E N(\theta, E')E' \, sin\theta \, d\theta dE' \qquad (2)$$

The numbers of reflected photons are always smaller than the number of incoming photons at a specific reflected angle due to the absorption of gamma radiation; therefore, the values of albedo number and energy albedo are always smaller than unity [4].

Experimental approach

A precise measurement of albedo can be determined by using a well-designed geometry. For a scattering medium where gamma photons are not absorbed, the sum of number and energy albedos will be unity. The source activity will provide the amount of radiation released by the source in unit time. The number albedo (A_N) is the simplest of these albedos which is the ratio of the total number of backscattered photons to the total number of photons falling on the target [4]. Number albedo is given by the following equation [14].

$$A_N = \left[\frac{N_{Comp}/N_{\varepsilon(E_{Comp})}}{N_{Coh}/N_{\varepsilon(E_{Coh})}(1/d\Omega)(1/2)} \right] \qquad (3)$$

In this equation N_{Comp} and N_{Coh} show the number of events recorded under the Compton and Coherent peaks, respectively. $\varepsilon(E_{Comp})$ and $\varepsilon(E_{Coh})$ factors are photo peak efficiencies of HPGe detector for Compton and coherent peaks, respectively. HPGe photo peak efficiency was described by determining the K X-ray yields from spectroscopically some pure targets. $d\Omega$ in above equation is the solid angle. 1/2 in the above equation indicates that half of the gamma radiation emitted by the source are incident on the target [6].

Experimental setup and measurement

Acquisition system

This study was done in Prof. Dr. Wolf Weyrich High Energy Spectroscopy laboratory at Atatürk University, Erzurum, Turkey. The experimental setup of this study is shown in Figure 1.
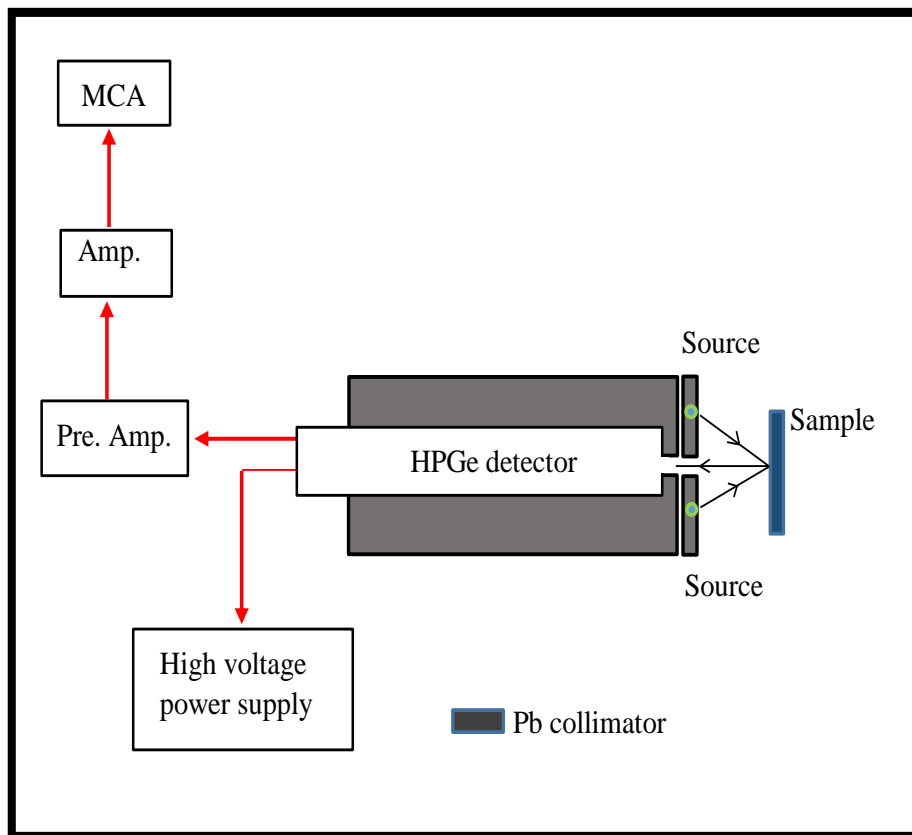
Figure 1. Experimental geometry

A lead collimator with circular aperture having a diameter of 0.5 cm, a length of 6.6 cm and a wall thickness of 1.8 cm was used for protecting the detector from being directly exposed to radiation from the radioactive source and environment. Samples were excited by 59.54 keV gamma radiation emitted from [241]Am (intensity of 5 Ci) radioactive source. HPGe detector with 182 eV at 5.9 keV resolution was used to detect the scattered gamma

radiation from all the samples. The radiations were scattered under 168° angle. The XRF spectra of the alloy samples were recorded for 7200 s. Also, background spectra for the same period of time were subtracted from each measurement. MAESTRO program was used for data analyze.

The thickness of $Ag_{72}Cu_{28}$ foil alloy (Sigma Aldrich) was 0.25 mm. The sample with radius of 0.65 cm were cut from the foil alloy. Four groups of $Ag_{72}Cu_{28}$ alloy were prepared the first group is control group, second group was immersed at 25°C in 10% HF for 1, 2, 3, 6 and 14 h third was immersed at 25°C in 40% HF for 1, 2, 3, 6 and 14 h and the fourth group was immersed at 80°C in 40% HF for 15, 30, 45 and 60 min. The experimental obtained XRF spectra of $Ag_{72}Cu_{28}$ are shown in Figure 2.
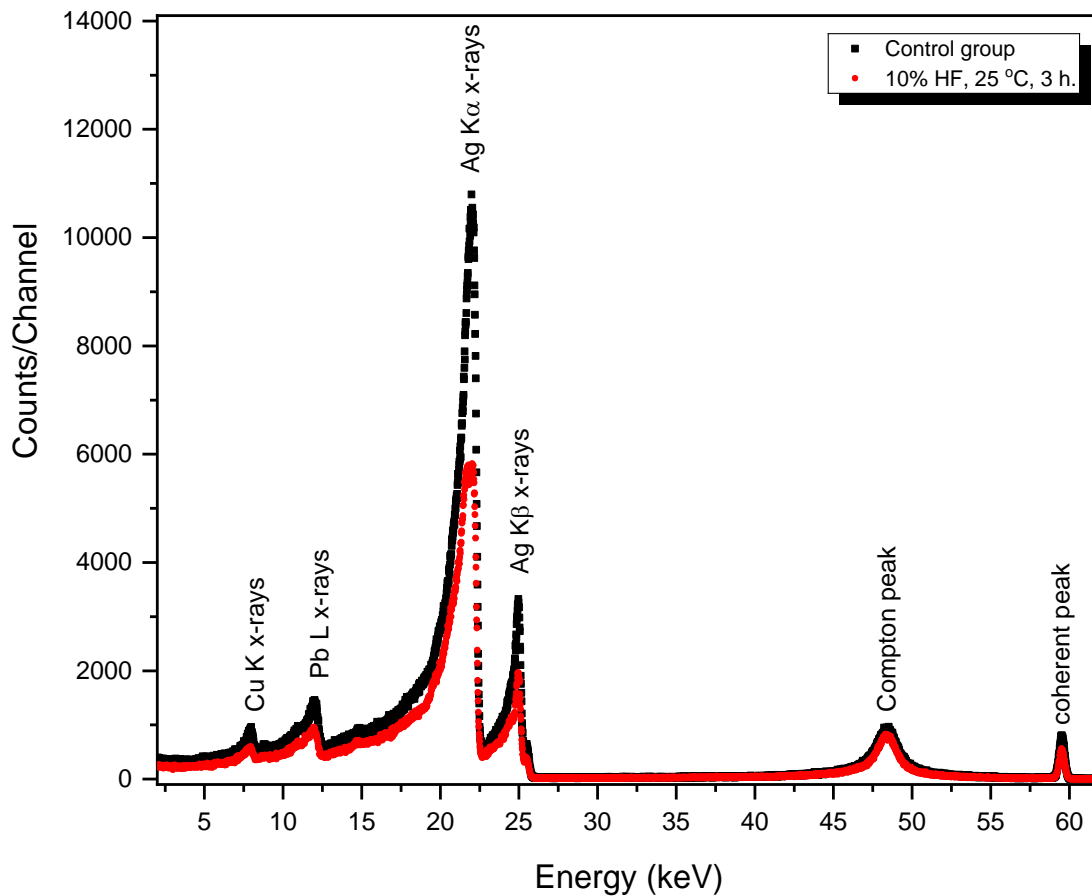
Figure 2. EDXRF spectrum of $Ag_{72}Cu_{28}$

Result and Discussions

In this study, the albedo number of the unetched $Ag_{72}Cu_{28}$ alloy surface was found to be 0.1524. The mass attenuation coefficient $\left(\mu/\rho_{Theo.} \right)$ and effective atomic number $\left(Z_{eff} \right)$ of $Ag_{72}Cu_{28}$ alloy are 5.093 cm^2/g and 45.33, respectively. Albedo numbers were given in Table

1 and Table 2, respectively, for each immersion times in 10% HF at 25°C and 40% HF at 25°C.

Table 1. Albedo numbers of $Ag_{72}Cu_{28}$ alloy for different immersion times in 10% HF at 25°C and 40% HF at 25°C

	Albedo numbers	
Time (h)	10% HF at 25°C	40% HF at 25°C
1	0.1485	0.1362
2	0.1412	0.1322
3	0.1386	0.1274
6	0.1354	0.1225
14	0.1218	0.1179

Table 2. Albedo numbers of $Ag_{72}Cu_{28}$ alloy for different immersion times in 40% HF at 80°C

	Albedo numbers
Time (min)	40% HF at 80°C
15	0.1278
30	0.1166
45	0.1114
60	0.1084

After times of treatment, surface porosity (roughness) increase compared with the control group. In addition, with longer treatment times, the $Ag_{72}Cu_{28}$ alloy HF-treated reveal a further increase in the development of large holes on the alloy surfaces. The albedo number value varies inversely with the surface porosity of the alloy. Albedo numbers decrease with increasing immersion time and higher concentration of the etching solution. This is due to the surface irregularities observed on the alloy sample surfaces. It is found that albedo numbers decreased at higher etching solution temperatures. In this study, it was also concluded that levels of concentration, immersion times and temperature of the acid solution affected the rate of reaction leading to micro-morphological changes.

Conclusion

Albedo is used to describe the reflective capability of electromagnetic radiation from the surface of materials. Albedo factors plays an essential role in different parts of science and research, for example, astrophysics, radiation protection and dosimetry, environmental science, etc. In this study the purpose was to determine the roughness created by hydrofluoric acid on the alloy surface by photon scattering. Albedo numbers change of $Ag_{72}Cu_{28}$ alloy was studied depend on immersion times and etching solution temperatures. It was found that the albedo number changes with the increasing of the etching time, temperature as well as it changes with high percentage of hydrofluoric acid. It can be concluded that albedo numbers decreased at higher etching solution temperatures with extension of involving time and greater concentration of the etching solution.

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Forensic Data Analysis Using Data Visualization Library

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The methods used in the data analysis process are developing day by day. The biggest reason for this is the increase in the data produced. Each device has started to produce data by communicating with each other and storing this data with appropriate memories. Therefore, it has become important to process the data produced in every field and turn it into meaningful information. But the abundance and complexity of the data made things difficult. It was tried to draw meaningful conclusions from these data by applying them to fields such as statistics, but as complex and multiple data increased, statistics began to be insufficient. As a result, both the data had to be transformed into meaningful information and this information would have to be presented as information that could be understood by everyone. In this area, it is ensured that data is used in different software languages, whether it is data analysis and visualization, or in fields such as machine learning, deep learning, and artificial intelligence. Processing and visualizing the data produced in the forensic field will also be beneficial for all units serving in this field. In the project, T.C. with the python programming language. The data obtained from the "Justice Statistics 2020" publication prepared by the Ministry of Justice, General Directorate of Criminal Records, and Statistics were analyzed and visualized.

Keywords: Data analysis, data visualization, forensic data analysis

ID: 133-POP

Metasploit and Penetration Tests

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It is accepted that cyber attacks are carried out by the person or people whom we define as "hackers" and who are known for their bad reputation. However, when we look at the first definition of the word hacker, it is seen that it is defined as a person who is not limited to the necessary knowledge about programmable systems, examines the details of the systems, and develops the capabilities of the systems. Looking at these definitions, it can be said that hackers are not harmful people, but rather useful people in the field of informatics. Eric Steven Raymond, the author of the Argo File (Jargon File), defines people who damage computer systems as "crackers". He says on the subject, "hackers build things, crackers break them". There are different definitions of people who damage systems. A similar definition is hackers with White, gray, and black hats. In the concept of cyber-attack, the method of harming the victims should not be overlooked, such as having information about the person(s) who harmed them.

As the internet phenomenon and technological innovations develop and become widespread, anonymity has begun to be lost. Nowadays, when anonymity is lost, it is seen that it has become more vulnerable to cyber-attacks. There are many types of simple attacks carried out with data obtained through social engineering, and we encounter these attacks every day. Systems developed to protect against such widespread attacks have to be constantly dynamic. Software developed to ensure the security of all programmable systems is written with the mindset of damaging hackers (it was used because it is a common expression). Hackers believe in the freedom to access free information, so they are dangerous. In particular, attacks are organized to access the information in the internet layer, which is defined as the "deep web". The deep web layer is the layer where certain security policies and access restrictions are made, encrypted, and where personal/institution/organization information is stored, and is known as the densest layer of the internet world (for example, the most common area of attack is the internet, but there are many different attack environments and types.). Penetration tests should be carried out regularly to prevent attacks. Penetrating tests aim to enter the infrastructure of an institution or organization by using the methods used by cybercriminals (hackers, crackers) in the real world. They develop the methods used by thinking like cyber criminals, applying infiltration and hijacking scenarios, and trying all the methods that attackers can try. These scenarios ensure that the system's vulnerable points are repaired and security is tightened when a real attack is encountered. Penetration tests have development environments. One of these environments is Metasploit. Metasploit Framework is a structure that contains the necessary tools for detecting vulnerabilities in systems, exploiting them, and infiltrating systems. It contains various malware methods such as

exploits, payloads, and auxiliary and encoders, and contains over 2000 exploits. However, these exploits must be coded for Metasploit to be used. One of the most important features of Metasploit is that it allows the user to determine his strategy. Metasploit is not just an attack. Backdoors for operating systems can be created and the target system can be attacked and hijacked through them. Many penetration tests are performed with Metasploit, which is an open-source platform used in both offensive and defensive security, which is preferred because it is common in terms of use.

Keywords: Penetration, Metasploit, Malware, Crackers, Hackers

ID: 134-POP

Physical Led Hologram (PLH)

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Abstract

Turkey, which is among the developing countries in the field of technology, is especially among the countries with geopolitical importance. For this reason, the existence of cross-border military operations has become an undeniable reality. Thus, the production and use of UAVs and some aircraft with technological innovations have increased rapidly. However, considering the geopolitical characteristics of the different geographical areas where cross-border military operations are carried out, there will be problems that may arise when intervening in the land areas where we do not have full control of the geographical structure. The project is being implemented to solve these problems and to provide more concrete information flow to the teams in charge of the operations.

Keywords: Physical Hologram, Unmanned Aerial Vehicles

Introduction

The PLH project was designed with inspiration from image processing technologies. An image is predicted by the values of the pixels by the machine. When each of these pixel values is handled from a different angle, environments, where the image can be simulated, are designed. Thanks to this project, images taken from aircraft are displayed in three dimensions on a moving panel. At the same time, the project has a dynamic structure that can serve many sectors. This project is called RGBH.
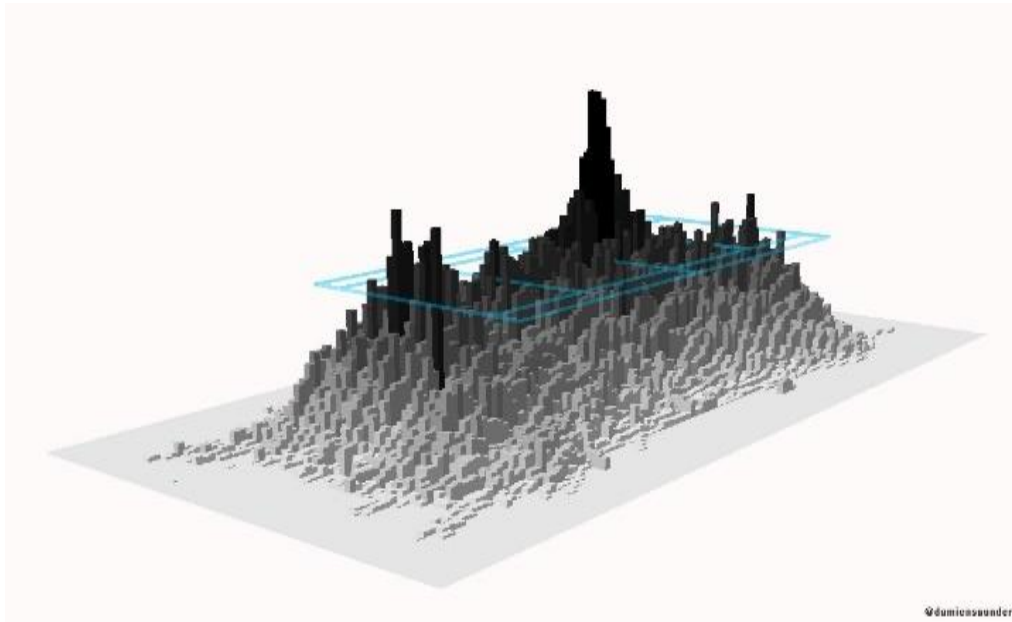
Figure 1. PLH project design view

Material and Methods

Images taken from aircraft are converted into gray-scale form and divided into pixels. The value produced for each pixel is created by running the motion system, with the help of independent engines, to create a physical simulation of the images. Thanks to the independent LEDs integrated into the moving system, they are transferred onto the panel, showing the height and width of all images, as well as their structural features.

Results And Discussion

The project, which is designed for each image taken from cross-border military operations that will have problems in making sense of it structurally, continues to be designed to operate in different areas over time. The project, which is planned to be implemented in the terrestrial region, will be turned into an environment simulator for both the gaming industry and the teams trained in the armed forces. It will consist of large structures protruding from the ground, such as cork barriers (which can be in round or square form). In this way, the desired scenario environment or the environments where the operation will be performed will be created exactly the same. For example, Mehmetçik, who will serve in a mountain or cell operation, will be able to practice with a pre-prepared environment. During this exercise, virtual reality glasses will be used to make the environment more realistic. When the project becomes larger and more comprehensive, the simulation of the submarine environment will be performed, and many projects developed for submarines and seas will be tested in a one-to-one real environment.

ID: 135-POP

SIR (Smart Indoor Route)

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The project designed as QR Code supported indoor navigation; indoors such as hospitals, airports, shopping malls, libraries, stadiums, and parking lots; It will be developed to solve the transportation problem of many large buildings and structures located in limited outdoor areas such as the campus, zoo, picnic areas, housing, and estates. Even if it seems easy to adapt to the great life architectures in which today and the future will be sustained, the time lost is too great to be underestimated. Especially in buildings such as hospitals where human density reduces productivity, rapid transportation is extremely important. On the other hand, the density of people arising from the transportation problem (which may be for other reasons) can be seen as a source of income for shopping centers, but the difficulty of large buildings in reaching customers should not be ignored. We are trying to implement our project to prevent such negative or negative situations and to have applications that can provide services when necessary.

Keywords: QR Code, navigation, transportation

ID: 144-POP

Magnetic and Magnetocaloric Properties of Pr$_{0.6}$Sr$_{0.4}$MnO$_3$ Manganite

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Magnetocaloric effect (MCE), which is briefly expressed as the change in the temperature of the magnetic material as a result of the change in the entropy of a magnetic material subjected to a magnetic field, is the basic working principle of magnetic refrigeration systems (MRSs) [1,2]. MRSs have been foreseen as alternatives to conventional vapor compression cooling systems owing to their energy efficiency, ecological safety, and the possibility of implementation in a wide temperature range [3]. Perovskite manganites shown with AMnO$_3$ chemical formula are one of the material groups that work intensively in the search for suitable materials for MRSs. In this study, magnetic and magnetocaloric properties of Pr$_{0.6}$Sr$_{0.4}$MnO$_3$ perovskite manganite has been investigated. To determine magnetic phase transition temperature (Curie temperature, T_C), the temperature dependence of magnetization measurements have been performed at zero field cooled and field cooled modes under 100 mT magnetic field. From the magnetic field dependence of magnetization measurements, magnetic entropy change values ($-\Delta S_M$) for different magnetic fields have been calculated and the type of the magnetic phase transition has been determined. Maximum magnetic entropy change ($-\Delta S_M^{max}$) value was calculated as 2.96 Jkg^{-1}K^{-1} under 5 T magnetic fields. The sample shows second order magnetic phase transition. The $-\Delta S_M^{max}$ and relative cooling power (RCP) value obtained for the sample is an agreeable size for magnetic refrigeration applications.

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ID: 164-POP

The Effect of Al Content on Phase Transformation Temperatures and Microstructural Properties of Shape Memory Alloys

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In the present work, the effects of Al on phase transformation temperatures and microstructural properties of Ti-15V-xAl (x: wt% 0, 2, 4 and 6) shape memory alloys produced by arc-melting technique were investigated. Phase transformation temperatures and thermal cycle anaysis were determined from DSC analyzes and it was seen that the increase in Al content caused an increase in the reverse martensite start and end temperatures. With increasing number of cycles, no remarkable change was observed in the transformation temperatures, which is a property that varies in proportion to the stability. XRD and SEM analyzes showed that the alloys had orthorhombic α'' martensite phase at 24 °C (room temperature; RT) and some β phases remained unchanged in the structure. From the TEM analyzes, it was observed that the martensite plate thickness decreased with increasing Al content. When all the results were evaluated, it was concluded that the Al content had a positive effect on the transformation temperature and microstructure of the Ti-15V shape memory alloy.

ID: 173-POP

Cytotoxic Potentials of Biosynthesized Silver Nanoparticles by Humulus Lupulus, Inula Viscosa and Olea Europaea Extracts, Against Human Breast Cancer (Mcf-7) Cell Line

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Plant-derived materials, which are economical and environmentally friendly, have gained importance in the biosynthesis of metallic nanoparticles in recent years. Phytochemicals increase functionality when absorbed by nanoparticles [1,2,3]. In this study, water extracts of *Humulus lupulus* (cones), *Inula viscosa* (leaves) and *Olea europea* (leaves) were used to facilitate the synthesis of silver nanoparticles. The proliferative effects of these extracts, synthesized with silver nanoparticles were analyzed on the breast cancer (Mcf-7) cell line. Nanoparticles synthesized via chemical method using sodium borohydride ($NaBH_4$), the reducing agent were used as control group. To evaluate the cytotoxic activity, MCF-7 cell line were exposed to 1:1, 1:5 and 1:10 dilutions of the plant extracts for 24 and 48 h, and viability of cells were measured by XTT assay. It was observed that the application of silver AgNPs alone in different concentration did not cause a statistically significant change on MCF-7 cells. However, AgNP of *H. lupulus, I. viscosa* and *O. europea* water extracts applied to MCF-7 cells showed statistically significant effects ($p < 0.05$) on cell viability in time and concentration dependent manner. These results showed that silver nanoparticles biosynthesized by *H. lupulus, I. viscosa* and *O. europea* water extracts can be regarded as a suitable candidate for designing anticancer pharmaceutical preparations in the treatment of breast cancer.

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ID: 178-POP

Self-Absorption Correction Factors of Some Algae Samples

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The purpose of this work is to investigate experimentally self-absorption correction factors of some algae samples using gamma-ray spectrometry. Various algae samples were collected from Antalya in Turkey. Algae samples were dried, and masses of the samples were calculated. Then densities of the samples were calculated. Algae samples were counted with and without point sources 1000 seconds using high purity germanium detector. The ^{22}Na, ^{60}Co, ^{133}Ba, and ^{137}Cs were used as point sources. Obtained gamma-ray spectra were analyzed using computer software to obtain counts of related gamma-ray energies. Afterwards, self-absorption correction factors of algae samples were calculated between 80 keV to 1332 keV gamma-ray energies. Self-absorption correction factors of algae samples versus gamma-ray energies graphics were acquired. Consequently, self-absorption correction factors of studied algae samples generally decline as gamma-ray energy increases. Self-absorption correction factors of some algae samples are nearly stable. The reason of this situation can be explained due to the densities and elemental contents of the studied algae samples.

ID: 197-POP

Relationship Between ^{210}Po/^{210}Pb Concentrations Rates and Earthquake

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Abstract

The amounts of ^{210}Pb and ^{210}Po, which are the last products of the ^{222}Rn series, are related to the levels of ^{222}Rn from soils and rocks. While some of the gas coming out of the rocks is absorbed by the aquatic environment sediments, the bit part spreads to the atmosphere and precipitates back to the earth as ^{210}Po and ^{210}Pb. These radioactive elements, which show precipitation, are reabsorbed by soil on earth or sediment in the aquatic environment. The absorbed ^{210}Po and ^{210}Pb radioactive elements accumulate along the sediment layers due to their half-lives in relation to the atmospheric fallout densities. In age determination studies, especially in aquatic environment sediments, the amount of substances accumulated in the sedimentary environment can be determined annually. In this study, the relationship between tectonic movements and the excess of ^{210}Po and ^{210}Pb amounts in the sediments was investigated. As a result of the study, it was determined that there were earthquakes with magnitude of 5.9 or above around the lakes while the ^{210}Po/^{210}Pb concentrations were above 3.

Keywords: Po, Pb, Earthquake, Sediment

Introduction

Po-210 is a natural radionuclide and one of the decay products of the ^{238}U series. It emits an alpha particle with an energy of 5.304 MeV during its physical half-life of 138.4 days. Despite its short half-life, it is constantly formed in the environment due to its long-lived main radionuclides (^{226}Ra, ^{210}Pb). Thus, the amount of ^{210}Po in nature largely depends on the amount of ^{210}Pb [1]. In marine environments, ^{210}Pb has two basic components, at equilibrium depth and excess. The component in equilibrium is formed by the decomposition of ^{226}Ra into ^{222}Rn, an inert gas, which is present in the environment from the uranium series, and its activities are equal to ^{226}Ra. excess ^{210}Pb is the most important source of its component, ^{222}Rn in the atmosphere. ^{210}Pb released in the atmosphere by diffusion of radon from soil and rocks; it returns to the earth's surface, lakes, seas and

oceans by precipitation or dry deposition. So that the aquatic ecosystem was affected from this recycle since three quarters of the world is covered with water [2,3].

The major main source of [210]Po in marine ecosystems is ^{210}Pb degradation. It occurs as a result of dry and wet atmospheric deposition of ^{210}Pb and radioactive decay of [226]Ra and [222]Rn gases dissolved in waters. While some of the gas coming out of the rocks is absorbed by the aquatic environment sediments, the bit part spreads to the atmosphere and precipitates on the earth as [210]Po and ^{210}Pb again. [210]Pb in groundwater, rivers, lakes and areas where rivers meet the seas; soil particles, rock fragments, suspended materials and sinks to the bottom. It is known that ^{210}Pb is adsorbed on particles smaller than 0.4 µm in aquatic environment and this radionuclide has particle reactive properties like [210]Po [4]. These radioactive elements that show precipitation are reabsorbed by sediments on earth or in the aquatic environment. Absorbed [210]Po and ^{210}Pb radioactive elements accumulate along the sediment layers in relation to the atmospheric fallout. Therefore, ^{210}Pb is an important tracer for historical events even in the earthquake rate since its profile's fluctuation identify the accumulation rate of sediment and also the change in the climate [5].

Study Area

Lake Bafa is located between Söke district of Aydın and Milas district of Muğla at 37° 30´ N, 27° 25´ E coordinates (Figure 1). It was part of the Aegean Sea in ancient times. Lake Bafa has been separated from the coastline, known as the Latmian Gulf in the past, and remained inside with the accumulation of alluviums coming from the Büyük Menderes (Figure. 1) [6]. And nowadays the lake is home to many bird species and has an important place among the world's bird habitats.
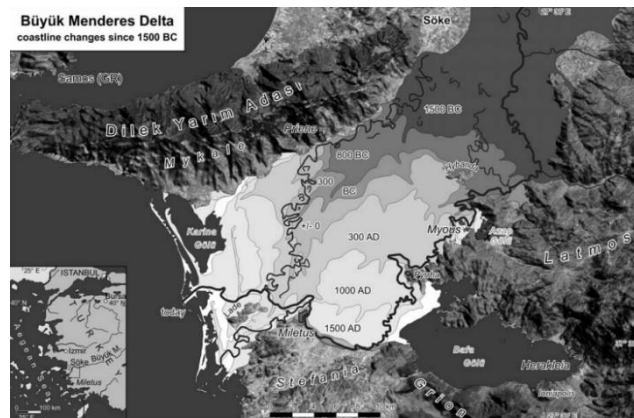
Figure 1. Chronological formation of Lake Bafa [6]

Material and Method

[210]Pb Dating

In sedimentological dating studies in aquatic environments, radioactive ^{210}Pb with a half-life of 22.3 years gained importance towards the end of the 20th century and continues to

be used as a tracer in age determinations. The age of the sediment layer can be calculated by using ^{210}Pb concentrations determined as equilibrium and above equilibrium as a result of radioactive decays [1].

The profile distribution of $_{210}$Pb activity in the sediments and the bed age of the sediments were determined using mathematical constant flux model (CF) and constant sedimentation rate model (CRS) models.

The equation used in both models

$$A_{Pb-210ex(t)} = (F_{Pb-210}/w)\, e^{-\lambda t} \tag{1}$$

Here,

$A_{Pb-210ex(t)}$ = ^{210}Pb activity above radioactive equilibrium at time t (dpm/g or Bq/g)

F_{Pb-210} = ^{210}Pb flux at the sediment-water interface (dpm cm^{-2} y^{-1})

w = sediment accumulation rate (g cm^{-2} y^{-1})

Radioactive decay constant of λ = ^{210}Pb (0.0311 y^{-1})

t = time (y)

has been defined as.

In constant flux, the initial excess ^{210}Pb activity of the sediment layer is also taken as constant, and the excess ^{210}Pb activity on the core surface is considered equal to the initial layer. In the fixed sedimentation rate model, the sedimentation rate in the aquatic environment is assumed to be constant, and it is accepted that the accumulation occurs [7].

Sampling

For the study in the lake sediment, core samples were taken from the lake and the most suitable 40 cm core (37°29'5.86"N, 27°27'1.97"E) sample for dating was examined. Core sampling was done with a "core-sampler" core receiver system. The core sample was separated in layers of 6 mm up to 10 cm in the first 10 cm and 12 mm in layers after 10 cm, and 28 sample samples were prepared. Sediment samples, whose wet weights were determined, were dried in an oven at 80°C and also their dry weights were determined. The dried samples' particle sizes were reduced by grinding and passed through a 250 µm sieve. For the determination of ^{210}Po, 1 g of the samples was taken and 6 mL of concentrated HF and 6 mL of concentrated HNO$_3$ were added in a Teflon beaker and kept overnight. The solution was left to evaporate at a constant temperature of 55 °C on the heating plate and then 20 mL of concentrated HCl was added before it reached complete dryness, and this process was repeated two more times. Then, evaporation was concluded by adding 10 mL of concentrated HCl [8]. In the last step of the radiochemical separation method, the solution was taken from the heating plate before it completely dried. The remaining residue was dissolved by adding 200 ml of 5 M 37% HCl and the solid and liquid phases were separated using filter paper. 0.4 g of ascorbic acid was added to the filtered solution to reduce Fe3+ to Fe2+. A copper disc placed on the carrier was placed in the solution and covered with a watch glass [9]. The solution obtained by the first deposition was kept in plastic bottles for the second deposition. In this way, ^{210}Po formed by the

decomposition of ^{210}Pb was brought into equilibrium with ^{210}Pb in the medium, and ^{210}Pb activity in the samples was determined using Bateman's (1910) equations.

Result and Discussion

The highest activity of excess ^{210}Pb was determined as 159±18 Bq kg-1 at 12 cm and the depth of equilibrium was determined as 12.6 cm. The ^{210}Pb concentrations detected in the core sample showed a smooth decrease with depth (Figure 2). This smooth decrease indicates that the ^{210}Pb flux in the lake sediment is constant. In this way, the age of the sediment layers was determined with the CRS model, which is used in areas where the flux is considered constant. And also the age determination was made with the CF model, which is another age determination method in which the sediment accumulation rate does not affect the ^{210}Pb flux, in order to support the age analysis determined by the CRS model. The results obtained from the age determinations sample are given in Appendix-A.
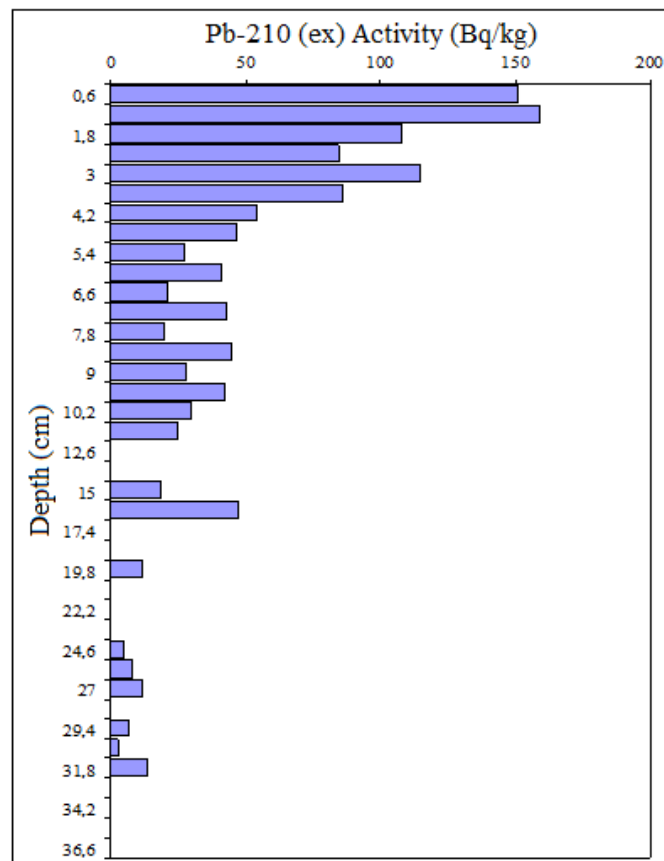
Figure 2. Depth dependent variation of above-equilibrium 210Pb activity

Considering the ratio of ^{210}Po/^{210}Pb concentrations in the core sample, it was expected to show a close to normal distribution, but this ratio was determined higher than 3 in some (Appendix-A). It is mentioned that radiochemical profiles of sediment cores have been significantly influenced by paleo-earthquakes [10]. So seismic activities around Lake Bafa were investigated at these depths (Table 1). It is observed that there are no significant earthquake records in the region after 1962 and the age of the depths where the

^{210}Po/^{210}Pb concentration ratio is high shows parallelism with the dates of the earthquakes that occurred close to the region.

Table 1. Historical earthquakes around Lake Bafa

Core Depth (cm)	Core Age		Earthquake		
	CF	CRS	Year	Area	Magnitude
19,8	1960-1963	1962-1964	1961*	Fethiye	6,3
21	1957-1960	1959-1962	1959*	Köyçeğiz	5,9
22,2	1955-1957	1957-1959	1955*	Söke	6,8
			1957*	Fethiye	7,1
			1959*	Köyçeğiz	5,9
28,2	1935-1937	1937-1943	1941*	Muğla	6

* http://udim.koeri.boun.edu.tr/

Conclusions

Historical earthquakes in the region could be determined by examining the age determination obtained by sediment core sampling. The ^{210}Po/^{210}Pb ratios, which show close to normal distribution along the core in normal conditions, showed a positive relationship at the time of the earthquake when its ratio higher than 3. Furthermore the relationship between the higher value of ^{210}Po/^{210}Pb ratios with depth and earthquake will be examined at future studies.

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Appendix A: Age determination data according to the CF and CRS method and
$^{210}Po/^{210}Pb$ concentration rates, obtaining from the core sample

Derinlik (cm)	Pb_{ex} (Bq kg^{-1})	CRS Year	CF Year	$^{210}Po/^{210}Pb$
0,6	150,66	2011	2011	1,88
1,2	158,91	2008	2008	1,71
1,8	107,75	2006	2006	1,74
2,4	84,74	2005	2004	1,16
3	114,96	2002	2002	1,11
3,6	85,9	2000	1999	1,59
4,2	54,1	1998	1998	1,26
4,8	46,8	1997	1996	1,46
5,4	27,5	1995	1994	1,57
6	40,77	1994	1993	1,01
6,6	21,3	1992	1991	1,32
7,2	43,2	1990	1989	0,99
7,8	19,75	1989	1988	2,34
8,4	44,8	1987	1985	0,9
9	27,77	1985	1983	1,47
9,6	42,26	1983	1981	0,99
10,2	29,81	1980	1979	0,91
11,4	24,48	1978	1976	1,12
12,6	0	1976	1975	1,56
13,8	0	1974	1973	2,17
15	18,61	1972	1971	1,41
16,2	47,66	1970	1966	1,02
17,4	0,26	1966	1964	2,44
18,6	0	1964	1963	4,25
19,8	11,96	1962	1960	4,75
21	0	1959	1957	4,65
22,2	0	1957	1955	3,75
23,4	0	1954	1952	2,62
24,6	4,75	1951	1948	1,55
25,8	8,11	1947	1943	1,53
27	11,73	1943	1937	1,31
28,2	0	1937	1935	5,53
29,4	6,73	1935	1928	1,26
30,6	2,78	1928	1920	1,06
31,8	13,46	1919	1906	0,75
33	0	1905	1892	0,93

ID: 226-POP

Determination of Radiation and Radioprotection Awareness in the Community

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Abstract

Mankind, who has been intertwined with radiation since beginning of the universe, has tried to understand the benefits and harms of radiation. Humanity, which increases its knowledge about radiation day by day and advances with technological developments, has begun to be affected by natural and unnatural radiation. After the realization of the effects of radiation on life, precautions were taken and the amount of radiation exposure was limited to protect human health [1]. Human beings, who continue their lives within the framework of these limits, continue to be conscious and raise awareness about radiation. In this study, it was tried to determine the knowledge levels of individuals who did not receive radiation education about radiation and radioprotection. As a result of the survey study conducted for the measurement of radiation and radioprotection information levels, it was determined that various studies should be carried out in order to give information about artificial and natural radiation sources, amounts and effects to our people.

Keywords: Radiation, Radioprotection,

Introduction

Humans have been living with radiation since the creation of the universe. Radiation is divided into two parts, ionizing and non-ionizing, according to the type of their energies. Ionizing radiation is a type of radiation that can form ions when interacts with materials. And also ionizing radiation has two types according to the source: natural and unnatural radiation [2,3]. Natural radiation affects everyone because it is found in soil and water. Natural radioactive products in the soil (such as radium, thorium, and uranium), radon gas, cosmic rays from the sun and elements such as potassium-40, carbon-14, and radium in our body expose people to radiation [4]. The production of unnatural radiation is done by very different methods such as; nuclear power plants, nuclear weapon experiments, technological improvements and also medical application is one of them [5].
In medical applications, there are certain limits to the radiation level that both the patient and the radiation workers can be exposed. It is very important for people who apply radiation for medical purposes to know and apply these limits in order to keep the radiation in certain level [1]. In addition, the increase in the level of knowledge of humans

about radiation and radioprotection will reduce the amount of dose to be taken by the public. At the same time, the reduction in the amount of dose that humans will be exposed to, will reduce the negative effects of radiation on human life in the future. In this study, the basic knowledge levels of people, living in Turkey, about radiation and radioprotection were investigated.

Material and Method

In this study 17-item survey were prepared, including the 3 sociodemographic and 14 basic radiation information. The survey questions were prepared for individuals who did not receive radiation training. In the preliminary information of the survey, information was given that who received any training about radiation do not participating in the survey. The survey was applied online and 568 participants have attended in the survey so far.

Result and Discussion

Total 568 participants participated in the survey, of which 53.6% were women and 46.4% were men. 9.5% of the participants are in the 0-19 age range, 13% are in the 50-59 age range, 12.2% are in the 20-29 age range, 25.3% are in the 30-39 age range, 33.8% are in the 40-49 age range, and 6.2% of them are over 60 years old. And also 9.8% of the participants had MSc or PhD, 20.4% had vocational school, 25.6% had high school, and 44.2% had bachelor degrees.

The answers given by the participants to the survey questions are shown in Table 1 together with their percentages.

Table1. Percentages of answers to survey questions

Question	Yes (%)	No (%)	No Idea (%)
Some daily tools such as mobile phones, televisions, and computers also emit radiation to the environment.	97,7	0,6	1,8
I have knowledge about ways of protection from radiation	50,3	33,9	15,8
Regardless of the amount of exposure, every radiation received is harmful to human.	85,1	8,1	6,8
Radiation is only harmful to pregnant women	4,1	92,6	3,3
Our body needs some radiation for vital activities.	24,6	37,3	38,1
The radiation we take into our body with food and drinks causes internal irradiation in our body.	24,2	13,6	62,1

The dose we are exposed to by unnatural radiation sources (medical applications, nuclear industry) is greater than the dose we are exposed to by natural radiation sources (cosmic radiation, radiation from nature products).	50,8	6,3	42,9
Radon gas, which is a natural radiation source, is a source of ionizing radiation that accompanies us at every stage of our lives.	30,1	5	64,9
When I see the signs indicating radiation areas in health institutions, I can understand that that area is a radiation area.	93,9	2,1	4
I think that the x-ray method used in diagnostic imaging examinations may increase the risk of developing cancer in the future.	72	9	19
We are exposed to radiation without having any medical treatment which is containing radiation.	75,6	8,3	16,1
Radiation devices do not emit radiation to their around while they don't work.	41,3	26,1	32,6
I trust the information of radiology units in health institutions about radiation protection and patient dose.	45,2	29,6	25,2
The harm of radiation to human health depends on the duration of exposure to radiation.	77,2	7	15,7

The percentages obtained show that our people have seen technological and medical devices as radiation sources. Participants think that the amount of exposure radiation from natural sources is less than electronic and medical devices, and they do not know enough about the natural radiation sources around them. At the same time, the results show that the participants do not have enough information about the radiation that needs to be taken from the food and the environment for the life cycle. The participants, who see technological and medical devices as a radiation source as dangerous, stated that they know the signs and pointers about the radiation and they also trust the information of radiation workers working in this field.

Conclusions

The answers given by the participants show that most of our people have reached a certain level of knowledge about the harms and effects of radiation. However, they have accepted technological and medical devices as radiation sources, they do not have enough information about the radiation coming from nature. As a result, it is seen that various studies should be carried out in order to convey information about artificial and natural radiation sources, amounts and effects to people.

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Fabrication of Inverted Solar Cells with ZnO Thin Film by Using Sputtering Method

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In the previous work, we investigated of the optical, morphological and structural properties of P3HT:PCBM based inverted organic solar cells. In this study, we have successively fabricated inverted OPV employing ZnO and MoO_3 as electron and hole selective layers, respectively. Firstly,99% pure zinc oxide was coated onto ITO surface by RF magnetron sputtering method and ITO/ZnO thin film was obtained. The zinc oxide coated ITO was transferred into the glove box. Later, the ITO/ZnO layer was coated with a 1:0.8 ratio P3HT:PCBM mixture at 800 rpm for 50 sec with a spin coating device in a glove box, and then annealed on a hot plate at 115 ℃ for 5 min. Subsequently, 10 nm thick molybdenum trioxide (MoO_3) was coated on the ITO/ZnO/P3HT:PCBM layer using thermal evaporation in high vacuum in the glove box. Finally, 100 nm thick Al metal was coated using thermal evaporation in glove box system and ITO/ZnO/P3HT:PCBM/MoO_3/Al inverted OPV structure were obtained. Under simulated AM 1.5 illumination at 100 mWcm^{-2}, the power conversion efficiency of I-OPV was calculated as approximately 0,69%. In the future, we will have found the optimum ZnO buffer layer by using the sputtering method to enhance the power conversion efficiency of the inverted organic solar cells.

Keywords: Inverted Solar Cells, ZnO, Sputtering, P3HT:PCBM.

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Production and İnvestigation of Protective Properties of Chromite Ore Dust Filled Glass Fiber Reinforced Epoxy Composite for Neutron Radiation Applications

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In this study, chromite dust-filled glass fiber reinforced epoxy matrix composites were designed and produced by a hand-laying technique by varying the chromite dust content from 0% by weight to 15% by weight. To understand the capacity of these composites to reduce fast neutrons, such as effective removal cross-section, half value layer, mean free path, and neutron transmission factor (NTF) was determined theoretically using the Monte Carlo simulation GEANT4 code. All the results found were compared with paraffin, a neutron shielding material. The addition of chromite dust was found to increase both the mechanical and radiation absorption capacities of glass fiber epoxy composites. It was observed that these composite materials exhibited absorption performance at values close to paraffin. In particular, it was determined that the sample containing 15% chromite dust absorbed higher neutron radiation than the other samples. For this reason, these composite materials can be used as shielding materials to prevent neutron radiation leakage that may occur in nuclear reactors, transport, and storage of used radioactive waste, boron neutron treatment units, and activation analysis applications.

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Cobalt Nanoparticles as Electrocatalysts towards Oxygen Evolution Reactions

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Co nanoparticles were successfully impregnated onto the supporting metal oxides (titania, zirconia, and ceria) surfaces by the facile and environmentally friendly method to increase the performance of the cobalt for oxygen evolution reaction (OER). The rate of the charge transfer and the electrochemically active surface area were increased by decreasing charge transfer resistance (R_{CT}) and the particle size. Co/MO_2 (M= CeO_2, ZrO_2, and TiO_2) catalysts exhibited impressive performance for the oxygen evolution reaction in an alkaline environment with low overpotentials (0.365, 0.373, and 0.390 V), low Tafel slopes (65.0, 70.8, and 67.9 $mV.dec^{-1}$), high turnover frequency (TOF) values, and considerable durabilities. After the stability test, although the commercial Co_3O_4 loses its activity to a great extent, no noticeable change was observed in Tafel slopes and overvoltages for the Co/CeO_2, Co/ZrO_2, and Co/CeO_2. As-synthesized Co based catalysts show higher activity and stability than commercial Co_3O_4 due to the smaller particle size, higher electrochemical active sites and smaller R_{CT} than commercial Co_3O_4. The Tafel slopes, onset and overpotential values, TOFs, Faradaic efficiencies, and stabilities show that Co impregnated metal oxides could be a promising class of electrocatalysts towards OER. Inspired by this work, inexpensive, environmentally friendly and highly active catalysts can be synthesized for use in OER via changing supporting materials or using different non-noble metals.

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Iridium Nanoparticles as Alternative Electrocatalysts towards Hydrogen Evolution Reactions

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Preparation of iridium nanoparticles on the oxide surface appears to be an efficient strategy for finding eco-friendly and cost effective catalyst. Herein, iridium based catalysts using titania, zirconia and ceria as a supporting material (Ir/MO_2; M = Ce, Ti, Zr) were developed for hydrogen evolution reaction (HER). Among these catalysts, Ir/CeO_2 shows superior activity and excellent stability. The onset potential (η_0) and overpotential ($\eta@10$ $mA.cm^{-2}$) of Ir/CeO_2 were found as -13 and -23 mV, respectively, these values are lower than the values obtained for commercial 10% Pt/C catalyst. Ir/CeO_2 provides 38.7 $mV.dec^{-1}$ Tafel slope, 1.95 @100 mV turnover frequency and 2.69 $mA.cm^{-2}$ exchange current density values. In addition, Ir/CeO_2 shows excellent stability even after 20 000 cycle in 1 M H_2SO_4. More importantly, no nafion was used to attach the catalyst on working electrode to conduct the electrochemical experiments. Ir/CeO_2 (2.44 wt. % Ir) with facile preparation technique, high stability and low iridium loading can be considered as a promising alternative electrocatalyst for HER.

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BIOLOGY
ORAL PRESENTATIONS

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The Effects of Superfix Navy Blue Bf (Snbbf) Synthetic Textile Dye on Larval Viability and Longevity in Drosophila Melanogaster Oregon-R Wild Strain

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Synthetic dyes are industrial products of commercial importance due to their widespread use in the textile, cosmetics, food, furniture, pharmaceutical and automotive industries .There are approximately 10,000 types of these paints used in many countries. With an annual production volume of 700,000 tons, dyestuffs constitute a significant portion (1/5) of all industrial waste (1). The mixing of the discharges from the textile industry into agricultural areas and water resources causes the soil pores to become clogged, resulting in a decrease in productivity and making drinking/irrigation water unsuitable for human consumption. In this study, the biotoxic effect of Superfix Navy Blue BF (SNBBF), used as a textile dye, on larval viability in *Drosophila melanogaster* Oregon-R wild strain and lifespan in female and male populations was investigated *in vivo*. For this purpose, Standard Drosophila medium prepared with distilled water was used for the control groups. Different doses of SNBBF dye (10, 20, 40, 60 and 80 ppm) were added to the Standard Drosophila Feeding place for the treatment groups. In order to evaluate the larval viability, the development of the 3rd stage larvae in the application groups was followed and it was observed that the larval viability decreased significantly ($p<0.05$). In the longevity study, adult individuals of the same age (3 days) were placed in the media prepared with different doses of SNBBF (10, 20, 40, 60 and 80 ppm) and their lifespans were followed. It was determined that both the maximum and mean life span of *D. melanogaster* were shortened depending on the increasing dose in male and female populations of Oregon-R wild lineage. When the data of the treatment groups were compared with the control groups, the difference between them was found to be statistically significant at the $p<0.05$ level.

Keyword: textile dye, longevity, larval viability

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The Quantitative Expression Analysis of Amyloid Beta Precursor Protein Pathway-Related Genes in Monosodium Glutamate Exposed Rat Brain Cortex: The Double-Edged Sword of Nutrition

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Abstract

Alzheimer's disease (AD), characterized by progressive neurodegeneration and becoming one of the most common forms of dementia today, affects millions of people around the world. The data from recent research shows that modified risk factors, such as diet and nutrition habits, can have a significant impact on AH's course. The purpose of this study is to examine the effect of MSG on the mRNA expression of amyloid beta precursor protein (*App*) and APP-cleaving γ-secretase complex components; presenilin 1 (*Psen1*), presenilin 2 (*Psen2*), and nicastrin (*Ncstn*). In addition, the neuroprotective potential of tannic acid (TA), a herbal polyphenol, was also investigated. Relative mRNA expression alterations of *App*, *Psen1*, *Psen2*, and *Ncstn* were investigated using quantitative real-time PCR analysis in rat brain cortex tissues obtained from saline, TA (50 mg/kg), MSG (2 mg/kg), and MSG+TA treated control and experimental groups. Results showed that while MSG exposure boosted *App* expression approximately 5 times compared to the control, this MSG-induced increase in the cortex was significantly suppressed by the simultaneous utilization of TA. On the other hand, *Psen1*, *Psen2*, and *Ncstn* gene expression levels, which decreased with MSG exposure, approached their normal levels with TA treatment. Our results show that MSG disrupts the regulation of amyloid plaque formation associated components and suggest that TA may be a promising natural compound to prevent diet-induced AD development risk.

Keywords: Alzheimer Disease, Amyloid Precursor Protein, Monosodium Glutamate, Tannic Acid,

Introduction

Alzheimer's Disease (AD) is the most common form of dementia and is estimated to affect approximately 60 million people worldwide [1]. Numerous environmental and genetic factors affect the formation of the disease, and therefore, effective treatment has not yet

been found [2]. Monosodium glutamate (MSG), found in most processed foods and known as a flavor enhancer, is the most widely used food additive in the world. Although it is stated to be safe by the Food and Drug Administration (FDA), numerous studies show that MSG causes significant problems in basic brain functions such as memory, cognition, learning and cellular metabolism [3-4]. It has also been found that MSG, decreases SOD and CAT enzyme activity in brain tissue and increases lipid peroxidation and nitric oxide, may be associated with other neurodegenerative diseases [5]. MSG has also been shown to increase amyloid-beta (Aβ) deposition in the hippocampus, which is a hallmark of AD.

It is known that the main factors causing neurodegeneration in the disease are amyloid plaque formation and intracellular neurofibrillary tangle accumulation [6]. These two factors impair synaptic function and induce neurotoxicity *in vivo*. Therefore, the focus is on anti-amyloid treatments in AD. Although synthetic drugs are the preferred anti-amyloid agents, these compounds can have significant undesirable side effects, especially when given long-term in a disease prevention paradigm, so many researchers support safer and natural therapeutic approaches that target the clearance of Aβ from nervous tissue [7]. World Health Organization (WHO) reports support the idea that regulation of dietary habits and intake of antioxidants can delay the progression of AD. Herbal medicines are thought to be a suitable alternative, especially for the treatment of psychiatric and neurological disorders, due to their low cost, easy supply, and fewer drug interactions [8]. Medicinal plants; thanks to the phytochemicals they contain, contribute significantly to slowing the prognosis of the disease by being effective in the cellular and molecular mechanisms associated with the development of neurodegenerative disease [9]. Many studies have suggested that the inclusion of foods rich in flavonoids, such as vegetables and fruits, in the diet helps to improve cognitive performance and therefore reduce the risk of dementia in older people [10].

Tannic acid (TA) is a member of the tannin category of plant-derived polyphenols that are in daily dietary intake because they are found in many plants. Similar to other polyphenols, tannins have antioxidant, antiviral/bacterial, anticarcinogenic, antimutagenic, and anti-inflammatory properties [11]. Therefore, TA has the potential to be a promising natural agent to alleviate MSG-induced neurodegeneration. The neuroprotective effects of TA against AD have been demonstrated in various *in vitro* and *in vivo* models of AD [12]. Besides its potent antioxidant and anti-inflammatory roles, evidence indicates that TA is also a natural inhibitor of protein expression and activity of β-secretase (BACE1), the primary enzyme responsible for the production and accumulation of the Aβ peptide. TA has also been reported to destabilize neurotoxic Aβ fibrils in vitro [13]. Besides its effects on the Aβ cascade, TA also inhibits *in vitro* aggregation of the tau peptide, an essential component of intracellular neurofibrillary tangles (NFT) [14]. Therefore, regarding pharmacological treatment for AD, natural polyphenols are considered to be a potential strategy for the prevention or treatment of AD.

Materials and Method

Experimental Design

24 Sprague Dawley rats (*Rattus norvegicus*, male, 9-10 weeks old, 180±20 g) were used in the study. The care of all living things and experimental applications were carried out in the Atatürk University Medical Experimental Application and Research Center (ATADEM) Laboratory with the Ethics Committee Approval Certificate approved by the Atatürk University Animal Experiments Local Ethics Committee (AUHADYEK). The animals were kept in grid plastic cages under standard light (12h-12h), humidity (40 – 60%) and room temperature conditions during the experiment. The animals were provided with access to fresh water and feed (ad-libitum) throughout the study.

The amounts of MSG and TA to be administered to rats were determined by considering the MSG consensus [15], FDA data, and neurotoxicity studies on the subject [4-16-17]. 24 Sprague Dawley rats were randomly divided into 4 groups; Con, MSG, TA, and MSG+TA. The animals in the control group were given saline by oral gavage for 21 days. MSG group rats were given orally MSG (2 g/kg) for 21 days [15]. TA group rats were treated with TA (50 mg/kg) by oral gavage for 21 days [18]. MSG+TA group rats were orally exposed to a combination of MSG and TA (2 g/kg and 50 mg/kg) for 21 days. At the end of the application, all rats were sacrified by cervical dislocation. Cortex parts were rapidly separated from the whole brain and frozen in liquid nitrogen for the experimental steps.

RNA isolation and cDNA synthesis

Total RNA isolation from cortical tissues of rats was performed using a commercial kit (RNeasy Mini Kit, Qiagen, Germany). All steps were completed following the manufacturer's protocol. Concentrations and purity of RNAs were measured using the Nanodrop instrument (Multiskan GO, Thermo Scientific). cDNAs were synthesized using the cDNA synthesis kit (iScript, Bio-Rad) according to the manufacturer's protocol).

Primer design and qPCR

Primers of target and housekeeping genes were designed using the Primer3 (http://bioinfo.ut.ee/primer3-0.4.0/) online tool (Table 1). The binding specificities of the designed primers were verified using the BLAST (https://blast.ncbi.nlm.nih.gov/Blast.cgi) module. Relative gene expressions were measured using the SYBR Green (SsoAdvanced Uni SYBR Green Supermix, Bio-Rad) qPCR method in a Rotor-Gene Q (Qiagen, Hilden, Germany). Beta-actin (*Actn*) expression was used for normalization and relative quantification. The relative expression results were analyzed using Livak and Schmittgen's comparative ΔΔCt method [19].

Table 1. List of qPCR primer pairs used

Primer	5'→3'
App forward	TGATCTACGAGCGCATGAAC
App reverse	TAGAAGGCATGAGAGCATCG
Psen1 forward	AGCACACAAGGAACAGAGAGG
Psen1 reverse	TCAGGAGTGGAGCGATGAG
Psen2 forward	TCTCCACAGACAACCTGGTG
Psen2 reverse	AAGCGTCCTACAGCTCTCAG
Ncstn forward	ACCAGGAAGAGGGTGTGAAAG
Ncstn reverse	TGGGATACCCACCTAACAGCA

Statistical analysis

All the measurements were triplicated for each animal and sample. Statistical comparison of the results was performed by one-way ANOVA and Tukey's post-hoc test using Prism software (GraphPad Software, San Diego, CA). Statistically significant differences are presented as follows: $p > 0.05$ or not significant (ns); $*p < 0.05$ (significant); $**p < 0.01$ (very significant); *** or **** $p < 0.001$ or 0001 (extremely significant).

Results

The results show that the expression of the *App* gene, the precursor protein responsible for Aβ production, increases with exposure to MSG. However, it is seen that this increase is significantly reduced with the application of TA (Figure 1).
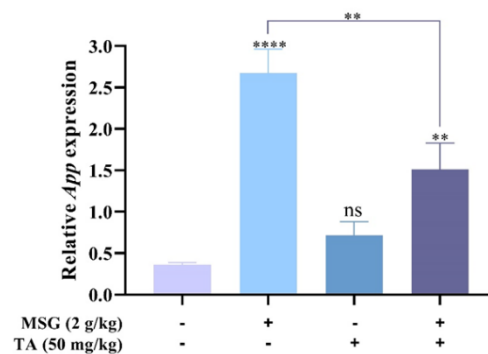
Figure 1. Relative gene expression of *App*

As seen in Figure 2, the *Ncstn* mRNA transcript level was significantly decreased in the presence of MSG compared to the control and TA groups. However, reductions in *Ncstn* expression approached control with TA administration.
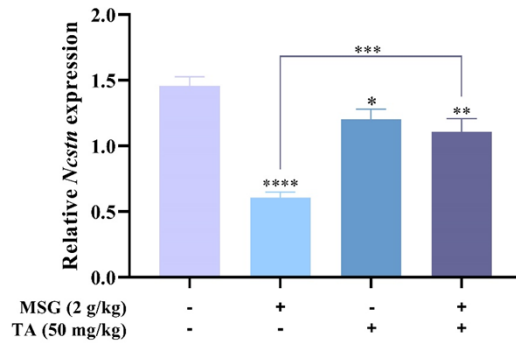
Figure 2. Relative gene expression of *Ncstn*

Psen1 mRNA expression was significantly down-regulated in MSG group rats compared to control. Compared to the MSG alone group, *Psen1* expression levels approached the control level in the group treated with MSG combined with TA (Figure 3).
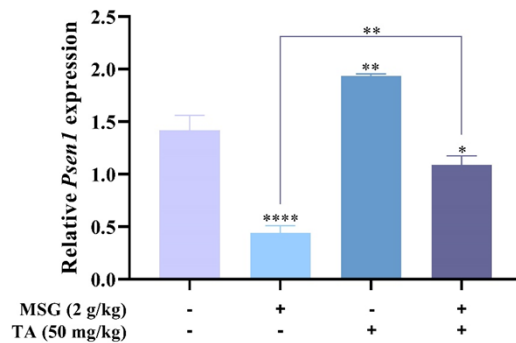
Figure 3. Relative gene expression of *Psen1*

Psen2 expression was significantly downregulated in the cortex of MSG-treated rats compared to control. It was observed that suppressed *Psen2* expression approached control with the application of TA combined with MSG (Figure 4).
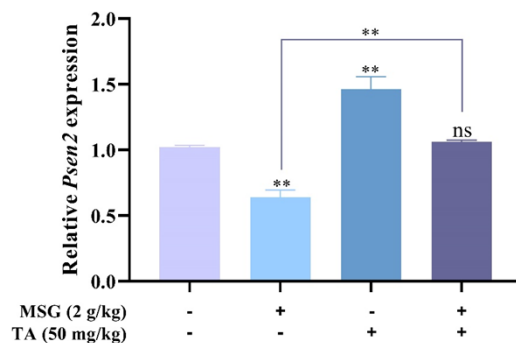
Figure 4. Relative gene expression of *Psen2*

Discussion

Amyloid plaques are formed as a result of the accumulation of Amyloid β peptides and can lead to the death of neurons and the progressive signs and symptoms of Alzheimer's [20]. In 1995, LaFerla et al. concluded that the Aβ peptide is neurotoxic in Alzheimer's disease. Amyloid deposits in certain areas of the brain can interfere with normal brain function and lead to dementia, seizures, movement problems, and other neurological features. Therefore, in this study, we investigated the expression levels of Aβ-related genes in the cerebral cortex tissues of rats exposed to MSG and how these expression levels changed with the application of TA [21].

Amyloid Precursor Protein (APP) is a membrane protein that is expressed in many tissues, including the brain and spinal cord (central nervous system), and is concentrated in the synapses of neurons [22]. The most well-known role of APP is in synaptic formation and repair. APP is cleaved by beta and gamma secretase enzymes. One of the fragments formed as a result of this cut is the Aβ peptide. Therefore, APP is known as the precursor molecule that produces amyloid beta (Aβ) found in the brains of Alzheimer's patients [23]. *App* expression is upregulated after neural injuries and during neuronal differentiation. Therefore, the logical inference is that *App* will also be elevated due to excessive accumulation of Aβ in Alzheimer's disease. Januz et al. (2000) concluded in their study that a reduction of approximately 50% in Aβ plaques is sufficient to positively affect cognition [24]. In this study, it was observed that there was a significant increase in the expression of *App* mRNA in the cortical tissues of animals treated with MSG, however, TA application combined with MSG could prevent this increase in expression in the cortical tissues of animals. These findings suggest that TA may be a safe and preventive modulator against MSG-associated Aβ accumulation.

Presenilins are defined as proteins that regulate APP processing through their effects on gamma secretase, an enzyme that breaks down APP. It is one of the four core proteins in the PS-1 gamma secretase complex and is known to play an important role in the production of Aβ from APP [25]. Presenilin 2 is known to be functionally homologous to presenilin 1. Processing of γ-secretase substrates is known to be reduced in *Psen1/Psen2* gene knockout mouse models. Saura et al. (2004) generated a transgenic knockout mouse that lacked both *Psen1* and *Psen2* in the postnatal forebrain [26]. Mice showed impairments in hippocampal memory and synaptic plasticity at 2 months of age and later developed neurodegeneration in the cerebral cortex. The authors concluded that *Psen1* and *Psen2* have important roles in synaptic plasticity, learning, and memory. Complete loss of Psen function in the brains of mice causes neurodegeneration [26]. A significant reduction in *Psen1* and *Psen2* mRNA expression was observed in the cortical tissues of animals treated with MSG in this study. However, it was observed that this reduction could be prevented in the cortical tissues of animals treated with TA in combination with MSG, and its expression level approached control. These findings suggest that TA is a safe and preventive modulator against MSG-induced Aβ-related abnormalities.

Like loss of PSEN function, downregulation of NCSTN levels leads to a massive accumulation of C-terminal fragments of the β-amyloid precursor protein. Downregulation of *Ncstn* strongly lowers levels of the *Psen1* complex. Therefore, it was concluded that *Ncstn* and *Psen* regulate each other by influencing γ-secretase function through complex formation and determine amyloid β-peptide production [27]. These findings indicate that regulation of the *Ncstn* must be maintained to ensure neuronal stability. This study showed that exposure to MSG significantly reduced the level of *Ncstn* gene expression. However, it was observed that TA was able to combat the suppressive effect of MSG and brought the mRNA level closer to control.

Conclusions

Taken together, the findings suggest that exposure to MSG causes gene expression changes that lead to significant adverse effects in Aβ formation and neuronal health, while tannic acid may reduce the risk of diet-induced disease development by regulating the expression levels of the investigated genes.

Acknowledgement

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Comparative Evaluation of the Distribution and Antibiotic Resistance Profile of Members of Enterobacteriaceae in Broiler and Free-range (Native) Chickens in Lagos, Nigeria

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Emerging wide distribution of antibiotic-resistant bacteria of the group Enterobacteriaceae in poultry and poultry products is posing a significant public health risk. The aim of this study was to determine the comparative distribution and antibiotic resistance profile of Enterobacteriaceae present in broilers and native chickens in Lagos, Nigeria. Using standard microbiological techniques, bacteria were isolated from 110 cloacal swab samples obtained from 58 broilers and 52 native chickens. Antibiotic susceptibility testing was done using the disk diffusion method and antibiotic resistance genes were detected by PCR. Thirteen bacteria isolates including *Salmonella* spp., *Hafnia alvei*, *Enterobacter cloacae*, *Trabulsiella guamensis* and *Citrobacter yongae* were obtained from both broilers and native chickens. All isolates showed resistance to more than one antibiotic. The highest rate of resistance was to chloramphenicol (100 %), ceftazidime (92.3 %) and Trimethoprime (85 %). Fifteen percent of the isolates were resistant to meropenem, cefepime and ciprofloxacin. *Salmonella* isolates harboured bla_{TEM} gene while *Enterobacter cloaceae* and *Citrobacter youngae* possessed both bla_{TEM} and bla_{CTX} genes. Results from this study shows that both broilers and native chickens contribute to the dissemination of antibiotic resistant Enterobacteriaceae within the food chain. Hence concerted effort geared towards controlling the spread of these pathogens is imperative.

Keywords: Antibiotic resistance, Enterobacteriaceae, Poultry

A Colorimetric Biosensor Based on Enzyme-Catalysis of ATP Degradation Products

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In this study, a colorimetric biosensor system based on enzyme-catalysis-induced of ATP degradation products (inosine and hypoxanthine) was designed and produced. ATP depletion plays an essential role in the formation of ischemic injuries. The identified concentration of inosine and hypoxanthine would also be related to the health state of the body. An early diagnosis is usually crucial, and it is the ultimate goal of this study, with the help of this paper-based biosensor, to make an early diagnosis with higher sensitivity than traditional methods.

A paper-based biosensor system was developed for easy to use and cheap quantitative detection of multi analytes. The database was created by experimenting with known concentrations of analytes and getting their color intensity with the help of the smart phone application called "Color Grab".

This paper-based biosensor had many advantages, such as long storage stability, high reproducibility, easy application, less time, and fewer steps of the process, so easier to use. Selectivity, specificity, stability tests indicated the potential usability of the developed paper-based biosensor system for inosine and hypoxanthine detection in real samples with an easy-to-use method.

 Keywords: Biosensors, ATP degradation, Biotechnology, Colorimetry.

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Antimicrobial, Antibiofilm and Antiurease Activities of Silver Nanoparticles Against *Proteus Mirabilis*

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Nanoparticles (NPs) are tiny materials ranging in size from 1 to 100 nm and have unique magnetic, electrical, optical characteristics differing from the bulk materials. They have broad spectrum of applications in pharmaceuticals, electronics, optics, aviation, construction, and automotive industries (Ali, 2020). Several physical and chemical techniques such as electrochemical, thermal decomposition, chemical vapor deposition, sonochemical reduction and microwave irradiation have been applied to produce metal NPs (Cele, 2020). Alternatively, green synthesis of offers an environmentally-friendly and simple mean for NP preparation. In the present study, silver NPs were produced by *Pseudomonas aeruginosa* OG1 strain. Characterization of NPs were performed by TEM-and XRD. These NPs were used against pathogenic *Proteus mirabilis*, which occurs widely in soil and water and shows high level urease activity and forms clear biofilms. It is the cause of 90% of all *Proteus* infections and frequently related with the catheter-associated urinary tract infections (Armbruster et al., 2018). Silver NPs were applied to inhibit the growth, urease production, and biofilm formation of *P. mirabilis*. Growth inhibition zones of 9 mm and 11 mm were obtained with 100 µg/mL and 200 µg/mL NPs, respectively. 60 % and 85% antibiofilm effects were obtained by 100 µg/mL and 200 µg/mL NPs, respectively. Urease activity of *P. mirabilis* was completely inhibited in both concentrations. These results show that the silver NPs can be used as effective antimicrobial, antibiofilm, and antiurease agents in the fight against pathogens.

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Potential Effects of Resveratrol

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Resveratrol (3,5,40-trans-hydroxystilbene) is a polyphenolic phytoalexin stilbenoid produced in response to exogenous stimuli such as ultraviolet light, plant injury, or fungal infection, particularly found in grapes, peanuts, mulberries, blueberries, spruce, and Japanese knotweed compound [1, 2, 3, 4]. It has been shown in various studies that resveratrol, which has anti-aging properties, is protective against some types of cancer, ischemia, infections, cardiovascular diseases, suppresses platelet aggregation, has vasodilator, antioxidant, anti-inflammatory and antiviral properties. Sirtiun 1, known as the DNA repair gene, is also known to be activated by resveratrol. It is also known that this compound has become the focus of many scientific studies in the field of medicine and pharmacology, showing a wide variety of bioactivities such as chemoprotective, antimicrobial, cholesterol-preventing and preventing skin diseases [5, 6, 7, 8, 9, 10, 11, 12, 13, 14 , 15].

In this review study, information is given about where resveratrol, a phytoalexin stilbenoid compound, is found, what kind of positive contributions it makes to human health, and the scientific studies that have been continuously increasing from the past to the present with the knowledge of its potential. With this study, it is thought that it will lead to scientific studies that will guide and make progress for the treatment as well as the prevention of many different diseases.

Keywords: Resveratrol, stilbenoid, phytoalexin, health
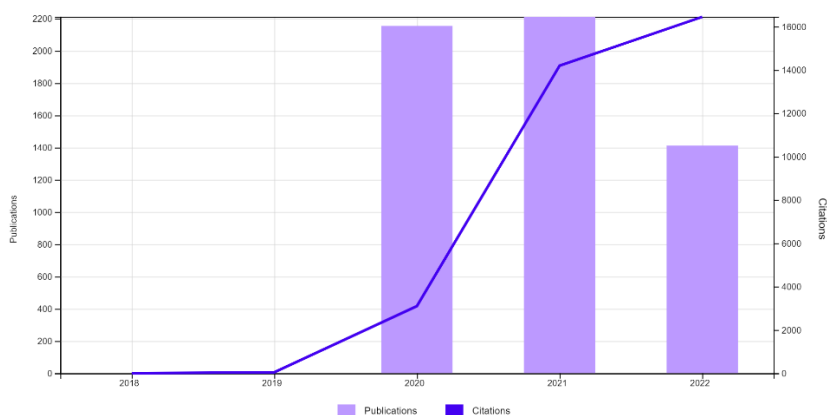
Figure 1. Resveratrol articles published between 2018-2022 (Web of Science)

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Use, Importance, Present and Future of Nutraceuticals in the Emerging Food Industry

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In recent years, important events that directly affect health and nutrition, such as war, famine, rapid population growth, air pollution, economic depression and epidemics, have led to a decrease in food resources, insufficient nutritional value of existing foods and difficult access to safe food. All these events have led to the appreciation of the nutraceutical and functional food markets, the increase in the importance of R&D studies in this field, and the creation of a portal built on healthy and safe foods with high nutritional and physiological values [1,2,3]. Nutraceuticals, which are expressed as "more than food but less than drugs", are a compound of rising value in the targeted food portal because they have similar properties to both nutrients and pharmaceuticals [1,4,5,6,7,8,9]. The term "Nutraceutical", which brings "nutrition" and "pharmacy" under the same roof, ensures that products that will contribute to the protection of our health are made ready without the need for medical consultation [10]. Known for their valuable biological activities and beneficial effects on health, nutraceuticals are bioactive or chemical compounds that promote natural healing of the body, prevention of possible diseases and treatment of existing diseases [11,12,13,14]. This review focuses on the food and health aspects of nutraceuticals, expressing the uses, current potential, possible side effects and increasing market share of nutraceuticals in the food industry.

Keywords: Nutraceutical, functional food, nutraceutical supplement

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Evaluation of Detox Drinks, Fruit and Protein Bar Consumption, Which Are a Popular Diet Trend, in Terms of Nutrition and Food Safety

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The increase in migration from the village to the city, which started with the industrialization revolution, and as a result, the active participation of women in working life has caused us to make changes in many areas of our lives, especially our eating habits [1]. In order to grow, develop, protect our health and sustain life, it is expressed as nutrition, that people take the nutrients they need in an adequate and balanced way according to their gender, age, weight, work, special situation and genetic characteristics [2,3]. Health and nutrition are the most basic needs for a person to survive and are directly related to each other [3]. Changes in our traditional eating habits and fast-food, which became widespread as a result of the accelerating routines of urban life, increased the chance of developing many diseases, especially obesity, when added to the sedentary lifestyle common in modern society [1,4,5,6]. Obesity, which is an important public health problem on a global scale, has paved the way for the emergence of many popular diet trends that ignore the relationship between nutrition and health, and many packaged food products sold under the name of diet [7,8]. It is still a mystery how healthy detox drinks, fruit and protein bars, which are at the forefront of these popular diet foods, are, to what extent they meet our daily nutrition routine and how they affect our body resistance. In this review, it is aimed to evaluate the possible effects of detox drinks, protein and fruit bars on body weight, nutrition and health in the short and long term in the light of current literature.

Keywords: Popular diets, detox diet, nutrition

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Regional Differences of Yoghurt in Traditional Turkish Cuisine

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Yogurt, which is the basic component of the nutrition culture of many societies that have existed in the world from the past to the present; It is a highly nutritious food rich in calcium, phosphorus and B vitamins, containing quality protein, lipids and carbohydrates, and high in dry matter [1,2]. Yogurt, which is known to originate from the Turks living in Central Asia, has been shaped and diversified by the influence of various cultures, regions and even technological developments [4,5,6,7]. The production process of yoghurt, which traditionally consists of milking, boiling, cooling to a certain temperature,resting by adding a piece of yoghurt and fermentation , varies according to the type of animal being milked and the locally varying fermentation and storage conditions [8,9,10,11,12]. In this review, by mentioning the changes that yogurt has experienced throughout the historical process, its place and diversity in Turkish society and in our country, which is a common cultural bond between societies; The differences of yoghurt in Turkish cuisine according to the regions are explained.

Keywords: Yogurt, traditional yoğurt, Turkish yogurt

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An Important Health Compound: Piceatannol

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Piceatannol (3, 4, 3′, 5′-tetrahydroxy-trans-stilbene) is a structural analogue of resveratrol, which is commonly found in grape, passion fruit, white tea and Japanese macaque plants and exhibits extensive pharmacological activities with properties such as antitumor, anti-inflammatory and antioxidant. Recently, it has attracted a lot of attention in terms of its biological activities. Unlike resveratrol, its melting temperature is between 223-226 0C and its molecular weight is 224.44 g/mol. Piceatannol is insoluble in water like resveratrol, but soluble in ethanol and dimethyl sulfoxide [1, 2, 3, 4, 5]. Recent studies have reported that piceatannol can alleviate neurological deficits and behavioral disorders in an animal model [6]. However, the prominent biological activities of piceatannol are antimutagenic [7], anticancer [8, 9, 10], antiparasitic and antibacterial [11, 12, 13], antiatherosclerotic [14], antiobesity, antidiabetic and anti-aging [15], antimicrobial [16], wart-curing [17], anti-angiogenic and anti-metastatic [18] effects can be given as examples. Piceatannol stands out as a remarkable compound in many scientific arenas, especially in medicine and pharmaceutical industry, with all these biological activities it has.

In the light of this information, it is thought that piceatannol, an analogue of resveratrol with therapeutic potential, contributes positively to human health, and with its increasing popularity, it will lead to scientific studies that will lead and advance in the prevention of the treatment of many different diseases.

Keywords: Piceatannol, resveratrol, stilbenoid

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Yogurt Preservation Methods in Traditional Turkish Cuisine

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In this study, it is aimed to reveal the variety and difference of preservation methods, which is one of the important factors in ensuring the continuity of yogurt, which has an important place in traditional Turkish cuisine and one of the leading milk and dairy products. Due to the nomadic lifestyle of the Central Asian communities, which is the origin of yoghurt, the food is portable, the winters are long and dry; For this reason, many reasons such as the fact that food supply is very difficult in the winter months, and the absence of technological devices that provide long-term preservation of food, as it is now, have led to the development of superior storage techniques for the preservation of food [1,2,3]. Many techniques have been developed in Anatolia to extend the shelf life of yogurt, which has been an important food source known to Turkish communities since ancient times. At the beginning of these are methods such as making pescutane, kurut, yoghurt powder, tarhana and storage with tallow oil. Although this diversity is based on the same principles, it varies locally [4,5,6,7,8,9,10].

Keywords: Food storage, Turkish cuisine, storage methods

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Biological Evaluation of *5,6,7-Trimethoxy-2,3-dihydro-1H-inden-1-ol* as Anticancer Agent

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The indane ring is the most studied skeletal structure in terms of being a biologically active molecule in synthetic chemistry (1). Natural compounds with the indane ring and indinavir, an inhibitor of the HIV-1 protease, also contain this ring, as do molecules with the names indantadol (an MAO inhibitor), indatralin (an amine uptake inhibitor), klidanac (an anti-inflammatory), indecainite (an antiarrhythmic), indacrinon (a diuretic), donepezil (an anti-Alzheimer) (2). The antibacterial, antifungal, and antiviral properties of indan-alcohol derivatives are particularly potent against cancer (3). Colorectal cancer is among the most frequent kinds of cancer in the globe. The metastatic, recurring, or locally aggressive tumors that are present in colorectal cancer necessitate the development of more efficient and novel treatment modalities (4). *Acinetobacter baumannii* and Methicillin-resistant *Staphylococcus aureus* (MRSA) are the most important pathogens responsible for hospital-acquired nosocomial infections at worldwide. In recent years, *A. baumannii* and MRSA have developed resistance to many antimicrobial agents (5). Therefore, there is an urgent need for the development of novel antibacterial drugs. For this purpose, we investigated anticancer activity against the colorectal cancer cell line (Caco-2), toxicity against the healthy cell line (Fibroblast), and antibacterial properties against *A. baumannii* and MRSA of previously synthesized *5,6,7-Trimethoxy-2,3-dihydro-1H-inden-1-ol* (6). According to the WST-8 test results, the compound was observed that it had a low toxic effect on fibroblast cells while killing cancer cells, with an IC50 value of 5.24 µM. In the antibacterial test results, it was determined that the synthesized compound did not have antibacterial activity against the tested bacteria. In summary, an alcohol derivative with an indane ring was found to be effective as an anticancer agent, although it did not have antibacterial activity.

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A Study on Cryoconites of Horseshoe Island (Antarctica)

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Cryoconite holes are unique microbial ecosystems formed by organic material trapped inside a glacier. Due to their extreme and highly isolated nature, these formations have attracted a great scientific attention with their biodiversity. Microbial hosts of these extreme habitats serve as a valuable source for astrobiology, biotechnology, cryobiology and climate change studies [1-2].

In this regard, our present study was conducted to investigate the presence of cryoconite holes in Horseshoe Island (Antarctica). During the 6th Turkish Antarctic Expedition (TAE-VI), 20 of Antarctic cryoconite holes were found. Their locations, distances from the glacial surface and characteristics of the organic matter was recorded. Moreover, each of the cryoconite holes were also photographed. According to the results, each hole observed in the field was Antarctic type of cryoconite holes characterized by an ice cap. The depths of the holes ranged from 10-27 inches. The consistency, color and texture of the organic matter also showed unique characteristics for each sample.

Consequently, 20 cryoconite holes were recorded in Horseshoe Island by this study for the first time. With future biodiversity studies, resources will be provided to biological sciences.

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MATHEMATICS
ORAL PRESENTATIONS

ID: 161-MOP

The Solution of Linear and Non-Linear Differential-Algebraic Equations (DAEs) with Laplace-Padé Method

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In this paper, we apply Laplace-Padé method to solve linear and non-linear differential-algebraic equations(DAEs). Firstly, The basic properties of the Laplace-Padé method are given. Secondly, we calculate Power series of the given equations system, then transform it into Laplace-Padé series form, which gives an arbitrary order for solving differential-algebraic equations(DAEs). Then, the three linear and non-linear differential-algebraic equations(DAEs) are solved by Laplace-Padé method. This means that Laplace-Padé method is a powerful tool for solving linear and non-linear differential-algebraic equations(DAEs).

Keywords: Differential-Algebraic Equations(DAEs), Power series, Laplace-Padé method

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Approximate Bound States of Schrödinger Equation for The Generalized Cornell Plus Yukawa Class Potential

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Schrödinger equation approximate bound states are obtained in the framework of quasi-exactly solvable problems, 106odüle106 generalized Cornell plus Yukawa class potential. The radial equation is transformed to the biconfluent Heun equation with the help of an adequate approximation scheme, where the eigenfunctions and the eigenvalues are obtained in closed-form. At last, few approximate bound states and energy levels are computed.

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New ``Conticrete" Hermite-Hadamard-Jensen-Mercer Fractional Inequalities

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The present attempt provides novel conticrete Hermite-Hadamard-Jensen-Mercer type inequalities for convex functions that unify continuous and discrete versions into single forms. They come out as a result of using Riemann-Liouville fractional operators with the joint implementations of the notions of majorization theory and convex functions. The obtained inequalities are in compact forms, containing both weighted and unweighed results, where by fixing parameters, new and old versions of the discrete and continuous inequalities are obtained. Moreover, some new identities are discovered employing which, bounds 107odüle107 absolute difference of the two left-most and right-most sides of the main results are established.

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A Logistic Equation with Constant Immigration, for Modeling COVID-19 Spreading Waves

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Some recent papers have modelled the growth dynamics of COVID-19 in several countries for the first wave using the logistic equation and getting agreeable results. However, we got poor results when using it to model the other waves (second, third and fourth). To overcome this flaw, we used a logistic equation involving constant immigration. The study was conducted in several countries, including Italy, Turkey, Austria, Russia, Japan, Algeria, Jordan, Iraq, Morocco, and Qatar. Using data from the Center of Systems Science and Engineering (CSSE) and World Health Organization (WHO) reports. One has estimated the model parameters for the other waves through linear regression (after performing a suitable variable change that transforms the nonlinear model into a linear one). According to a comparative study between our approach and the existing one, we conclude that our approach has higher accuracy for all waves.

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Exact Sequences for Gamma Modules

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The 109odüle of a Γ-ring was introduced by N. Nobusawa in 1964 [4], and then W.E. Barnes generalized Nobusawa's definition by weakening the conditions and developed the more general Γ-ring in which all the classical rings are contained in this Γ-ring [2]. Since then the theory of Γ-rings have been extensively investigated by a number of mathematicians to develop many basic characterizations of Γ-rings.

The 109odüle of gamma 109odüle was firstly introduced by Kyuno in 1977 [3]. Later, Ameri and Sadeghi redefined the gamma 109odüle by adding another condition to the definition given by Kyuno and also defined unitary gamma 109odüle. In addition, many basic concepts related to gamma 109odüle structure are defined and isomorphism theorems in gamma modules are proved [1].

Gamma module sequences are required to give a characterization of projective and injective modules. For this purpose, we obtained some results about exact sequences of gamma modules and investigated some special gamma module structures.

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Closed-Form Solutions of 2-dimensional Systems of Recurrence Equations

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The present paper deals with the solutions of these two systems of nonlinear difference equations

$$x_{n+1} = \frac{1}{y_n(x_{n-1}-b)-a}, \quad y_{n+1} = \frac{1}{x_n(y_{n-1}-b)-a}, \quad n \in \mathbb{N}_0,$$

$$x_{n+1} = \frac{-1}{y_n(x_{n-1}+b)-a}, \quad y_{n+1} = \frac{-1}{x_n(y_{n-1}+b)-a}, \quad n \in \mathbb{N}_0,$$

where the initial values x_{-1}, x_0, y_{-1}, and y_0, and the parameters a and b are arbitrary real numbers.

The main purpose of this work is to represent the general solution of some particular cases of these two systems in terms of Padovan, Tribonacci, and generalized Pell with negative index numbers.

Keywords: System of difference equation, General solution, Padovan numbers, Tribonacci numbers, Generalized Pell with negative index numbers.

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Anti-Synchronization between Fractional-Order Chaotic System and Integer-Order Chaotic System

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Abstract

This paper investigates the phenomenon of anti-synchronization between the fractional-order lesser date moth and the integer-order chaotic system. Based on Lyapunov stability theory and numerical differentiation. Nonlinear feedback control is the method used to achieve the anti-synchronization of chaotic systems addressed in this paper. Numerical examples are implemented to illustrate and validate the results.

Keywords: Chaos, Anti-Synchronization, Nonlinear Control, Fractional-order chaotic system, Integer-order chaotic system.

Introduction

Chaos is a fascinating nonlinear phenomenon that has received a lot of attention in recent years. over the course of the previous two decades. The chaos theory has proven to be effective in a wide range of situations. Such as data encryption [19], financial systems, biology and biomedical engineering [2], etc. Fractional-order chaotic dynamical systems have begun to attract a lot of attention in recent years and can be seen as a generalization of chaotic dynamic integer-order systems. The synchronization between the fractional-order chaotic system and the integer-order chaotic system is thoroughly a new domain and has begun to attract much attention in recent years because of its potential applications in secure communication and cryptography. Obviously, the synchronization between fractional-order chaotic system and integer-order chaotic system is more difficult than the synchronization between fractional-order chaotic system or integer-order chaotic system for different order of their error dynamical system. As a special case of generalized synchronization, anti-synchronization is achieved when the sum of the states of master and slave systems converge to zero asymptotically with time. In this research work, we apply nonlinear control theory to antisynchronize two chaotic systems when a fractional-order system is chosen as the drive system and a integer-order system serves as the response system, The anti-synchronization capability of the approach is demonstrated using a fractional-order lesser date moth chaotic system and an integer-order chaotic system.

Problem Formulation for Fractional-Order and Integer-Order Chaotic System

Consider the following fractional-order chaotic system as a drive (master) system

$$D^{\alpha} x_1 = Ax_1 + g(x_1) \qquad (1)$$

where $x_1 \in R^n$ is the state vector, $A \in R^n$ is the linear part, $g(x_1)$ is a continuous nonlinear function, and D^{α} is the Caputo fractional derivative. Also, the response system (slave) can be described as

$$\dot{x_2} = Ax_2 + g(x_2) + u \qquad (2)$$

where $x_2 \in R^n$ is the state vector, $A \in R^n$ is the linear part, and $g(x_2)$ is a continuous nonlinear function and $u \in R^n$ is the control. Define the anti-synchronization errors as

$$e = x_2 + x_1.$$

The anti- synchronization error system between the driving system (1) and the response system (2) can be expressed as

$$e^{\cdot} = \dot{x_2} + \dot{x_1}$$

where $\dot{x_2}$ is obtained from the response system (2), while no exact expressions of $\dot{x_1}$ can be obtained from the driving system (1). Therefore, numerical differentiation method is used to obtain $\dot{x_1}$. According to the definition of derivative, derivative is approximately expressed using difference quotient as

$$g'(a) \approx \frac{g(a+h) - g(a)}{h} \qquad (3)$$

$$g'(a) \approx \frac{g(a) - g(a+h)}{h} \qquad (4)$$

where (h > 0) is a small increment. Formulae (3) and (4) are called the pre-difference formula and the post-difference formula, respectively. the global anti-synchronization problem is essentially to find a feedback controller u so as to stabilize the error dynamics for all initial conditions $e(0) \in R^n$.

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ENGINEERING
ORAL PRESENTATIONS

ID: 149-EOP

Numerical Analysis of a Solar Air Heater with Sinusoidal Corrugations on Absorber Plate

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It is necessary to focus on renewable sources of energy due to an increase in energy consumption and continuous reduction in fossil sources. The use of solar air heaters is common in domestic, agricultural, and industrial areas. However, the efficiency of conventional air heaters is low. Efficiency is increased by adding roughness, fins, etc. on the absorber surface**.** In this study, the turbulent airflow sinusoidal wave air heater was compared with a smooth duct in order to observe the enhancement in the Nusselt number with the Reynolds number investigated in the range of 4000 to 16000. The numerical study is designed with 2D in ANSYS Fluent software. The duct geometry is divided into three parts entrance, test, and exit according to the ASHRAE 93 standard [1]. The sinusoidal corrugation is designed with a wavelength (λ) of 10 mm and an amplitude (α) of 1.5 mm. A constant heat flux of 1000 W/m^2 was applied to the aluminum absorber plate in the test section. Other walls are designed adiabatically. Incompressible, no-slip conditions and steady and turbulent flow are designed using the RNG k-ε model with enhanced wall treatment. The sinusoidal corrugated design increased the friction factor and Nusselt number by 2.31 and 2.25 times respectively in comparison with a smooth duct. Thermo-hydraulic performance parameter (THPP) is defined to evaluate the overall performance of a solar duct with sinusoidal corrugated. In the literature, it has been stated that a THPP value greater than 1 is suitable for the practical use of the air heater [2]. The maximum THPP obtained is 1.87 at Reynolds number 16000. Also, the Nusselt number increased under all conditions with an increasing Reynolds number.

Keywords: solar air heater, sinusoidal corrugation, numerical analysis

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Determination of Output Voltage of Li-FePO4 Battery Cells Using Artificial Neural Networks Under Variable Current Profile

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Abstract

The duties of Li-ion batteries in the usage areas are increasing their importance day by day. Various Li-ion battery units are used in strategic systems in the defense industry, space industry, automotive industry, energy usage areas and biomedical areas. In addition, the current demanded by these systems from the power supply is not always constant and changes dynamically. Therefore, it is clear that conducting studies on battery cells and battery units in the electrochemical structure of $Li\text{-}FePO_4$, one of the Li-ion battery derivatives that come to the fore with its reliability, with current methods will guide new research areas. In this study, experimental dynamic charge/discharge data on A123 Systems ANR26650 $Li\text{-}FePO_4$ battery cells have been investigated. Non-linear current, voltage, and state of charge information are transferred to the artificial neural network method. It is aimed to estimate the output voltage, which is one of the important parameters, with the highest accuracy by following the irregular current profiles and changing state of charge values. Algorithms in the internal structures of artificial neural networks are also compared with each other and a consistent method is determined with the help of statistical error types. The actual error values of the results, the squares of the errors, the mean values of the squares of the errors, and the correlation coefficient are determined and the method of the study is interpreted.

Keywords: Neural networks, parameter, estimation, $Li\text{-}FePO_4$, dynamic.

Introduction

In industrial applications, the current demanded by the systems from the power supply is often not constant. It is known that especially electric vehicles have a dynamic current profile during driving. The user load profile in energy storage systems is also similar [1]. In order to transfer the information of battery blocks that provide energy to systems with dynamic current profile to simulation and testing processes, it is necessary to model with stable methods or to make parameter estimations. Generally, in battery technology types used in energy storage units, the charge rate is lower than the discharge rate [2]. Therefore, the dynamic variation of the charge/discharge current during the specified test periods

makes the estimation of the current and voltage profiles more complicated than the operations with constant current. To obtain stable results, it is important to overcome the complexity of the processes by choosing the most accurate methods in parameter estimation. In this direction, methods such as artificial intelligence (AI), artificial neural networks (ANN), and deep learning (DL), which are supported by up-to-date technological developments, are applied to different scientific fields. In optimization-based studies in Li-ion battery technologies, basic heuristic methods such as genetic algorithm and particle swarm optimization are generally preferred [3]. The artificial bee colony (ABC) algorithm, which is one of the new methods, has been adapted to these systems recently [4]. The transfer of the ANN method to this Li-FePO$_4$-based study is also important in terms of contributing to the literature.

The service life of Li-ion batteries varies according to the environmental conditions in which they are used and the charge/discharge profile [5]. Lithium batteries are designed in different electrochemical types due to their advantages and disadvantages such as price, performance, reliability, and cycle life. One of the most advantageous in terms of production cost and reliability is the Li-FePO$_4$ chemistry type [6]. Li-FePO$_4$ battery cells generally have a voltage range of 3.5-2.5 (nominal 3.2-3.3 V), energy density of 120-150 Wh/L, specific energy amount of 80-90 Wh/kg, specific power of 200-300 W/kg, 1500-2000 cycle life [7].

The parts of this study can be summarized as follows: In Section 2, information is given about the ANN method used in the study. Experimental test data and ANN results are compared in Section 3. In addition, the internal algorithms in the ANN are also compared with each other. As a result of the comparisons, the performance of the ANN is commented on by considering the error-based statistical methods. Section 4 summarizes the results at the conclusion of the study.

Artificial Neural Network

Inspired by the neurological communication between the body and the brain, ANN sees the functioning of the human brain as a guide. Intercellular communication in the body is provided by neurons. The neurons shown in Fig. 1 are divided into four parts in terms of their anatomical structure: nucleus (core), axon, dendrite, and synapse [8, 9]. The data transmitted to the nucleus, which is the data processing center, through dendrites, is transferred to the axon after the nucleus. Data from the axon are transmitted to other neurons by means of electro-neurological signals. Similar to biological neural networks, ANN contains nerve cells [10, 11]. ANN and brain have fundamental similarities: ANN accesses information by training, neurons seen as weights are responsible for storing information [12].

In the fundamental ANN method given in Fig. 2, communication is provided by systemic neurons. In ANN, besides the input and output data, there are different number of layers between these two stations. When the literature is examined, it is seen that there is no definite agreement on the number of neurons in the hidden layers of ANNs. In addition,

the number of neurons is not clear because the subject studied, the method used, and the desired outputs differ in the studies. Therefore, the number of neurons is determined by trial and error [10]. ANNs, which have the ability to learn nonlinear relationships between variables in the objective function, are widely preferred in many areas such as optimization, clustering, estimation, classification, and simulation [13]. In the estimation studies in the literature with ANN, comparisons are made by making error-based performance measurements such as R^2, RMSE, MSE, MAE, MAPE (%) between the results and the actual values.
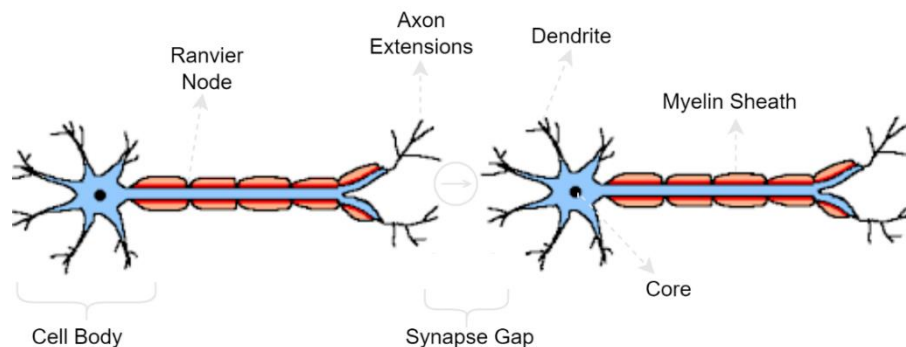
Figure 1. Biological neuron structure
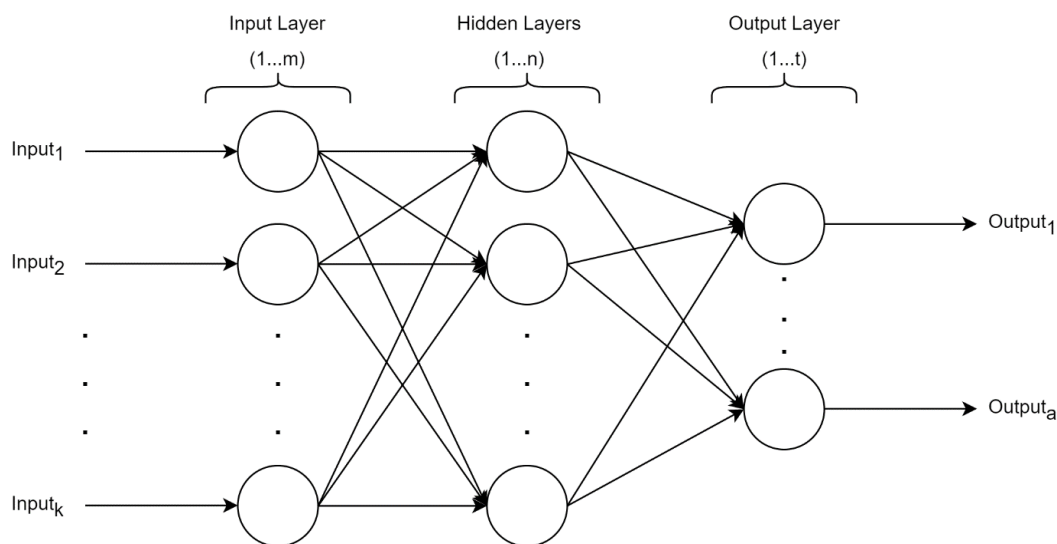
Figure 2. Neuron structure of ANN

Detection of Dynamic Voltage Profile Using Artificial Neural Network

In cases where there is no possibility of experimental testing of battery cells, it can be used by obtaining the desired data from reliable data banks [14, 15]. The data examined in this study have been taken from the CALCE Battery Research Group database [16-18]. Dynamic cell voltage (V_T), dynamic current profile (I) and state of charge (SoC) change for A123 Systems ANR 26650 Li-FePO4 2500 mAh electrochemical battery cell are given in Fig. 3 and Fig. 4.
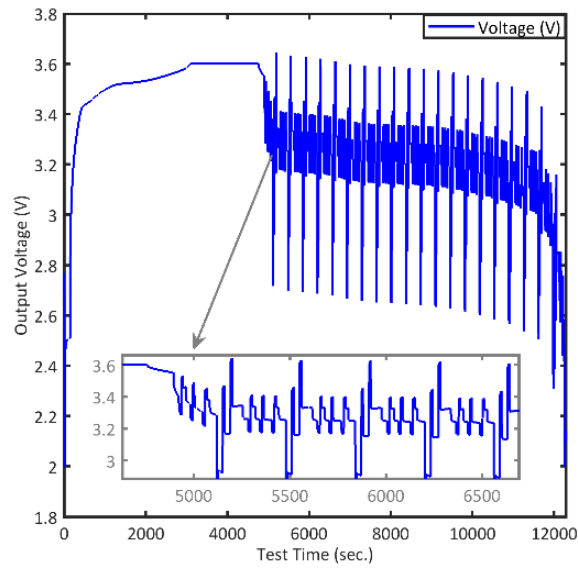
Figure 3. Experimental actual values of V_T change
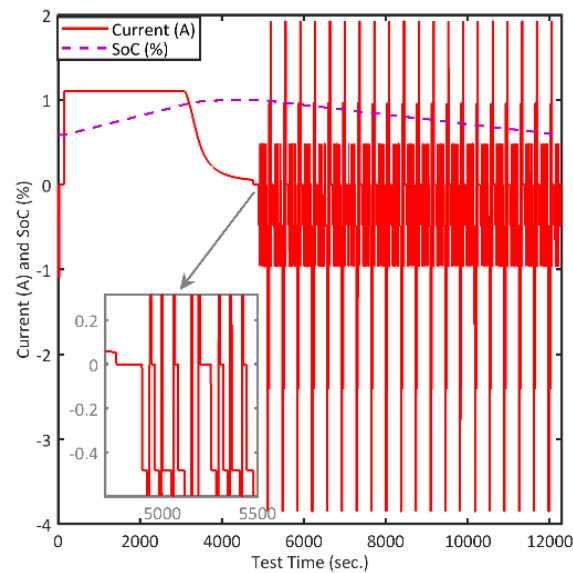
Figure 4. Experimental actual values of I and SoC change

When the simulation study is performed with the curve fitting (CF) method, it is seen that the most consistent cases provide an average of 65% regression coefficient in the estimation of only current-dependent voltage situations. When the 5th degree polynomial equation is established depending on the value of I and SoC, it is seen that the most consistent cases provide an average of 96% regression coefficient as seen in Fig. 5. However, increasing the number of variables and the degree of equations has a detrimental effect on the stability of the system. This situation necessitates the application of different methods that can be stable.
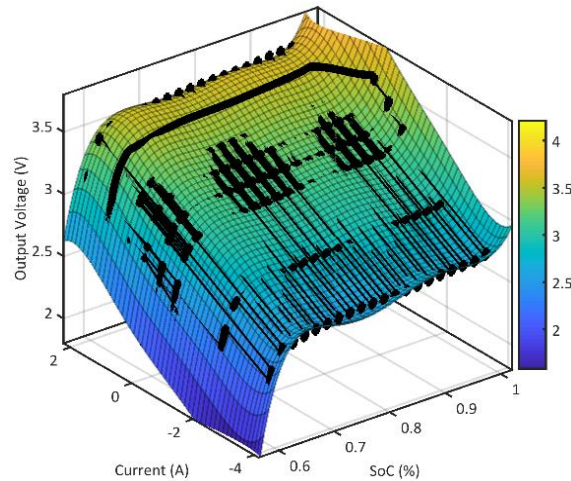
Figure 5. Simulation study with CF method (Regression coefficient 96%)

Table 1. Training performances of ANN internal algorithms

	Training Algorithm	Number of Hidden Neurons	MSE	Regression R Values
Training	Levenberg-Marquardt	10	$(4.9624)10^{-4}$	0.9948
	Bayesian Regularization	10	$(4.4384)10^{-4}$	0.9955
	Scaled Conjugate Gradient	10	$(2.8565)10^{-3}$	0.9711
	Levenberg-Marquardt	20	$(8.0438)10^{-4}$	0.9920
	Bayesian Regularization	20	$(1.7517)10^{-4}$	0.9982
	Scaled Conjugate Gradient	20	$(1.8340)10^{-3}$	0.9814
	Levenberg-Marquardt	30	$(2.4098)10^{-4}$	0.9975
	Bayesian Regularization	30	$(1.7715)10^{-4}$	0.9981
	Scaled Conjugate Gradient	30	$(2.6156)10^{-3}$	0.9732

As seen in Table 1, Table 2, and Table 3, three different training algorithms in the internal structure of the network have been used in the simulation studies with ANN. Among these internal algorithms, Levenberg-Marquardt is fast, but requires large memory size. The training of the algorithm automatically ends when the simulation study stops developing. In Bayesian Regularization, more time is needed for iterations. It can be a good classification choice for small size data with high complexity and noise level. Training is stopped according to adaptive weight minimization. The Scaled Conjugate Gradient algorithm requires less memory for training. Similar to Levenberg-Marquardt, training of the algorithm automatically ends when the simulation study stops developing. In this

study, the training rate is 70%, the validation rate is 15%, the testing rate is 15%, and the number of training is 10.

Table 2. Validation performances of ANN internal algorithms

	Training Algorithm	Number of Hidden Neurons	MSE	Regression R Values
Validation	Levenberg-Marquardt	10	$(3.5026)10^{-4}$	0.9969
	Bayesian Regularization	10	0	0
	Scaled Conjugate Gradient	10	$(2.1924)10^{-3}$	0.9767
	Levenberg-Marquardt	20	$(8.5410)10^{-4}$	0.9913
	Bayesian Regularization	20	0	0
	Scaled Conjugate Gradient	20	$(1.4427)10^{-3}$	0.9859
	Levenberg-Marquardt	30	$(2.1024)10^{-4}$	0.9978
	Bayesian Regularization	30	0	0
	Scaled Conjugate Gradient	30	$(2.4806)10^{-3}$	0.9753

Table 3. Testing performances of ANN internal algorithms

	Training Algorithm	Number of Hidden Neurons	MSE	Regression R Values
Testing	Levenberg-Marquardt	10	$(3.6334)10^{-4}$	0.9964
	Bayesian Regularization	10	$(7.1956)10^{-4}$	0.9928
	Scaled Conjugate Gradient	10	$(2.6682)10^{-3}$	0.9727
	Levenberg-Marquardt	20	$(7.7995)10^{-4}$	0.9914
	Bayesian Regularization	20	$(2.6748)10^{-4}$	0.9973
	Scaled Conjugate Gradient	20	$(1.4582)10^{-3}$	0.9848
	Levenberg-Marquardt	30	$(1.2692)10^{-4}$	0.9988
	Bayesian Regularization	30	$(4.9960)10^{-4}$	0.9954
	Scaled Conjugate Gradient	30	$(2.8038)10^{-3}$	0.9719
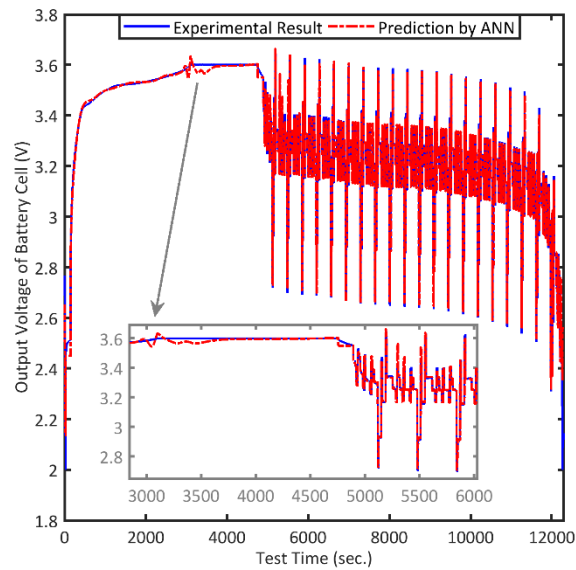
Figure 6. Actual and estimated values of battery output voltage
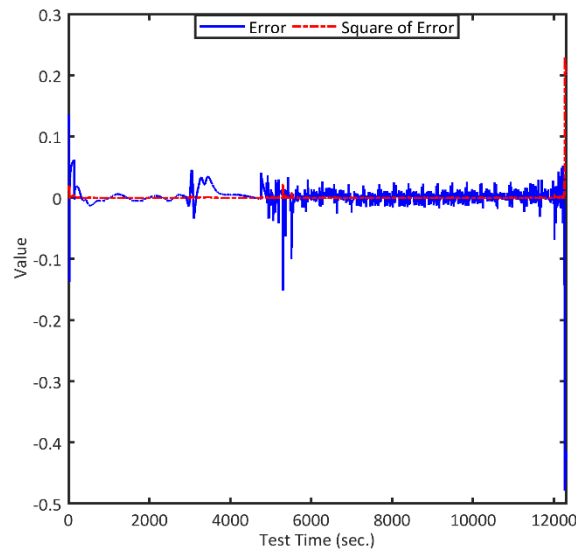
Figure 7. Error statistics between actual and estimated values of battery output voltage

When the training conditions in Table 1 are examined, the two best performances are exhibited by Bayesian Regularization with 20 neurons and Bayesian Regularization with 30 neurons. Levenberg-Marquardt with 30 neurons has performed close to the first two performances. When the validation situations in Table 2 are examined, although Bayesian Regularization exhibits the best two performances, a random relationship has been observed between the data in the case of correlation. Levenberg-Marquardt with 30 neurons has showed the second best performance in validation. When the test cases in Table 3 are examined, Levenberg-Marquardt with 30 neurons and Bayesian Regularization with 20 neurons have showed the best performance. When the result data of training, validation, and testing situations have been examined, Levenberg-Marquardt with 30

neurons has showed the most successful performance. Therefore, the study continues by considering the output values of this algorithm.

Fig. 6 shows the real data of the V_T and the output values of the Levenberg-Marquardt algorithm with 30 neurons in the ANN. In Fig. 7, the actual error values of the relevant algorithm and the squares of the errors are given. In general, the MSE value $(2.1927)10^{-4}$ is and the correlation coefficient is 0.9978, which is quite acceptable.

Conclusions

In the study, which has been carried out using some popular methods, first of all, the artificial neural network has been defined, neurons and layers have been created. Afterwards, the variable current profile, voltage values and state of charge obtained from the experimental test data have been analyzed. By continuing the activities of the study, different training algorithms in the artificial neural network have been combined with different neuron numbers and their performances have been measured. The best performing Levenberg-Marquardt algorithm with 30 neurons has been selected and the estimation process has been started. The error, squares of the errors, and correlation values between the actual data and the estimated data have been determined. As a result, it has been observed that the artificial neural network, which offers high accuracy voltage values even in dynamic current profiles, exhibits consistent and stable behavior. Outputs that have the potential to be transferred to implementation and testing processes have been obtained.

In future studies, it is planned to compare the performances of an optimization algorithm and artificial neural network under three different dynamic flow profiles.

Acknowledgement:

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Waveguide Design and Application for Multi-Magnetron Microwave Oven

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In this study, waveguide was designed, simulated and produced for multi-magnetron oven that can reach high temperatures. Microwave oven magnetrons generate electromagnetic (EM) waves at 2.45GHz [1]. Our rectangular waveguide design, which can operate at this frequency, was analyzed in the CST Studio Suite program. It was taken so that the long side of the waveguide was between 75-105 mm and the short side was half of the long side. As a result of the simulations; When the S_{21} parameters were examined, it transmitted the 2.45 GHz EM wave for this range and the S_{11} values averaged -90 dB. In the simulations made for the oven with 2 magnetrons of 28x28x28 cm dimensions, the S_{21} parameters were around -6 dB when the two magnetrons placed opposite each other were in the same direction, while this value was approximately -186 dB when one of the magnetrons was rotated 90 degrees relative to the other. Helpful results were obtained when the long side of the waveguide was 101 mm and the short side was 50.5 mm. A waveguide suitable for these values was produced and successfully tested in a multi-magnetron oven. As a result, it has been seen that this waveguide designed for microwave ovens that can reach high temperatures with many uses such as chemistry, nanotechnology[2] and recycling[3] is applicable.

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Soft Switching for Hybrid DC-DC Boost Converter

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In this paper, a hybrid DC-DC boost converter with high voltage gain and a wide duty cycle range was proposed. After detailed analysis of the proposed converter, it was designed. Thanks to the active soft switching applied to the proposed converter, the losses due to hard switching were reduced. While the main switch of proposed converter was turning on, the main switch voltage was nearly zero during current transition and in the opposite case, the main switch current was nearly zero during voltage transition. Thus, the power losses were reduced for both cases when the main switch turned on and off. The simulation results for MOSFET and IGBT based proposed converter with active soft switching were obtained for variable loads

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The Effect of Filling Ratio on The Thermal Performance of a Thermosiphon Type Heat Pipe

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The heat exchangers are widely used in a variety of usage area. The heat exchangers including heat pipes are one of the devices whose efficiency values are considerably high. Thermosiphon type heat pipes work under gravity effect. There are some factors which affect the thermal performance of a thermosiphon. These factors can be listed as the filling ratio, working fluid, inclination angle, heating power, cooling water flow rate, heat pipe type etc. In this experimental study, the effect of filling ratio on the thermal performance of a thermosiphon was investigated. The heat pipe was 1 m long. It was separated to 3 parts whose names were evaporator (0.4m), adiabatic zone (0.2m) and condenser (0.4m). The experiments were performed at the vertical position of the heat pipe. Two kınds of working fluid was used in the study. One of them is pure water while the other one is the nanofluid including MgO nano particles. Particle concentration of the nanofluid was 1 % by weight. Three filling ratio values which were 20%, 25% and 33% of the heat pipe, were used to observe the effect of filling ratio. The heating powers were changed from 200 W to 400 W while cooling water flow rates were changed from 3 g/s to 9 g/s. Thermal efficiency values of each working fluid were calculated for each experimental conditions. The maximum efficiency value was calculated as 59.4 % when the working fluid, filling ratio, heating power and cooling water flow rate were MgO/Water nanofluid, 33%, 300 W and 3 g/s respectively. In this study, it was seen that the increase in the filling ratio also increased the thermal efficiency of the heat pipe.

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Small-Satellite Vehicle Miniature Avionics for Space Orbital Operations

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In this study, an avionics system design is presented for spacecraft carrying missions such as simultaneous reaching a common orbit, approaching a very close distance, or independent docking without ground control using various flight techniques, of any two rows of small-satellites using a space-to-ground data link with a series of orbital maneuvers. Bus; UHF includes uplink/downlink, S-band downlink, inter-satellite link communication systems, power module with two deployable solar energy systems that will both generate the power to support all mission phases and maintain positive energy balance, and the inertial reference module (IRM) that provides both attitude determination and control system (ADCS) and command and data processing (C&DH) functionality. Both attitude determination and control system (ADCS) and command and data processing (C&DH); It includes two star cameras, MEMS IMU (3-axis gyroscope and 3-axis accelerometer), three torque coils. ADCS and C&DH combine to form the IRM A unique relative navigation data link from space to place enables the transmission of images of the other nano-satellite with two infrared imagers and two visible imagers. The Orbital module that houses the camera systems also includes an inter-satellite link (ISL) patch antenna, a docking electromagnet, simple high-intensity reference LEDs to provide target aids during initial operations and to verify sensor operations in orbiting lighting conditions, a docking mechanism and guidance, navigation and control (GNC) and image processing (IP) processors. An inter-satellite link is shared between two spacecraft via a radio-range inter-satellite link to other data as well as location data from delta GPS. . In the meantime, sensors are verified and characterized via on-board navigation systems, providing high-performance attitude determination with recirculation maneuvering and relative aiming relative to other small-satellites. The work presented in this mission is intended to be used to validate and characterize systems for future applications involving high-performance, low-power processors, modular design science research, exploration missions, new technology products, and constellation missions.

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Potential and Feasibility of Residential Photovoltaic Systems in Turkiye

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Fossil fuels, which are indispensable in terms of cost in today's energy production, are on the verge of being replaced by renewable energy sources due to the greenhouse gas effects they leave behind. Renewable energy sources are clean and sustainable energy sources that are compatible with nature[1]. Among those, solar energy is the most accessible and has the highest potential regardless of geographical location. Photovoltaic (PV) systems are utilized to convert solar energy into usable energy. The use of PV systems is an excellent way to generate electricity with no by product, especially for countries that has no fossil fuel but high solar energy potential[2]. It is a good alternative for Turkiye as well, which meets most of its energy needs from fossil fuels and has a high insolation throughout the year in most regions. Therefore, in this study, the feasibility of off-grid residential PV systems in Turkiye and the obstacles in front of it are examined. Off-grid PV systems were preferred to ensure that photovoltaic systems in residences are reliable, sustainable, and independent from imported energy. Turkiye's off-grid PV system potential is spaciously and comprehensively examined by selecting one province from each of the 7 geographical regions of Turkiye. The System Advisor Model (SAM) program of the National Renewable Energy Laboratory (NREL) was used to evaluate the technical and economic feasibility of these systems[3]. Off-grid PV systems simulated using SAM are reported by technical results such as electricity generation, efficiency, and losses. The application is based on meeting all the residential energy needs in the provinces regionally from solar energy[4]. The different capacity factors due to the different sunshine hours of the selected provinces are important for the possibility of investing in off-grid PV systems in. In addition, the economic feasibility of off-grid PV systems is investigated considering the parameters such as levelized cost of energy (LCOE), levelized cost of energy storage (LCOS) and net present value of money (NPV). Another important factor that determines the applicability of PV systems is grid parity. Compliance with grid parity of the cities we selected will increase the use of off-grid PV systems by providing an alternative energy source to fossil resources in electricity generation.

Reference

[1] "IRENA – International Renewable Energy Agency", /. https://www.irena.org/.

[2] "IEA – International Energy Agency", *IEA*. https://www.iea.org.

[3] "NREL - National Renewable Energy Laboratory", *NREL*. https://www.nrel.gov/index.html.

[4] "IEEE - The world's largest technical professional organization dedicated to advancing technology for the benefit of humanity." https://www.ieee.org/.

Structural Behavior of Concrete-Filled Auxetic and Conventional Lattice Structures under Uniaxial Compression

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Auxetic structures, owing to their unique deformation properties, are growingly used in many different fields such as the defense industry, textile and biomedicine. However, structural engineering is not one of the fields where these structures are widely used and recently, some studies have been conducted to increase possible applications of auxetics in this field. Especially, the use of auxetic structures with concrete, which is by far the most used structural material, is drawing attention. In this paper, the mechanical behavior of concrete-filled Re-entrant and Arrowhead auxetics together with the concrete-filled conventional Honeycomb lattice structure were investigated numerically. In the design of these composites, attention was paid to provide the overall dimensions of the composite structures and the lattice structure densities were as close to each other as possible. Quasi-static finite element analyses of these composite structures under uniaxial compression were carried out by the Explicit Dynamics module of Ansys Workbench software. For the accuracy of the boundary conditions and the mesh size in the analysis, the numerical results of the concrete-filled Re-entrant structure were compared with the experimental results from the literature. A mesh size of 2 mm was employed in the structures and 5 mm displacements were applied to the structures in the analysis. In the comparison of the structures, the load value corresponding to the applied displacement and the energy absorption capacities obtained from the load-displacement curves were considered. As a result of the analysis, it was seen that the lowest values were obtained from the Honeycomb composite and the Re-entrant composite has the highest strength and energy absorption capacity. These results show that the concrete-filled auxetic structures outperformed the concrete-filled conventional lattice structure under uniaxial pressure.

Keywords: Auxetic, concrete-filled, finite element analysis

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Comparative Performance Analysis of Artificial Bee Colony and Particle Swarm Optimization Algorithms in Modeling Pan Evaporation

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Evaporation phenomenon is one of the most difficult parameters to predict in the hydrological cycle. It is considered as an important variable in determining reservoir capacities and irrigation water needs, in water budget calculations, and in the formation of heat flow between the earth and the atmosphere. In this respect, successful modeling of evaporation phenomenon is an important issue in many respects. Many methods such as artificial intelligence methods and machine learning techniques have been used in evaporation modeling in the literature. In recent years, metaheuristic optimization algorithms, which were inspired by the foraging behavior of living creatures in nature, have also begun to be applied in hydrological phenomena. In the current study, pan evaporation modeling was carried out with the help of Artificial Bee Colony and Particle Swarm Optimization algorithms, which are commonly used metaheuristic methods, and the performances of both methods were examined comparatively. In the studies carried out, monthly data between 2002 and 2019 of the meteorology station number 17230 which is belong to Turkish State Meteorological Service, located in Anamur district in the south of Turkey were used. In the evaluation of the results, Coefficient of Determination (R^2), Nash-Sutcliffe Efficiency Coefficient (NSE) and Mean Square Error (MSE) values were used as performance criteria. The results obtained at the end of the study were examined numerically with performance indicators and visually with time series graphs and Taylor diagrams.

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A Review on Dynamic Efficacy of Moving Loads on Beams

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Abstract

Moving-load dynamic problems are usual in engineering and day-to-day life. Every structure or machine subjected to loads that move in space and thrilled the structure or machine into vibration is such a problem. The dynamic reaction of a beam due to moving masses or moving loads has been of emphasis in the design of bridges, railway tracks, and machining operations. The emphasis of this problem detects usages in several utilizations in the field of bridges, transportation, overhead cranes, guide ways, rails, roadways, cableways, runways, pipelines, and tunnels. This article has reviewed the study of moving loads problems on beams. Generally, to assist perception and enable a shortcut to learn of moving load problems on beams to recent researchers, these problems are reviewed with helpful references for each kind of problem.

Keywords: Moving load, Vibration control, Beams

Introduction

One of the usual issues in engineering and routine life is moving load problems. Every structure or machine subject to loads that carry in the area and shake the system or machine into shaking is one of the problems in this field. Examples are countless. Vehicle-bridge interplay is a widely moving load problem that is investigated. Machine tools, vehicle discs, wood saws, drum brakes, and computer discs are simply a tiny number of parables. Till the mid-19th century, the dynamic agents of moving loads were not known. Stoke is the first researcher about a moving-load problem (moving force subject). This record was wrote-in by Timoshenko [1]. Beam kind structures are extendedly utilized in several branches of mechanical, civil, and aerospace engineering. The emphasis on moving load is detected in many usages in the field of transportation. Suspension bridges, railway and highway bridges, crane runways, guideways, cableways, rails, roadways, runways, tunnels, and pipelines are a sample of structural elements to be designed to support moving loads. Also, in the design of machining operations, many members can be designed as beams acted upon by moving loads. Several numbers of printed articles on moving-load dynamics.

In this article, we reviewed the treatment of beams under the influence of moving load. This is an almost incredible duty to record and summary all of them. Alternately, in this tutorial, some articles on moving-load problems on the beam are reported. Railway bridges

vibration by traveling trains is the first example of moving load. In subjects like these, the structure is moving in a direct path. Harmonic pure or steady force is the usual kind of moving load. The moving-mass problem is the subject expressed by the vibrancy of a beam under a moving pointwise mass, and the unique features connected to moving-load problems can say with this subject. Figure .1 showed the publications of moving loads on beams since2000-2022.
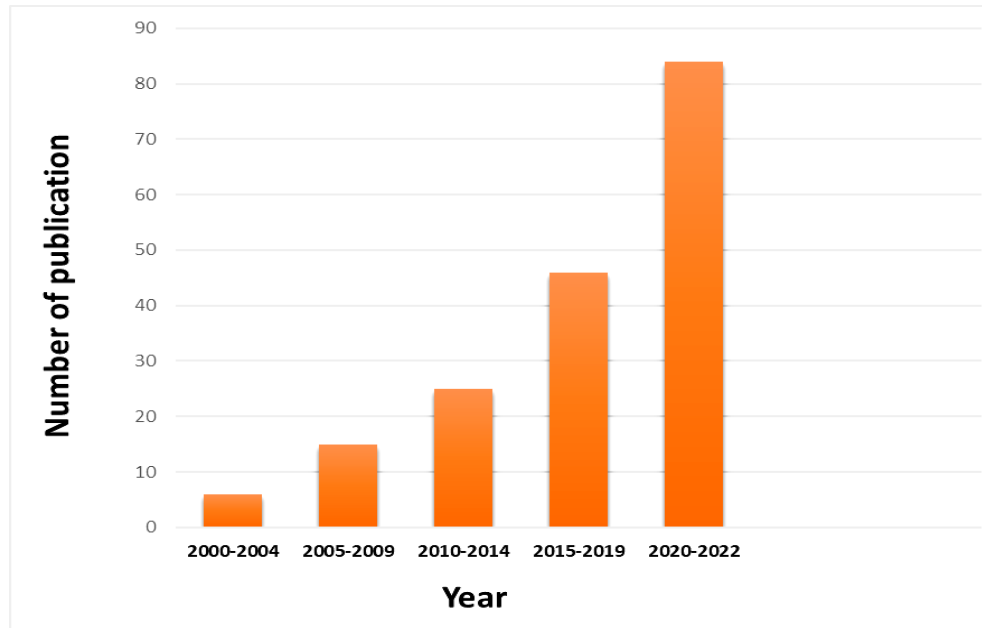
Figure 1. publications of moving loads on beams: A classification by year

Treatment of beams under the influence of moving load

Different types of problems dependent on moving loads have been described in the book via Fryba [2]. The behavior of the Euler-Bernoulli beam without any initial stress under constant moving load was studied by Krylov [3]. Buckling and the post-buckling reaction of an infinite beam on a non-linear subgrade is one of the problems investigated in ref [4] and [5]. From these results can be understood that post-buckling behavior is unstable if the nonlinear foundation can give durability and controlled the linear base. A method to examine the fault influence of a beam on a nonlinear elastic base was developed by Sheinman and Adan [6]. Also, in ref [7-10], the turbulence of the beam on a nonlinear elastic subgrade due to moving vehicle loads was explained. Infinite double Euler–Bernoulli beam by elastic subgrade with random stiffness due to an oscillating moving load was analyzed dynamically by Mohammad Zadeh et al. [11]. Also,
the behavior of finite elastic beams on adjustable bases under moving transverse load has been explained in [12]. Dimitrovová [13] has presented the moving, dynamic answer of a beam on the base with random stiffness variation and under a force moving with fixed velocity and also researched critical velocity. Studying durability and the vibration of infinite Euler –Bernoulli beams based on a Winkler-type elastic subgrade while the system is under moving load with harmonic amplitude or fixed variations and static axial force, was done by Kim [14].

Investigating numerical methods for analyzing the behavior of infinite Euler Bernoulli beams on simple Winkler and tensionless subgrade due to moving loads in ref [15] and [16] presented. Motaghian et al. [17], Toscano et al.[18], Nagaya and Kato [19] explained the free vibration of Euler-Bernoulli beams on the Winkler subgrade, the performance of passive fricative damping systems in the setting of decreasing the consequences of amplification phenomena, respectively. Lee studied the behavior of multispan beams with non-symmetric linear ends [20]. Ref [21-23] reported the free vibration and non-linear free vibration analysis of functionally graded beams due to fixed moving load on the nonlinear elastic subgrade. Analyzing the behavior of uniform Euler-Bernoulli beams that have rotational joints and translational ends was investigated by Lorenzo et al. [24].

The reaction of an infinite beam on a viscoelastic subgrade subject to concentrated moving load is explained with analytical solutions by Basu and Rao [25], and investigating this problem on the bilinear viscoelastic foundation was in ref [26]. The steady reaction of an infinite elastic and uniform beam on a Pasternak and elastic subgrade with concentrated moving load is expressed by Diego Froio et al. [27] and Mallik et al. [28], respectively. Using an analytical solution is one way to analyze the behavior of the beam that can be pointed to the research of Yang et al. [29]. Furthermore, Olson [30] so that yang use this method for the forced and free vibrancy of inhomogeneous Euler–Bernoulli beams with open cracks and Olson use it with the finite element way for the dynamical reaction of a beam under moving load with fixed speed. Hamada, by utilizing the Laplace transform technique, analyzed the dynamical behavior of the Euler-Bernoulli beam subject to moving load [31]. Linear dynamical reaction of a simply supported beam under the influence of a moving load by variable speed and constant magnitude with the effect of the Coriolis and centripetal forces studied via Michaltsos [32,33]. Using modal analysis method for the dynamical reaction of multispan non-uniform beams due to moving load with variable and constant speed was examined via Dugush and Eisenberger [34]. For investigating the dynamic reaction of elastic homogeneous isotropic and prismatic damped Euler–Bernoulli beams under moving loads, a new is presented in [35] and [36]. Argento [37], by using Galerkin's way, investigated the reaction of rotational Rayleigh beam due to axially accelerated distributed surface line load. Effects of rotational inertia on strength and frequencies of columns Rayleigh beam due to variant harmonic loads studied by Kim [38]. The dynamical behavior of the infinite Rayleigh beam on a nonlinear subgrade subject to moving load presented by Hryniewicz [39]. Performancing pre-stressed condition in the Rayleigh beam said by Omolofe [40]. A finite element technique to investigate the dynamic reaction of a beam relies on layered inertial modified Pasternak or Winkler model subgrade under moving load investigated by Shah et al.[41].

Sapountzakis and Kampitsis introduced the nonlinear reaction of shear deformable beams on tensionless nonlinear viscoelastic subgrade due to moving loads [42]. Timoshenko investigated the moving load problem by utilizing specific functions, for a simple beam under constant-speed and harmonic moving load [43, 44]. As a result, several researchers illustrated different ways to assess the shear coefficient of Timoshenko beam opinion [45-47]. Achenbach and sun used the Fourier transform as a healthy way for analyzing the

behavior of uniform Timoshenko beam with infinite length under constant velocity moving load [48]. Following references are presented the research about moving load on infinite Timoshenko beam due to harmonic moving load on various subgrades like viscoelastic, nonlinear viscoelastic, and Pasternak elastic [49-53]. Kargarnovin et al. [54, 55] used Timoshenko beam opinion for modeled bridge and the rail and two layers of parallel damped springs in connection with a mass layer. Spectral finite element (SFE) formula and solution for the vibrancy of the cracked Timoshenko beam under moving load studied by Sarvestan et al. [56].

Conclusions

In the present study, we studied a review of moving load problems on beams. Examples are countless but, in this article, we reviewed some of them. This review article can be employed via researchers from different disciplines as a perfect source for better realization of efficiency of moving load in various systems. In other words, to help understand and process a shortcut to start of science of moving load problems to new researchers, different types of moving load problems are shortly reviewed with useful references for each form of problems. From the review, the following concluding remarks are considered:

1- An investigation of beams subject to moving load, researchers can develop vibration modeling of various kinds of structures in macro- to the nanoscale.

2- Using novel and modern subgrade models under the influences of moving load can be extended considering fractional damping fractional and non-linearity. The feasible usages of these subgrade models can be explained for various structural systems like railways and bridges for vibration suppression.

3- The mechanical behavior of structures such as beams, and foundations subjected to moving load should be also investigated under the effect of different parameters such as thermal variation and cyclic loads.

4- More research is needed towards the development and analysis of moving load on beams that dynamic analysis of these models requires the development of new accurate and efficient numerical methods of solution and their computer implementation.

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Investigating The Variable Mass Pendulum with and Without Damping

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Abstract

In mechanics, variable-mass systems are systems which have mass that does not remain constant with respect to time. In this article a model of oscillation on a spring pendulum with the mass decreasing at a constant rate is presented with or without damping behavior.

Keywords: Newton's second law, variable mass systems, spring pendulum, damping.

Introduction

In mechanic science, the system of variable mass refers to system of material that the mass changes with time. To perform Newton's law of movement directly as a system, it may be confusing [1, 2]. By arrange differently of Newton's second law and adding an expression to calculating for the momentum beared by mass arriving or leaving the system can calculated the time dependence of the mass. In this article we investigated the movement of one-dimensional oscillator with reducing mass, and with or without damping at time-varying mass according to Newton's second law.

The model of oscillation with variable mass

A leak pail of water that is connected to a spring to modelling a variabe mass oscillator was investigated [3]. As showed in figure 1, water exites from a little opening at the down of the pail. In this condition, and disregard attrition, the system is under the act of three various forces, as the force applied by the fluid water, the elastic force applied by the spring, and the weight of the oscillator. This model described by Eq.(1) of movement:

$$m\frac{d^2z}{dt^2} = -\frac{dm}{dt}r - kz - mg \qquad (1)$$

that z(t) is the location of the capital of mass measured from the support location, k is the stiffness factor of the linear restituting force, $r = w - \frac{dz}{dt}$ is the relative speed of digression water with according to the capital of mass of the frame, and g is the fixed acceleration of gravity.
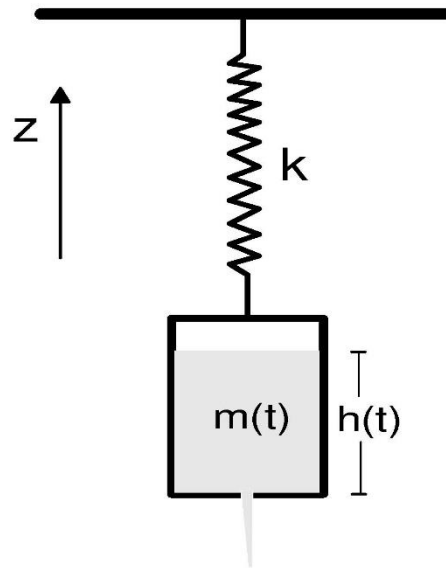
Figure 1. Pendulum with a variable mass [3].

If r=0, $\frac{dm}{dt} = 0$,and $\frac{d^2z}{dt^2} = 0$, according to Eq.(1),the balance location is:

$$z_0 = -\frac{m_0 g}{k} \tag{2}$$

that m_0 is the primary mass of the oscillator. If m is fixed, the system vacillates near the location z_0. So, by utilizing coordinate conversion:

$$z \rightarrow z + z_0 \tag{3}$$

the Eq.(1) turns into:

$$m\frac{d^2z}{dt^2} = -\frac{dm}{dt}r - kz + (m_0 - m)g \tag{4}$$

So, at every time t the "immediate" balance situation is expressed as:

$$z_0(t) = \frac{m_0 - m(t)}{k}g \tag{5}$$

The mass of water has a second-class dependency on the time that expressed as:

$$m_w(t) = m_w(0)\left(1 - ft\sqrt{\frac{g}{2h_0}}\right)^2 \tag{6}$$

that $f=\frac{a}{A}$ is the relation among the cross-sectional area a of the opening, $m_w(0)$ is the primary mass of water, and the cross-sectional area A of the column of water, and h_0 is the primary height of the column of water. The mass of the oscillator is given by the sum of the mass of the pail m_b, and the time-varying mass of water $m_w(t)$. If assume the osmosing of water happens at a very low speed, can ignore the result of the first term on the right side of Eq. (4) on the dynamics of the oscillator. In this method, the equation of movement of the oscillator expressed as:

$$[m_b + m_w(t)]\frac{d^2z}{dt^2} = -kz + [m_w(0) - m_w(t)]g \tag{7}$$

Results and discussion

In this article for primary amounts of each variables we consider following amounts. The primary mass of water $m_w(0)$, the passed time t = 0, the amount of the relation among the cross-sectional areas a and A, the primary location z = z(0), the primary speed v(0), the primary height of the water column h(0). We consider the values of position as a subordinate of time for f = 0.01. The utilized values of the other parameters are g = 9.8ms^{-2}, k = 10^2 kg s^{-1}, m_b = 1 kg (mass of the pail), $m_w(0)$ = 10 kg (primary mass of water), and h(0)= 0.5 m (primary height of the water column). According to table1, we investigated three behaviour for movement of osilator as with damping equal 5,10 and without damping. Figure2 showed while the water in the pail flows out, "immediate" balance location of the oscillator goes raising. The oscillations are clearly caused by the operation of the restoring force, as the mass of the oscillator and also its weight reduced.
In this situation can say that the system shows a usual oscillatory treatment with frequency and domain which chage when the water of pail flow out and in the end only the pail of water remains which vacillates as a harmonic oscillator.

Time	Value of damping
Between 0 and 70 second	C=0
	C=5
	C=10

We also calculate and the gravitational potential energy, W, the elastic potential energy, U_k, that the formulation of them is:

$$U_k=\frac{1}{2}k(z - \frac{m_0}{k}g)^2 \tag{8}$$

$$W=mgz \tag{9}$$

As we know, the mechanical energy of system is the sumation of the gravitational potential energy, the elastic potential energy, and the kinetic energy as showed:

$$E = T + Uk + W \tag{10}$$

Figure 3 describes the treatment of the energy of the oscillator as a follower of time. According to the figuer 3 can say that whole of energy of the system is not conserved becuase of loss of the mass of the system.

(a) C=0

(b)C=5
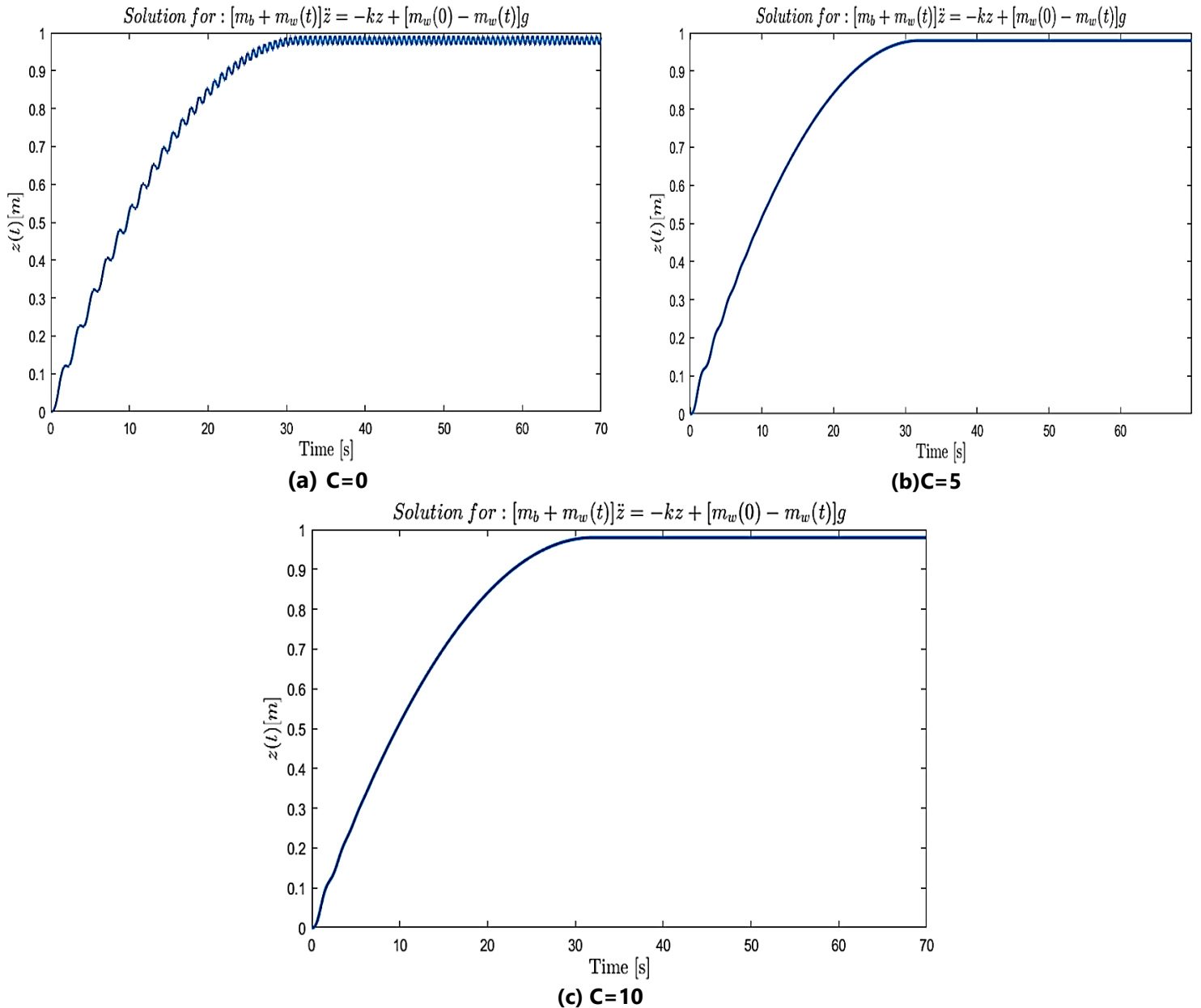
(c) C=10

Figure 2. Location as a function of time for f = 0.01
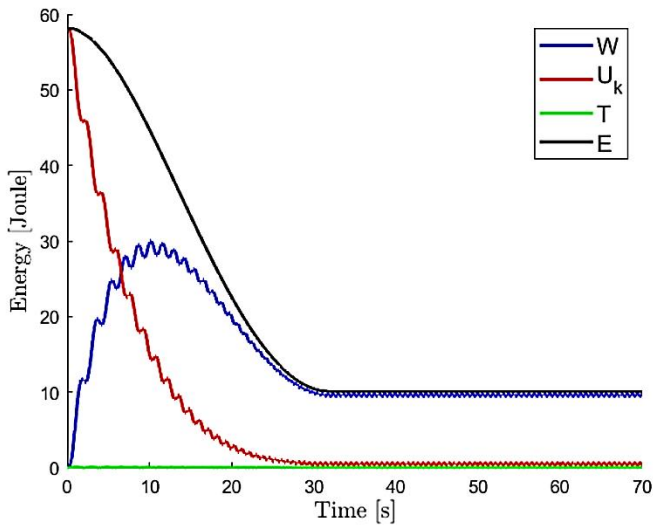
(a) C=0
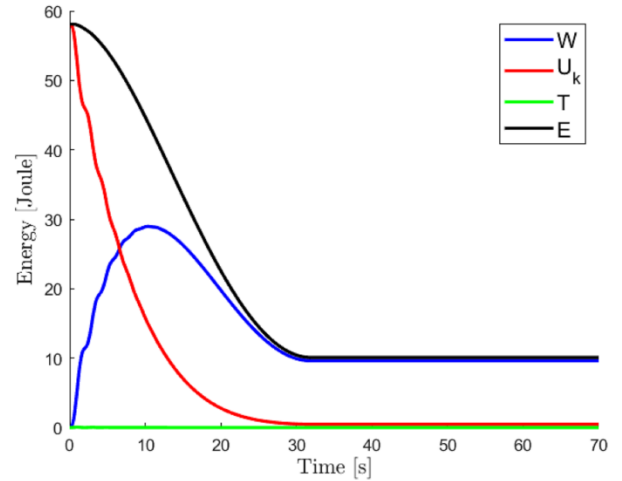
(b) C=5
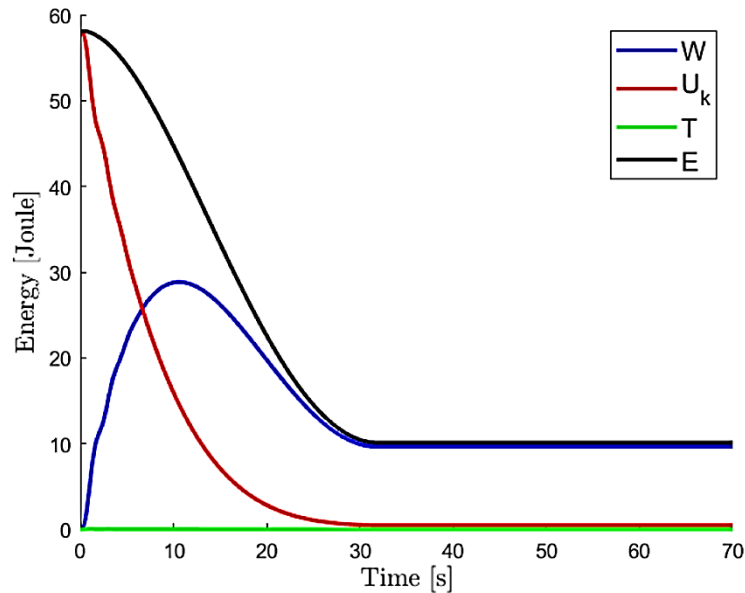
(c) C=10

Figure 3. Energy as a function of time for f = 0.01

Conclusions

In this article we describe the manner of variable mass system by decreasing mass with/without damping. We consider the time variation of the mass by utilizing an easy modeling that the mass of the oscillator has a second-class dependency on time.By comparing the results that obtained from of figure2 and 3, can say that with the passage of time and the increase of the amount of damping, the amount of fluctuations decreases and the graph gets closer to convergence.In other words it is notable that if the amount of damping is less, the duration of time will be longer.

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ID: 179-EOP

Determining the Electricity Energy Generation Potential from Animal Derived Biogas by Thematic/Digital Mapping Method: Example of Eastern Anatolia Region

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Considering the reduction of fossil energy sources, which are described as non-renewable energy, their harmful effects on the environment and their negative effects on human health, studies on renewable energy sources have gained momentum in the global sense. The issue of electricity energy production from biogas, which is one of the renewable energy sources, has become increasingly popular in recent years. In this study, the animal numbers of the provinces in the Eastern Anatolia Region were evaluated using the 2021 data of the Turkish Statistical Institute and the manure, biogas and electricity energy production amounts of the provinces in the region were determined. Using these amounts, thematic/digital maps were prepared on the basis of provinces and evaluations were made in terms of quantity. When a comparison is made in terms of the amount of manure that can be produced in the provinces of the Eastern Anatolia region for 2021, Erzurum ranked in the first place with 3.732.151,72 ton/year and when a comparison is made in terms of the amount of biogas and electricity that can be produced, the province of Van is ranked in the first place with 157.888.540,72 m^3/year and 742.076.141,38 kWh/year. The amounts of manure, biogas and electricity energy that can be produced from all 14 provinces in the region for 2021 have been determined as 22.613.873,02 ton/year, 1.003.183.755,12 m^3/year and 4.714.963.649,12 kWh/year, respectively. According to the data obtained from the website of the Republic of Turkey Ministry of Energy and Natural Resources, the amount of electricity energy used by Turkey in 2021 is 329.6 billion kWh. Considering this rate, it has been determined that the electricity energy that can be obtained from animal-derived biogas in the Eastern Anatolia Region can met approximately 1.45% of our country's electricity energy needs for 2021.

ID: 193-EOP

Rescue System Development for Atmospheric and Subatmospheric Rocket Systems

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In today's technology, the importance of the rescue system, which is frequently used in vehicles operating in/above the atmosphere, is extraordinary. When a spacecraft performs its mission and enters the earth's atmosphere or enters the atmosphere of any planet in the solar system, the success of the system depends on a safe landing. Failure of the rescue system will result in complete failure of the project. The rescue system not only reduces project costs, but also offers the opportunity to be reused. In this study, a parachute rescue system designed for a subsonic rocket is presented. A specific design has been made to ensure the safe landing of both the rocket and the payload. By determining the parachute classes that can be used, a detailed comparison was made to select the most suitable parachute. Analysis of parachute inflation time and opening sequences was also performed among the compared types. A flight plan has been made so that the parachute can follow the filling sequences properly. Appropriate thread and fabric types that meet the system requirements were determined and parachute scaling calculations were also made. Preferred parachutes were evaluated through numerical study, taking into account the flight conditions.

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ID: 194-EOP

Structural and Mechanical Design of a Lightweight Fixed Wing UAV for Surveillance Purposes

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In this study, the structural, mechanical and avionics design of a fixed-wing UAV used for surveillance is presented. Within the scope of the mission of the UAV, the system requirements were determined and the design was shaped accordingly. A fixed-wing UAV is preferred because it can fly longer than rotary-wing unmanned systems. Having advanced mapping capability, the UAV is designed to be able to land autonomously to the nearest landing area when its power supply is about to run out. It is controlled by a brushless DC motor powered by a Li-Po battery and is therefore much lighter than other examples powered by conventional internal combustion engines. For the same reason, it has a different configuration compared to other examples. All flight performance parameters were investigated in detail and a three dimensional simulation was conducted through Matlab Simulink. Considering different flight conditions, simulations were carried out and the configuration of the aircraft was optimized based on the results obtained. After the final design was obtained, it was observed that the UAV, which was produced and assembled, was successful in static tests, air-air and air-ground tests.

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ID: 196-EOP

Fire Detection and Early Warning System Design with UAVs in Forests

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UAVs, which were initially used mainly for observation, are now used in a wide range of areas such as transportation, agricultural spraying, fire detection, and military operations. The reason why UAVs are more preferred in such areas is that they reduce the workforce and are much more effective when they are designed and/or modified based on the tasks. The most important parameter in fighting forest fires is to intervene as soon as possible after the fire has broken out. If an incipient fire is not detected and dealt with quickly, it becomes more and more difficult to put out the fire, and this increase in difficulty is geometric rather than linear. In this study, a fixed-wing UAV was designed to detect forest fires and send warning signals to first responders. The UAV, which is planned to scan an area with a height of 150 meters and a diameter of 5000 meters, is designed to scan about 2000 hectares of land. It can stay in the air for 45 minutes, has a charging time of approximately 30 minutes and can perform uninterrupted scanning and observation with battery replacement. The UAV, which can fly autonomously on specified routes, can autonomously land near the predetermined locations and replace the battery when its charge is low. It also has a thermal camera that can detect temperature changes between -40°C and +550°C, has the ability to detect a possible fire during flight through an image processing card along with a wide-angle camera. When a fire is detected, it sends a notification to the main ground computer containing instant location information and fire size. The ground computer, on the other hand, transmits the received information to the fire first responder team in the form of SMS and radio notification containing such information.

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The Effects of Unidirectional Compression on the Hardness Properties of Polyamide Materials

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Polyamide materials are used in many areas due to their good mechanical and chemical properties, thermal stability, high wear resistance and low friction coefficient and easy machinability. In addition, polyamide materials have wide usage areas in automotive, electrical/electronics, furniture, construction, white goods, security materials and medical materials. These materials can operate under different loadings during use. Therefore, the investigation of different mechanical effects is also an important issue. In this study, the compression process was applied to the polyamide material and its mechanical properties were determined according to the compression condition. The applied compression processes were carried out in the elastic region and plastic region of the material. Compression ratios were 1%, 2%, 5%, 10%, 20%, 40%, 60% and 92.26% according to the sample size, respectively. Permanent deformation rates were calculated by measuring the final dimensions of the compressed samples. A remarkable increase in compression ratios above 10% was observed in permanent deformation rates. In addition, hardness measurements were carried out from the compressed samples. As a result of the hardness measurements, it was observed that the hardness value did not change at 1% compression rate, but increased slightly at 2% compression rate. It was observed that the compression ratios above 10% compression ratio decreased significantly.

Keywords: Polyamide, mechanical properties, compression, deformation, hardness

ID: 235-EOP

Proposal for a Parachute System for the Recovery Mechanism of Subsonic Rockets Capable of Carrying Payload

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In this study, a mechanical and design solution for parachutes that provide safe landing is presented on the basis of the two-stage rescue strategy of subsonic rockets performing payload missions. In the system presented, a total of 3 parachutes are used, one of which is a main, one is a drift and one is a payload parachute, the dimensions of which are aided by differential calculations and modeling. In the presented system, a total of 3 parachutes are used, one of which is a main, one is a drogue parachute, and one is a payload parachute, the dimensions of which are assisted by differential calculations and modeling. Of these, the nose cone and the payload are lowered together with shock cords to the 36" tertiary parachute opened at the apogee. Then, the remaining part of the rocket begins to be lowered with the help of the 36" primary parachute, which is also opened at the apogee. 500 m before the rocket lands on the ground, the 84" main parachute located in the rear fuselage opens and safely lowers the rocket to the ground. Since the parachutes are produced with the pizza slice strategy, when folding, this situation can be taken into account, making it occupy less space for easy placement. However, the length of the parachute ropes was calculated by taking 1.15 times the diameter of the parachute. While tearstop, airtight ripstop nylon fabric is used for the parachutes in the presented system, the shock cord of the parachutes is paracord rope (approximately 10 meters), and paracord rope is used to provide this. Reef knots are formed by using 12 slices of hemispherical type secondary (main) parachute suitable for use as subsonic lowering, and 8 slices of drift parachute and tertiary parachute, using 4 mm paracord rope, and the ends are produced with rings.

ID: 255-EOP

An Investigation on the Wear Resistance Effects of Severe Plastic Deformation

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In this study, the application of Multi-Directional Forging (MDF), which is a Severe Plastic Deformation (SPD) method, to AA5083 aluminum alloy and, accordingly, the wear resistance of the material was investigated. The workpieces prepared in the form of cubes with a side length of 15mm were first subjected to homogenization heat treatment and then 1 pass and 4 pass MDF processes were applied on the workpieces. After the process, the Brinell Hardness test method was applied to the workpieces to have an idea about the change in the mechanical properties of the material. While the hardness value of the material decreased with the homogenization process, it increased in direct proportion to the number of passes of the applied MDF process. In addition, a similar situation was observed in the wear resistance of the material. In materials subjected to abrasion under the same conditions, the highest mass loss was measured in the homogenized one, and the least mass loss occurred in the workpiece with 4 passes of MDF.

Keywords: Multi-Directional Forging, Brinell Hardness, AA5083, Wear Resistance

ID: 167-EOP

Determination of Specific Nitrification Rate with Batch Reactors and Respirometric Studies for an MBR Operated under Intermittent Aeration Conditions

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In the textile industry, innovative methods aiming to use less water, such as Digital (or inkjet) textile printing (DTP), cause an increase in the ammonium and organic nitrogen concentration of wastewater produced. Nitrification process is the first step of biological nitrogen removal, which is highly preferable compared to physical and chemical removal processes. However, the nitrification process is not sufficient for a complete nitrogen removal and denitrification processes, a subsequent process, may be needed. In this study, specific nitrification rate was investigated in an MBR operated under intermittent aeration conditions, where nitrification and denitrification processes take place in a single reactor. By this way, the impact of extended denitrification periods, i.e. unaerated periods, on the nitrification kinetics were investigated. Batch reactors and respirometric studies were operated with sludge samples taken from MBR, where aeration was applied with different on/off times. In the batch tests, 50 mg/L $N-NH_4^+$ and $NaHCO_3$ (500 mg/L $CaCO_3$) as an alkalinity source were added to 1 L sludge taken from the MBR, and the ammonium oxidation rates were monitored together with nitrate and nitrite formation and alkalinity consumption. In the respirometric studies, the oxygen consumption rate was measured by injecting 50 mL of water containing 50 mg/L $N-NH_4^+$ into a respirometer vessel containing 1 L of sludge taken from the MBR. Specific nitrification rates obtained with batch assays and respirometry were compared and discussed in detail.

Determination of Specific Denitrification and Denitritation Rates with Batch Reactors for an MBR Operated Under Intermittent Aeration Conditions

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Textile industry wastewater is one of the significant sources of water pollution and it contains high concentrations of colour, salinity, COD and inorganic compounds. Digital (or inkjet) textile printing (DTP) technique generates higher ammonium and nitrogen content in textile effluents. The discharge of these wastewaters without appropriate treatment can be harmful to the receiving environment. Therefore, innovative processes including both nitrification and denitrification should be used to remove COD, colour and nitrogen compounds simultaneously. In this study, specific denitrification and denitritation rates were investigated in batch reactors for which biomass was obtained from an MBR operated under intermittent aeration conditions, where nitrification and denitrification processes take place in a single reactor. In order to achieve optimum process performance, the impact of extended aeration on denitrification and denitritation processes kinetics should be known. Batch reactors were operated with sludge samples taken from the MBR, where aeration was applied with different on/off times. In batch assays, 25-50 mg/L $N-NO_2^-$ or $N-NO_3^-$ and 150 - 300 mg/L COD were added to batch reactors and reduction performances were monitored by means of nitrate and nitrite reduction and COD consumption.

ID: 163- EOP

Classification of Electronic Circuit Elements by Machine Learning Based Methods

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Abstract

Electronic circuit elements are electronic parts that play an important role in the operation of any system and are widely used in the field of technology. Electronic circuit elements have started to be produced in smaller sizes with the development of technology. Traditionally, the correct classification of electronic circuit elements has been difficult. In recent years, developments in the field of machine learning have made a significant contribution to the correct identification and classification of electronic circuit elements. In this study, in order to classify electronic elements correctly, a 3-class (capacitor, diode and resistor) dataset downloaded from the internet is compared with machine learning methods. The experimental results obtained as a result of the comparison have shown that it has promising performance in classifying electronic circuit elements using machine learning methods.

Keywords: Machine learning, classification, electronic elements

Introduction

With the innovations in the field of technology, the use of electronic devices that respond to human needs more quickly is increasing day by day. Today, electronic devices are used successfully in many fields. Electronic circuit elements involved in the design of electronic devices play an important role in the operation of electronic devices. Electronic circuit elements are important parts used in the operation of any circuit working with an electronic circuit system. However, electronic circuit elements are very important for the development of both industry and economy [1]. In parallel with the development of technology, electronic circuit elements used in electronic devices have begun to be produced in smaller sizes [2]. Therefore, it has become a difficult problem to accurately define the electronic circuit elements used in electronic devices. In order to overcome this problem, machine learning methods that recognize and classify objects from the image have been developed and achieved better success than traditional methods. The developments in the field of machine learning have made important contributions to the correct recognition and

classification of electronic circuit elements, and many studies have been carried out in this field.

In a study by Atik, a new deep learning-based convolutional neural network is proposed for the correct classification of electronic components. The proposed neural network model structure was classified using the electronic component data set consisting of 3 different classes (capacitor, diode, and resistor), and a success accuracy of 99.99% was obtained [3]. In a study by Liu and Liu, a method based on convolutional neural networks was used to recognize electronic components and an accuracy of 95.63% was achieved [2]. In a study by Asadizanjani et al., machine learning and image processing techniques were used to detect whether integrated circuits (ICs) are fake and successful results were obtained [4]. In the study by Varna and Abromavičius, a deep learning-based system was proposed to detect and classify real-time electronic components, and capacitors, resistors, diodes, and transistors were successfully detected in the proposed system [5].
In a study by Ng, machine learning and deep learning were used to recognize and classify capacitors, integrated circuits (ICs), and resistors, and satisfactory results were obtained [6]. In the study conducted by Chigater et al., the detection process was carried out by looking at the physical appearance, roundness, and correlations of capacitors, diodes, resistors, and transistors [7].

In this study, a dataset consisting of capacitor, diode, and resistor circuit elements is used to successfully classify electronic circuit elements. In order to correctly classify the electronic circuit elements in this dataset, Support Vector Machine (SVM) [8], Naive Bayes [9], and Random Forest [10] machine learning methods were compared. The experimental findings obtained as a result of the comparison have shown that the classification of electronic circuit elements using machine learning methods has promising performance.

Material and Method

In the study, a dataset was used to recognize and classify capacitors, diodes, and resistors that play an important role in electronic circuit systems [11]. The images of the electronic elements with different pixel sizes in the dataset are given in Figure 1.

Figure 1. Images of electronic circuit elements in the dataset (a) capacitor, (b) diode, (c) resistor

In order to successfully classify 3 different electronic circuit elements in the study, the images of the electronic circuit elements in the dataset were re-adjusted to 48×48×3 pixels, and SVM [8], Naive Bayes [9], and Random Forest [10] machine learning algorithms were used to classify. A total of 2708 electronic circuit element images in the dataset were used for the training and testing of these algorithms. In this dataset, 600 capacitors, 728 diodes, and 1086 resistor images were used for the training of machine learning algorithms, and 72 capacitors, 96 diodes, and 126 resistor images were used for testing.

Results

SVM, Naive Bayes, and Random Forest machine learning algorithms were trained and tested using 2414 training and 294 test datasets separated in the dataset. Comparative experimental findings obtained as a result of training and testing the algorithms are shown graphically in Figure 2. In addition, numerical findings obtained from SVM, Naive Bayes, and Random Forest machine learning algorithms are given in detail in Table 1, Table 2, and Table 3, respectively.
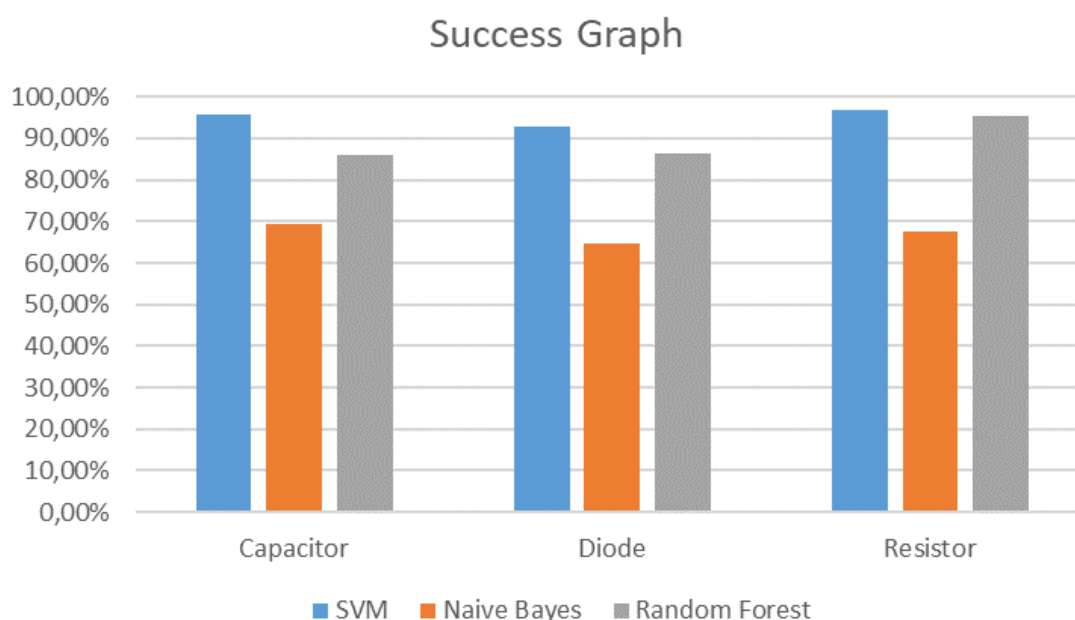
Figure 2. Success graph obtained as a result of the training and testing of the algorithms

Table 1. Numerical findings obtained as a result of training the SVM algorithm

Type of circuit element	Precision	Recall	f1-score	Support
Capacitor	0.96	0.96	0.96	72
Diode	0.96	0.93	0.94	96
Resistor	0.95	0.97	0.96	126
	accuracy		**0.95**	**294**

Table 2. Numerical findings obtained as a result of training the Naive Bayes algorithm

Type of circuit element	Precision	Recall	f1-score	Support
Capacitor	0.63	0.69	0.66	72
Diode	0.61	0.65	0.63	96
Resistor	0.75	0.67	0.71	126
accuracy			**0.67**	**294**

Table 3. Numerical findings obtained as a result of training the Random Forest algorithm

Type of circuit element	Precision	Recall	f1-score	Support
Capacitor	0.98	0.86	0.92	72
Diode	0.93	0.86	0.90	96
Resistor	0.85	0.95	0.90	126
accuracy			**0.90**	**294**

According to the experimental findings, the SVM algorithm showed a success rate of 95.24%, the Naive Bayes algorithm 67.01%, and the Random Forest algorithm 90.14% in the classification of electronic circuit elements.

Conclusions

In this study, SVM, Naive Bayes, and Random Forest machine learning algorithms were used and experimentally compared to recognize and classify electronic circuit elements used in electronic systems made in smaller sizes in parallel with the development of technology in recent years. A dataset containing 2708 electronic circuit elements was used to successfully recognize and classify electronic circuit elements. Thanks to this dataset, machine learning algorithms were trained and tested. According to the training and test results, the best classification was obtained from the SVM algorithm with a success rate of 95.24%. Then, the classification success rate was obtained with a 90.14% Random Forest algorithm and a 67.01% Naive Bayes algorithm, respectively.

As a result, it has been seen that electronic circuit elements used in electronic systems are successfully recognized and classified by machine learning methods.

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ID: 181- EOP

Digitization of Cpr Mannequins, Use with Websocket Artificial Intelligence Classifier

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Abstract

Today, digital transformation is advancing rapidly. They were performing CPR with a mannequin, made from a real 60 year old doll named Resusci Annie [1]. The American Heart Association encouraged the Laerdal company guided by the CPR committee in order to produce medical devices[2]. Only in the USA the number of people who dies because of cardiac arrest varies between 150000 and 450000 every year. The first aid during cardiac arrest has a vital importance[3]. In this study, a modularly developed electronic sensor and microcontroller board were mounted on mannequins. The gained data intercommunication both mobile devices and personal computers via websocket. The websocket provides real time data transfer between computers by intercommunicating them. The mannequins having websockets on their different parts has been designed to be able to trace sensor data and record it in real time. It is aimed via websockets to trace the data of the massages applied to the more than one cpr mannequins. By the develop software, it can be obtained information about accuracy and quality of cpr. In this study, It is determined the validity and accuracy of cpr by using the data gained from the sensors placed on the mannequins. With this study, an effective training application will be developed by digitizing the cpr mannequins and lots of life will be rescued.

Keywords: CPR, CPR Manikin, Medicine, Artificial Intelligence, Websocket

Introduction

An ideal CPR massage interval is expressed as compression of 100-120 times per minute and application to the chest at a depth of approximately 5-6 cm(centimeters). In order to determine the validity and accuracy of the cardiac massage in the study, feedback is provided on whether an ideal massage was performed to the Observer Trainer with an AI classifier based on the data collected from the sensors placed on the manikin. Thus, by digitizing the mechanical manikin , a more effective practical training application will be developed and provided. It provides real-time data transfer by communicating with each other between the developed websocket and CPR mannequins. When CPR is performed by an untrained person, the rate of returning to life is between 3-8%, and when an educated person does it, this rate is between 16-22%. Figure 1 shows the correct

application of CPR on the manikin [4]. Figure 2 shows the test data retrieving from the digital CPR manikin we designed.
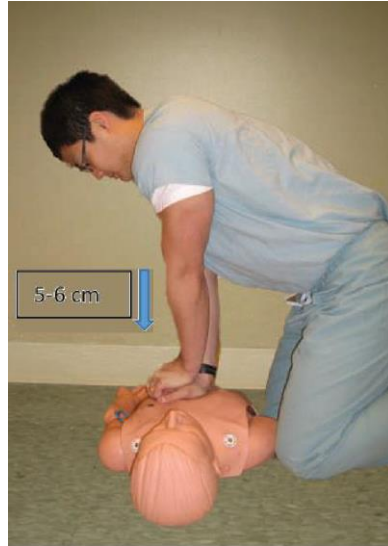
Figure 1. The correct application of CPR on the manikin

Figure 2. Test data retrieving

General Information

This section provides general information about CPR. CPR is the first aid method used in cases such as cardiac arrest or shortness of breath. CPR is an abbreviation for "cardiopulmonary resuscitation"[5]. Cardio heart refers to the pulmonary lung. Resuscitation is the intervention to a patient whose breathing or blood circulation has stopped. The part of this application where no drugs or devices are used is called "basic life support". CPR is all of the methods that should be applied in emergency situations when the heart and breathing suddenly stop[6]. These practices are popularly known as heart massage and artificial respiration. If CPR is performed within four minutes of cardiac arrest or respiratory arrest, 6% of patients survive. For these reasons, CPR is the first aid method that should be done in a short time. Failure to perform CPR has a high rate of death from cardiac arrest [7]. Conscious CPR practice increases the chances of survival of patients. Cardiac arrest is the absence of blood circulation in the body due to heart failure. Cardiac arrest symptoms include; Heart palpitations, nausea and vomiting, loss of consciousness, no pulse, zero blood pressure, abnormal breathing. Figure 3 shows the correct position of the CPR application on the manikin.
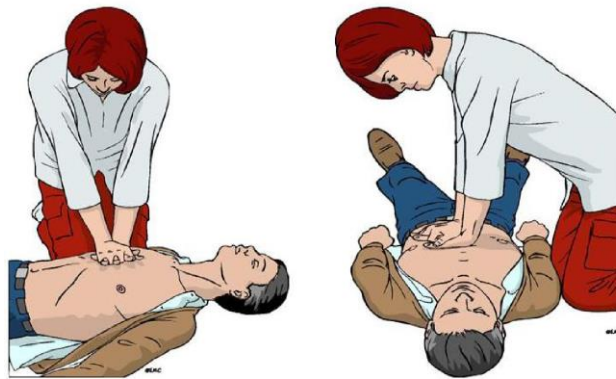
Figure 3. Shows the correct position

Material And Method

In this section, first of all, information is given about the materials used in the project work. Digital mannequin and websocket design are explained.

In this study, we used an Esp32-32S Wifi microcontroller card. It has been preferred because it has a WiFi module on it and is modular and economical. In Figure 4, we have a microcontroller card.

Figure 4. Esp32s wifi microcontroller card.

A weight sensor is a sensor that converts force or load into an electronic signal. The weight sensor used in the project is shown in Figure 5.

Figure 5. Weight sensor

It is necessary to use a weight sensor amplifier to make sense of the data from the weight sensors. The Hx711 gravity sensor amplifier shown in Figure 6 was used in the study.
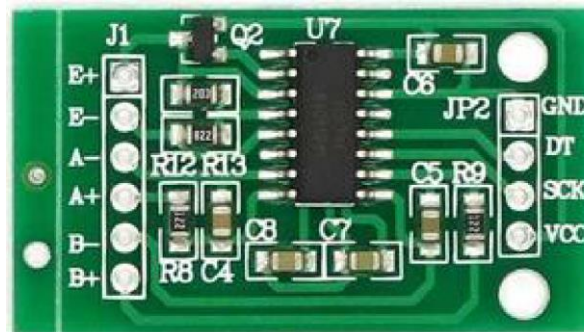
Figure 6. Hx711 card

In order to assemble the circuit we designed into the CPR mannequin, a modular printed circuit was designed and placed in the 3d printing. In Figure 7, there is the circuit we designed.
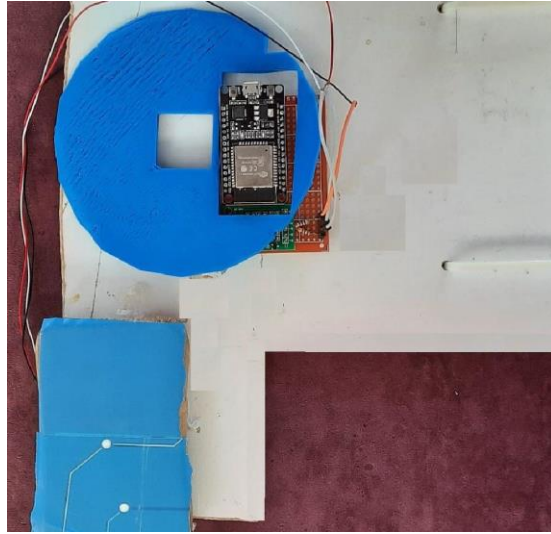
Figure 7. The circuit design

Obtaining Test Data

Inadequate CPR application can cause death of the patient. A human's heart beats between 80 and 120 per minute. Test data were collected from the experimental setup we designed in this study. The collected values were analyzed using the peak value method. As seen in Figure 8, there are peak values in the resulting graph. If the peak values appearing in the graph are greater than the values before and after them, they were taken for evaluation. These peaks indicate the number of compressions. If the compression in one minute is between 80 and 120 and over 3kg, it is considered successful. In addition, the gender, number of tests, height, weight and age information of the test takers were obtained to be used in the artificial intelligence classifier.
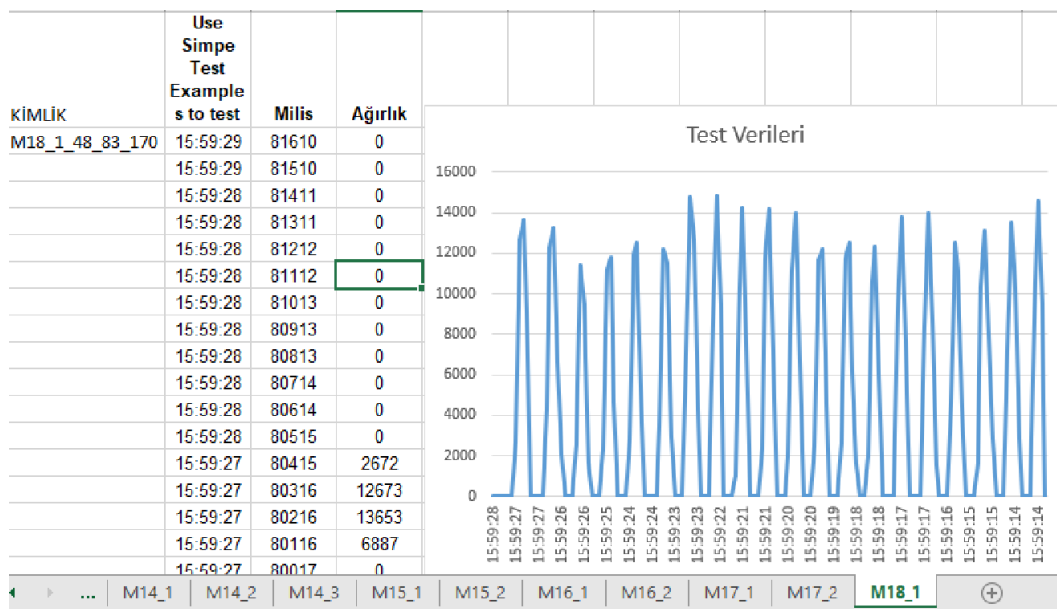
Figure 8. Test Data

Websocket Design

It is planned to monitor and record the sensor data on the mannequins in real time with Websocket. The data obtained from the mannequins are transferred to the websocket designed with Node.js codes. Data from more than one mannequin goes to the websocket. Data coming to websocket can be monitored from mobile or desktop applications. Also, in online mode, data is sent to the cloud. In offline mode, data is sent to the cloud when it is online. Figure 9 shows the websocket design.
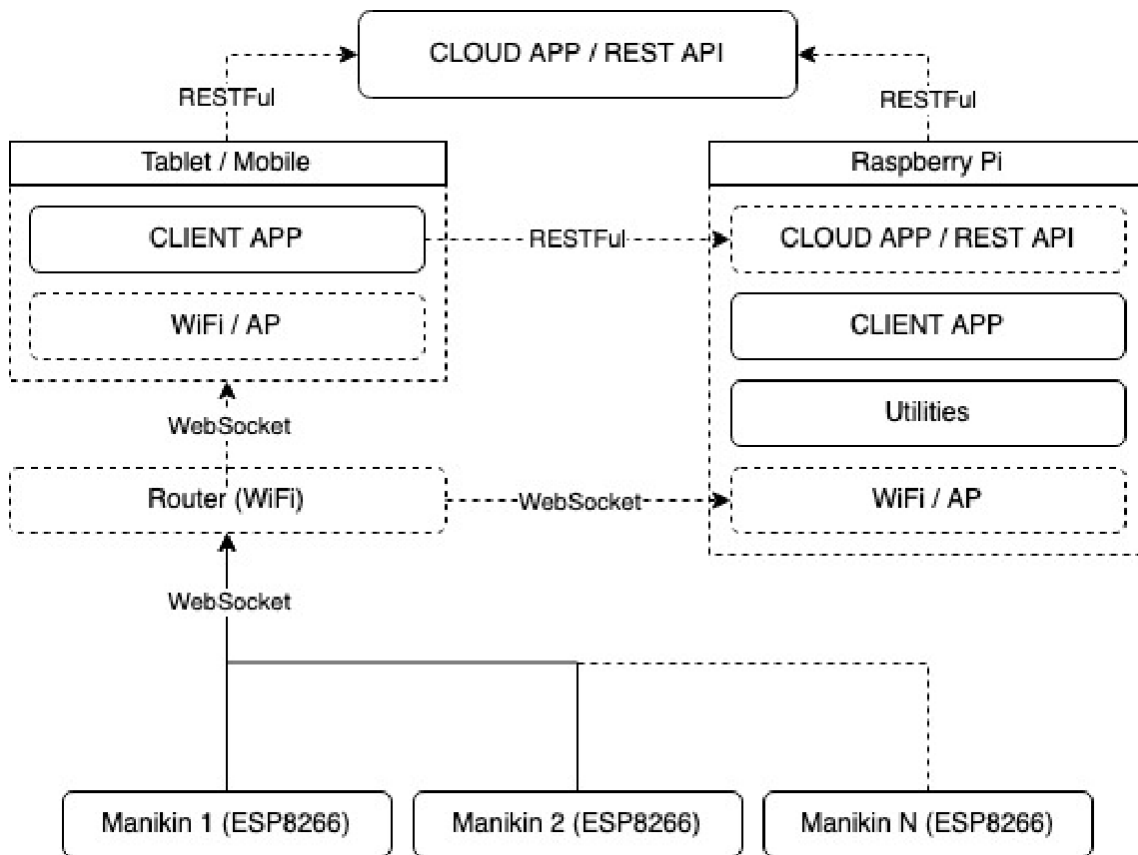
Figure 9. Web Socket Design

Artificial Neural Net Classifier

In order to determine the validity and accuracy of cardiac massage in the study, 1-minute test data were collected from 51 people. Approximate numbers of 1000 of data were read in each test process. Based on the data, feedback was provided on whether an ideal massage was given to the Observer Trainer with an ANN classifier. With the Matlab® program, the identity data on each excel sheet was read and CPR data was created. The noise data occurring over 50 kg and below 5 kg have been removed. It was determined how many compressions each trainee made in one minute. A hidden layer 10 neuron neural network with 5 inputs is designed [8]. The designed ANN architecture is shown in Figure 10.
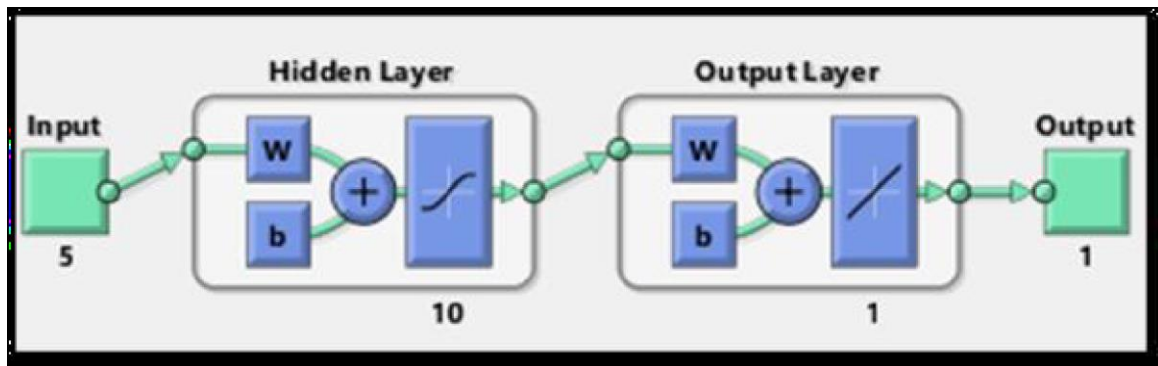
Figure 10. ANN Architecture

20% of test data is reserved for testing and 80% for training. The mean square error of 1000 iterations was 1.7 Figure 11 shows MSE values during training.
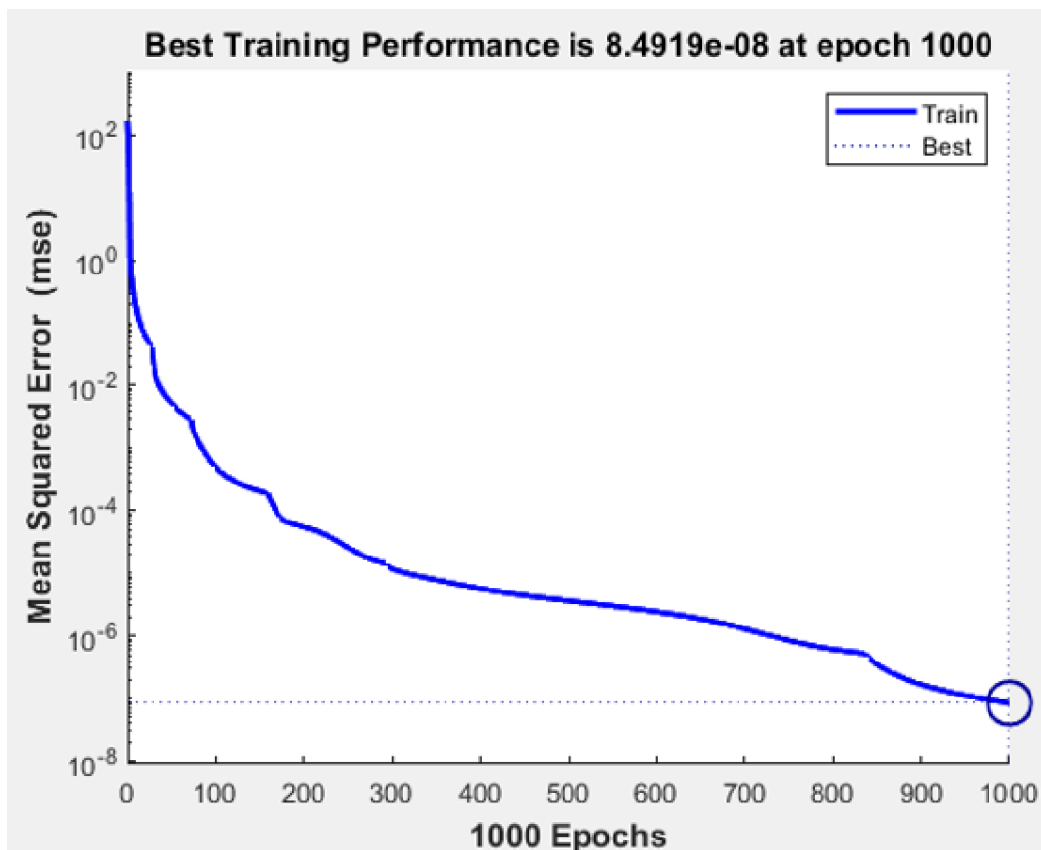
Figure 11. MSE Values During Training

Randomly selected test data was simulated. Prediction and target data were found. Those who get over 90 points are considered successful. Table 1 shows the target and predictive scores of the test data.

Table 1. Target and estimation scores of test data

Trainee Info.	Estimation	Target
1. 'M03_3_16_55_170'	67.0144	67.0000
2. 'M04_1_17_65_175'	91.6418	91.5000
3. 'M05_2_17_58_173'	95.9573	96.0000
4. 'F06_3_17_49_157'	58.7052	60.0000
5. 'F07_2_16_48_158'	49.4950	49.5000
6. 'M08_2_17_63_182'	90.5126	90.5000
7. 'F10_2_17_47_170'	59.9979	60.0000
8. 'M11_1_17_80_182'	36.5006	36.5000
9. 'M11_3_17_80_182'	57.9633	58.0000
10. 'M12_2_20_60_179'	62.4960	62.5000

The identity information received for the artificial intelligence classifier includes gender, age, height, weight information. In table 2, the highest scorers are young men. On the other hand, the young athlete achieved a high score in a woman. Table 2 shows the information of the trainees for the highest scores.

Table 2. Trainees' info for highest scores

Trainee Info.	Highest Scores
1. 'F02_2_16_45_165'	90.5000
2. 'F02_3_16_45_165'	94.5000
3. 'M03_1_16_55_170'	92.5000
4. 'M04_1_17_65_175'	91.5000
5. 'M04_2_17_65_175'	100.0000
6. 'M04_3_17_65_175'	100.0000
7. 'M05_2_17_58_173'	96.0000
8. 'M05_3_17_58_173'	100.0000
9. 'M08_1_17_63_182'	95.5000
10. 'M08_2_17_63_182'	90.5000
11. 'M16_1_47_87_182'	96.5000

Conclusions

In this study, it is aimed to apply an ideal CPR. Data was transmitted wirelessly with the designed digital CPR and websocket. With the ANN classifier, feedback is provided on whether an ideal massage has been performed. The test result of the recorded data shows that all test results are correctly classified with an MSE value of 1.7%. In addition, the success of the practitioner groups can be predicted according to the results from the artificial intelligence classifier. More effective training can be provided as a result of the digitalization of the CPR manikin. In the next stage, it is planned to mount the system on the CPR mannequin and transfer the processed data to the cloud system. The survival rate will increase as the quality of CPR training improves.

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EOP

ID: 182- EOP

The Application of Different Printing Techniques on Natural Materials

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Recently, especially after the COVID-19 pandemic, consumers' awareness of healthy life, nature and environmental protection has affected their product preferences as well, and it is observed that the trend is mostly towards natural and ecological materials. In recent years, the interest in new, different and modern designs using natural materials and traditional methods forces designers to search for new ones. An interesting and important part of the textile industry is the printing collaborating with art. Coloring of textile materials is made by patterning and printing techniques during dyeing, weaving or knitting. Printing is the process of transferring various colors, patterns, motifs or decorations to the fabric with different methods or techniques. While the entire fabric is colored in the dyeing process, certain areas of this material are colored in the printing process. In this study, different printing techniques were applied to the surface of natural materials such as fabrics woven with vegetable fibers, felt and leather, and the designs were used in the production of various decorative products. In the results of the study, it has been determined that specific printing types such as screen printing (serigraphy), block printing (woodblock printing), ecological printing and marbling can be applied to felt being nonwoven and both the grain and suede sides of leather as well as natural woven fabrics. It is thought that natural materials being applied different printing techniques will offer creative ideas to the designers in order to utilize them in new and different areas of use, and original and unique products will be appreciated by consumers.

Key words: Screen Printing, Block Printing, Cotton, Leather, Felt

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Looped Leather Weavings with Sustainability and Industrial Symbiosis Approach

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Woven fabrics which have an important added value in the textile industry are produced with various techniques and methods. The most used and produced type of weaving is the structures formed as a result of the interconnection between warp and weft yarns, which consist of two yarn systems. In addition, there are fabrics produced on special looms such as three-thread structures as towels, velvet and machine-made carpets, two-, three- and multi-layer fabrics, axial weavings and three-dimensional structures. In the process of weaving of pile or looped structures, vertical loop structures can be placed on the fabric surface with additional mechanisms. Sometimes the yarn that will form a loop or pile is wrapped in a second warp beam and directed for the pile formation, and sometimes this process can be done with long jumps (weft loop structures) on the surface of the fabric with the weft. In this study, waste leather pieces formed in the leather industry were woven with the corduroy technique, which is one of the weft-loop structured weaving technique, and brought back into production with a sustainable approach. Today, innovative approaches that suggest turning waste into a source and the effort to use natural resources efficiently are gaining importance. For this reason, we believe that the designs obtained in our study will actually serve as an example of "industrial symbiosis" (the process in which the wastes or by-products of one industry or industrial process become the raw material of another) such as the transformation of leather industry wastes into raw materials for pile surfaces in weaving enterprises. Thus, the reuse of waste materials will contribute to both the reduction of the pollution load in the ecosystem and the development of products with high added value.

Key words: Leather Wastes, Weavings, Industrial Symbiosis, Sustainability

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Automatic Detection of Polyps in Endoscopic Images with U-Net-Based Model

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Polyps are precursors of colorectal cancer, which is one of the most common types of cancer in men and women. Experts use the colonoscopy method to detect polyps. However, during colonoscopy, experts may miss polyps depending on polyps type and size. In this process that directly affects human life, computer systems based on artificial intelligence can help experts. In this study, a U-Net-based model with ResNet-34 backbone is proposed for the automatic detection of polyps from endoscopic images. The dataset used in this study includes 1000 endoscopic images and ground truth mask images created by experts marking the polyp areas in these images. Since the images in the dataset have different resolutions, each image and its mask are divided into sub-images of 256×256 pixels and included in the training, validation, and testing processes of the U-Net model. The mean intersection over union (mIoU) value obtained by the model on the test images is %88.56. The proposed model demonstrated superior performance compared to similarly conducted studies in the literature. The proposed method can potentially be employed in clinical settings to detect polyps automatically.

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MATERIALS SCIENCE
ORAL PRESENTATIONS

ID: 171-MSP

Influence of Current Density on the Composition of Sb-Se Thin Films

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Sb_2Se_3 has attracted great interest in its use in photoelectrochemical applications as a photoelectric light absorber due to its comprehensive optoelectronic properties [1–2]. It is also of great technological interest in several applications such as thermoelectric devices, thermosensitive fibers, phase change memory devices, hydrogen storage materials, photoelectrochemistry, etc.

We deposited thin films of Sb_2Se_3 from an organic electrolyte at the nickel electrodes. Has been studied the dependence of the effect of current density in the range of 0.16-0.22 mA/cm^2 at various concentrations of the initial components. The results obtained by SEM and photocalorimetric analysis show that thin, high-quality films with a composition close to stoichiometric are formed from an electrolyte that consists of 11.25×10^{-3} SbOCl + 1.25×10^{-3} H_2SeO_3 + 0.007 $H_2C_4H_4O_6$ at 0.19 mA/cm^2 current density. The antimony and selenium content in the deposits is 48.8% and 51.2%, respectively (the stoichiometric composition consists of 50.73% Sb and 49.27% Se). It is found that with an increase in the current density to 0.22 mA/cm^2, the antimony content in the deposits increases to 69.7%. Also, the uniform deposition and adhesion of films on the electrode surface deteriorate due to the acceleration of the process and, as a result, the obtaining deposits are deposited on the bottom of the electrochemical cell. The positive effect of an increase in current density on the increase in the deposit yield is due to Faraday's law.

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Static-Structural Analysis of Gas Turbine Blade Fabricated with Titanium Based MAX Phase Materials

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Abstract

Gas turbines are widely used in the aviation, marine, and energy industries. Gas Turbine engine parts are generally made of Ni-based superalloys, but their service temperatures are limited. Max phase materials is a candidate material for turbine blades. Therefore, if the turbine blade is produced from the MAX phase, various analyzes have been made with the Aysys 2020 R2 program to obtain information about the static and structural properties of this produced material. In Ansys program; boundary conditions were determined such that rotational velocity (in the X axis) was 1000 rad/s, thermal condition was 1000 ℃, and pressure was 1 MPa. Total deformation, equivalent stress, and equivalent elastic strain datas of max phase materials (such as Ti_2AlC, Ti_3AlC_2, Ti_4AlN_3, and Ti_3SiC_2) analyzed with Ansys were compared with the actual data of the commercial product CMSX4. The material with the least total deformation was Ti_3SiC_2 (5.94 μm) which was 8 times less deformed than CMSX4 (49.58 μm). The material with the least equivalent stress value was Ti_2AlC with 9.97 MPa. The material with the highest ductility was CMSX4, with an elastic stress value of $2.56e^{-4}$ μm/μm, while the material with the closest ductility was Ti_4AlN_3 with a value of $3.91e^{-5}$ μm/μm. In other words, CMSX4 is 1.78 times more ductile than Ti_4AlN_3. As a result, according to the study, it was seen that max phase materials are more brittle than CMSX4, although it is actually candidate materials for turbine blades due to lower density, high temperature stability.

Keywords: Gas turbine blade, Numeric analysis, MAX phase

Introduction

Gas turbine engines operate on the principle of converting the heat energy generated by the combustion of fuel into kinetic energy. The compressor is activated with the air sucked into the engine from the front turbines. However, the energy obtained with this air is not sufficient. For this reason, fuel is mixed into the air accelerated by the compressor in the combustion chamber. Thus, more energy is obtained. This energy provides thrust for the movement of air and sea vessels. Gas turbine engines are also used in power plants to generate energy. The turbine temperature is around 1000 ℃ in the combustion chamber

area. There are many turbine blades in this area. These blades are made of single crystal super alloys. These materials are preferred due to their high creep resistance. In addition, combustion chamber parts are coated with ceramics with low thermal conductivity. These coatings are called thermal barrier coatings. Thermal barrier coatings protect turbine blades from aggressive environment effects. It allows them to be used for a longer life.

In parallel with technological developments, many studies are carried out to make gas turbine engines more efficient. In these studies, instead of the traditional materials used today, lower density and higher temperature resistant materials are being explored. This is because the use of lower density materials lightens the engine. Thus, higher powers can be achieved with less fuel consumption. Thus, engines with low emissions can be produced. In addition, the use of higher temperature resistant materials allows more fuel to be fed into the combustion chamber. Thus, more powerful engines can be produced. This greatly increases the speed of aircraft. For this purpose, some engine components have started to be produced from SiC/SiC CMCs. However, under aggressive turbine operating conditions, oxidation of SiC causes corrosion problems. To solve these problems, researchers have produced coatings called environmental barrier coatings on SiC CMCs. Thus, the performance of SiC CMCs has been slightly improved. But there is still a need for alternative materials.

MAX phase materials are likely to be used in gas turbine engines due to their low density, high temperature oxidation resistance, good creep resistance, good thermal shock resistance, and phase stability at high temperatures. MAX phase materials are generally formulated as $M_{n+1}AX_n$ (n= 1- 5), where M stands for transition metals, A stands for group A elements and X stands for Carbon (C) or Nitrogen (N). They have a uniqe microstructural feature with nano layers. There are systems with elements such as Ti, V, Ta, Nb in the letter M. Among these systems, Ti based MAX phases are the most subject to scientific studies. MAX phase alloys with the highest elastic moduli are: Ti_3SiC_2 and $TiAlCN$, Ti_4AlC_3. The fracture toughness of Ti_3SiC_2 is the highest among the MAX phase alloys. The most important feature of MAX phases in general is their phase stability. According to the literature, Ti_3SiC_2 has excellent oxidation resistance up to 700 °C [2] and phase stability up to 2300 °C [1], and the melting temperature for Ti_3SiC_2 is above 3000 °C [1]. The phase stability of Ti_3SiC_2, Ti_3AlC_2, Ti_2AlN compositions from MAX phases are shown in Figure 1.
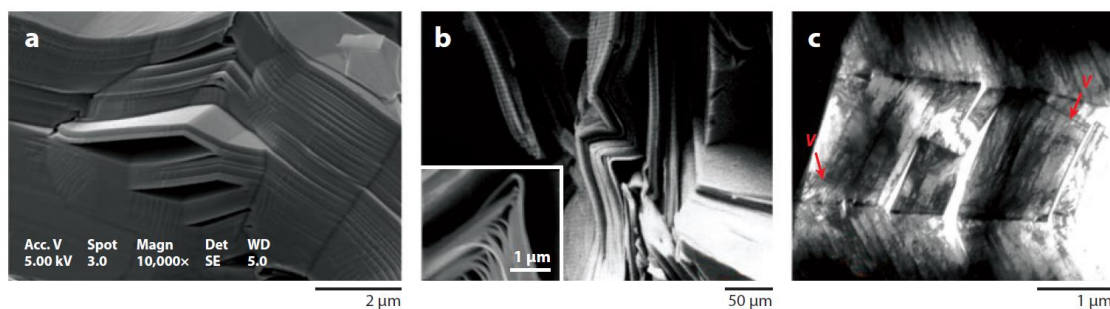
Figure 1. Typical examples of Max Phases at different length scales [2].
Ti_3SiC_2, Ti_3AlC_2, Ti_2AlN compositions can maintain their phase stability up to 1300 °C. Ti_3SiC_2 alloy behaves more stable than the others and when it loses its stability, it forms the TiC

phase, which is thermodynamically more stable. Ti_3AlC_2 ternary composition undergoes a sudden phase change after 1300°C and forms TiC phases together with Ti_2AlC, a second MAX phase.

Methodology

The Density (g/cm^{-3}), Young's modulus(GPa), and Poisson's Ratio properties of Ti based alternative materials (Ti_3SiC_2, Ti_3AlC_2, Ti_2AlN) and CMSX4, which is currently used as a commercial product, are given in **Table 1**.

Table 1. Mechanical Properties of Materials

Materials	Density (g/cm^{-3})	Young's modulus(GPa)	Poisson's Ratio
CMSX4	8.927	84	0.39
Ti$_2$AlC	4.1	277	0.19
Ti$_3$AlC$_2$	4.2	297	0.20
Ti$_4$AlN$_3$	4.7	310	0.22
Ti$_3$SiC$_2$	4.52	343	0.20

Turbine blade part was designed in Ansys 2020 R2 program. By creating elements in the Turbine Blade part designed in the program, exactly 147458 elements were created. The width and length of each element is 1mm. Figure 2 shows the turbine blade designed with Ansys and divided into elements.
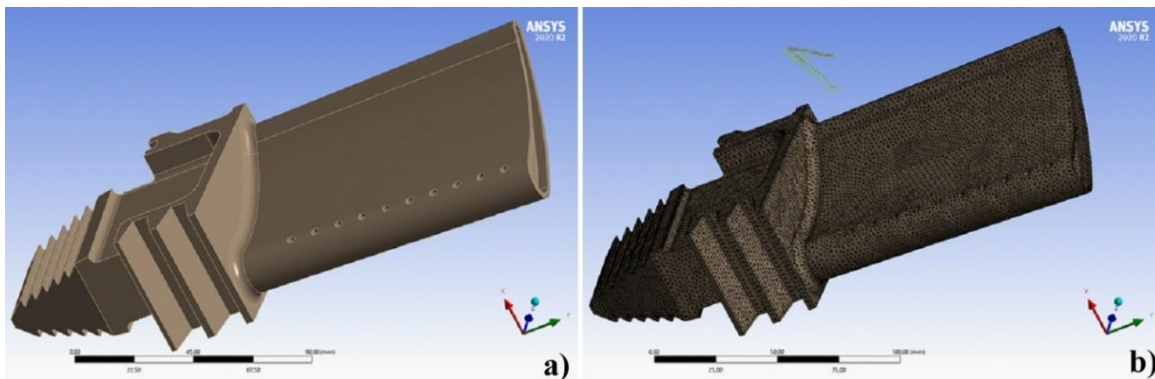
Figure 2. (a) CAD Model and (b) Mesh Model of Turbine Blade

The operating conditions of the turbine blades in the hot zones of the aircraft engine are investigated. In the light of these data, in Ansys program; boundary conditions were determined such that rotational velocity (in the X axis) was 1000 rad/s, thermal condition

was 1000 ºC, and pressure was 1 MPa. Total deformation, equivalent stress, and equivalent elastic strain datas of max phase materials (such as Ti_2AlC, Ti_3AlC_2, Ti_4AlN_3, and Ti_3SiC_2) analyzed with Ansys were compared with the actual data of the commercial product CMSX4. The created experimental environment is shown in Figure 3.
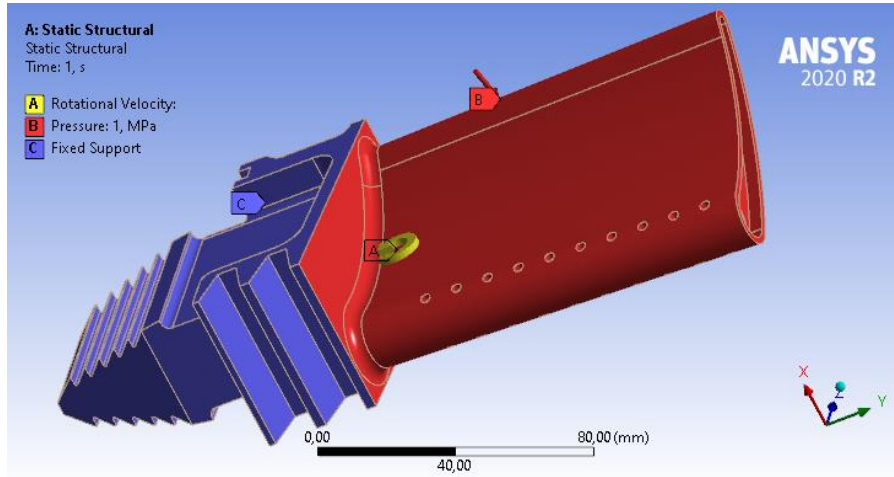
Figure 3. Boundary Conditions of Analysis

Results & Discussion

The results of the structural analysis are as shown in Table 2.

Table 2. Static-Structural Analysis Results

Material	Total Deformation (µm)		Equivalent Stresses (MPa)		Equivalent Elastic Strain (µm/µm)	
	Max	Average	Max	Average	Max	Average
CMSX4	302.29	49.583	216.59	21.037	2.5877e-003	2.5555e-004
Ti_2AlC	40.598	6.6446	97.387	9.9688	3.5306e-004	3.6696e-005
Ti_3AlC_2	38.919	6.3691	99.871	10.198	3.3787e-004	3.501e-005
Ti_4AlN_3	43.815	7.1711	112.13	11.379	3.7929e-004	3.9065e-005
Ti_3SiC_2	36.28	5.9378	107.49	10.975	3.1488e-004	3.2625e-005

As can be seen in Fig 4 and Table 2, Ti_3SiC_2 material was the experimental group with the least total deformation.
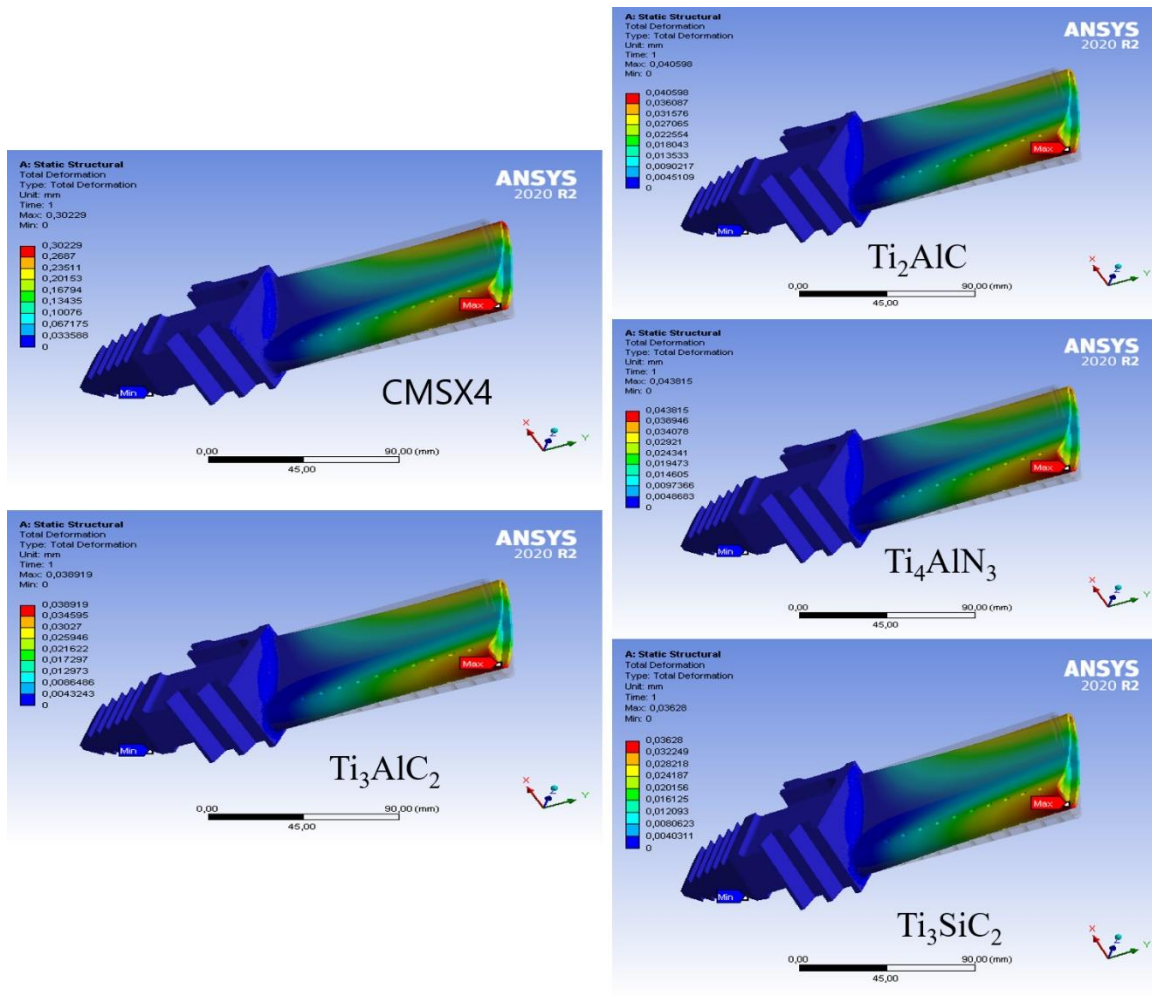
Figure 4. Total deformation results of materials

The total deformations reached a maximum in the same places for all the materials used in the experiment, in the corner region at the top of the turbine blade, which is indicated in figure 4 by maximum in red. If the total deformation is less in Ti_3SiC_2, it means that the material stretches less. This behavior is actually a property that should be present in the turbine blade.

Structures such as steel often undergo plastic deformation and subsequent fracture. For a safe design, it is necessary to design structures so that they are always within the elastic limit, i.e. without plastic deformation. Since most of the experiments are performed under simple loading conditions (such as uniaxial stress), it is often a problem how this can be related to the general loading conditions actually observed. Equivalet Stress (Von Mises stress) is a value calculated to determine whether the structure has undergone plastic deformation under any loading condition. The calculated stresses at any point can be written as a scalar value, known as the Von Mises stress, which can be compared with the experimentally measured yield point.

As can be seen in Figure 5, Ti4AlN3 is the material with a stress value closest to CMSX.
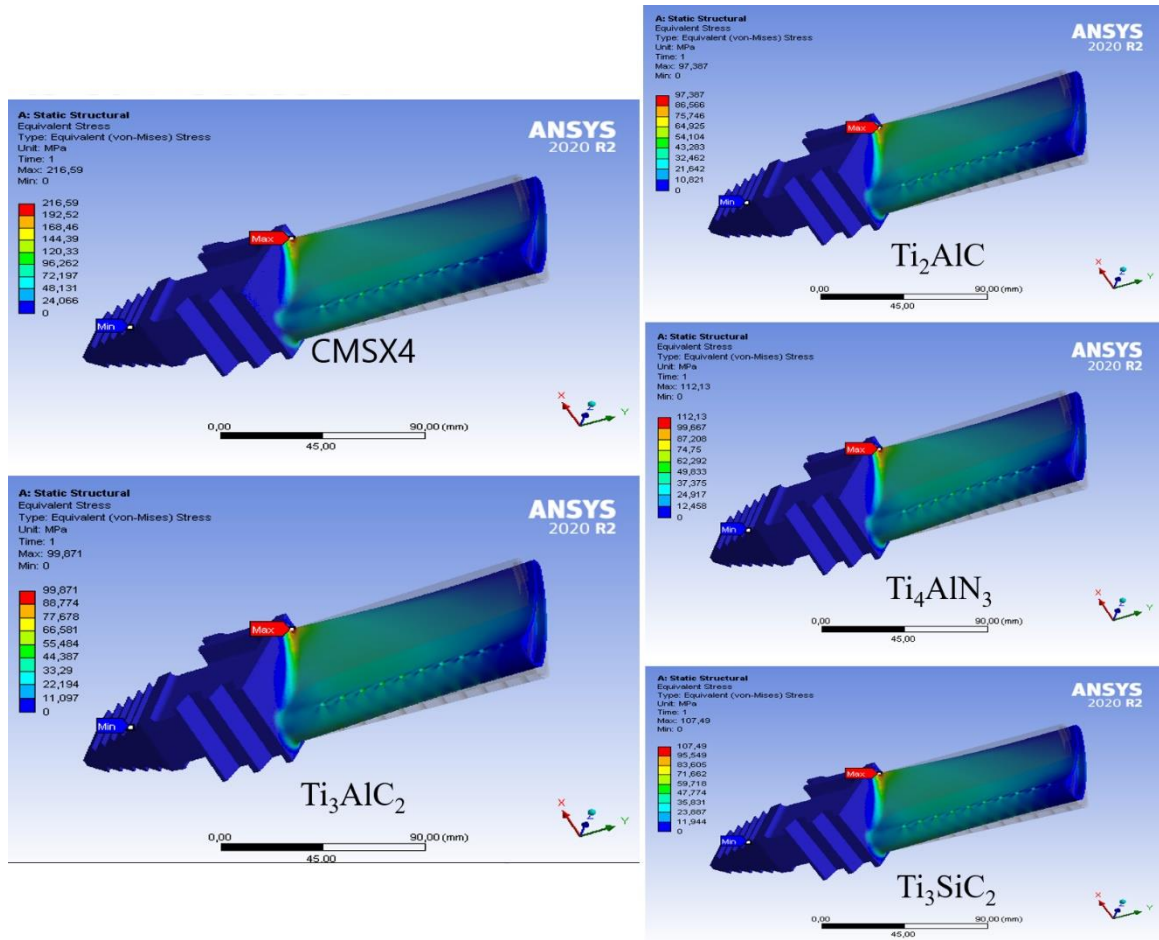
Figure 5. Equivalent Stress results of materials

The equivalent elastic strain is defined as the limit for the values of strain up to which the object will rebound and come back to the original shape upon the removal of the load. Elastic limit is defined as the point on the stress-strain curve where the object changes its elastic behavior to plastic behavior.

Materials with high elastic strain also have good ductility. For this reason, after the commercial CMSX4, the material with the equivalent elastic strain value closest to it is Ti_4AlN_3 as shown in Figure 6. In addition, as seen in Figure 6, while strain occurred on the entire surface in CMSX4, strain occurred only in the region called root zone in max phase materials.
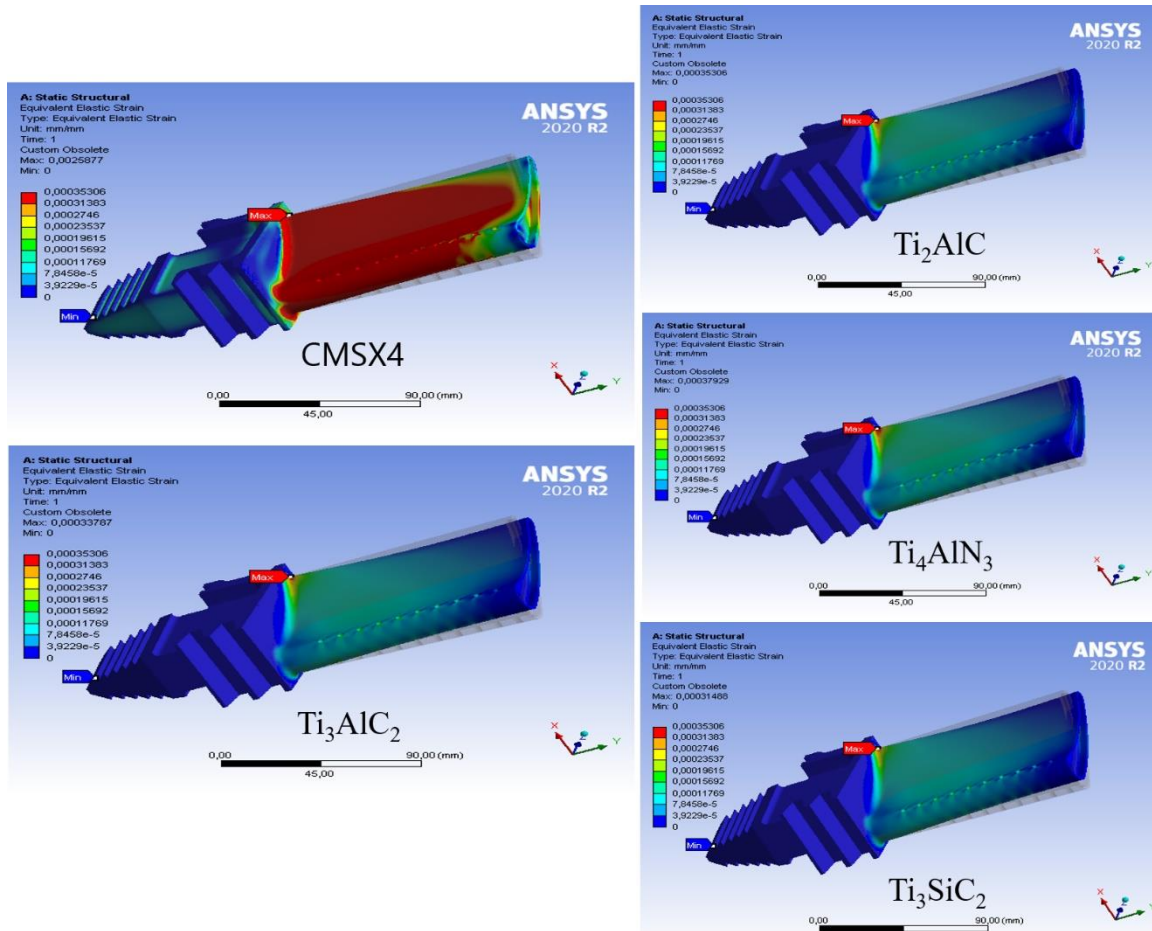
Figure 6. Equivalent Elastic Strain results of materials

Conclusions

The material with the least total deformation was Ti_3SiC_2 (5.94 μm) which was 8 times less deformed than CMSX4 (49.58 μm). The material with the least equivalent stress value was Ti_2AlC with 9.97 MPa. The material with the highest ductility was CMSX4, with an elastic stress value of $2.56e^{-4}$ μm/μm, while the material with the closest ductility was Ti_4AlN_3 with a value of $3.91e^{-5}$ μm/μm. In other words, CMSX4 is 1.78 times more ductile than Ti_4AlN_3. As a result, according to the study, it was seen that max phase materials are more brittle than CMSX4, although it is actually a suitable material for turbine blades because it has high temperature resistance and very low density.

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An Experimental Study on the Thermal Properties of Boron/PLA Sustainable Biocomposites

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Abstract

In this study boron fillers, which are boric acid: borax (1:1) combines (BxBc), were reinforced into the PLA matrix at four different contents of 3%, 5%,8% and 12% in weight in order to determine optimum fire resistance rate for PLA. Biocomposite has compounded a twin screw extruder and manufactured using an injection device. DSC analysis was applied to determine the significant transition temperatures such as melting (T_m), cold crystallization temperature T_c, and glass transition (T_g) of biocomposites. Thermogravimetric analysis was performed to find out the thermal decomposition temperature and thermal stability of the injected samples. UL94 test was carried out to understand the effects of boron fillers on the fire resistance of the biocomposites. Test results showed that boric acid: borax combines addition could remarkably decrease the fire speed of PLA by about 66%. Although the addition of boron compounds into PLA also slightly decreases the maximum thermal degradation temperature, it provides a significant increase in the charring rate of the biocomposites. The DSC analysis results showed that the addition of boron compound initiated the crystallization temperature at least 8 °C earlier than pure PLA.

Keywords: Fire resistance, biocomposites, thermogravimetric analysis, PLA.

Introduction

Due to the thermal and fire sensitivity of polymers and biocomposite materials, especially components used in the automotive industry, it is important to develop their fire resistance. Bio-based composites are commonly employed as industrial materials such as automotive, aviation components and building materials and more areas. In these areas, flammability is a significant property as well as mechanical and physical properties [1]. Bio-based composites are used in the automotive industry in many parts such as lightweight interior components, dashboards, parcel shelves cabin linings and seat cushions [2]. In the literature, boron compounds are used to improve the flammability properties of polymers and polymer-based composites due to their molecular diversity and trihalides are effective lewis acids, they promote cross-linking, decreasing the decomposition of the polymer into volatile flammable gases [3,4]. Sabbagh [5] et al. reinforced zinc borate into the

flax/polypropylene (PP) composite. They reported that the addition synergetic effect of zinc borate (ZB) and ammonium polyphosphate into PLA improved the UL94 rating and reduced the HRR as well. Cavdar et al. [6] worked on the influence of boron fillers and natural fiber loading on the mechanical, fire and thermal performances of wood flour (WF) filled high-density polyethylene composites. They reported that the addition of boron filler into the composite increased LOI levels and charring rates, and reduced the burning speed of the composites by about 50%. Altuntaş [7] et al. investigated the thermal properties and fire resistances of boron fillers added to wood plastic composites. The results showed that as the amount of the boron compounds increased, the burning degree (°C) increased and the burning speed decreased of the composites.

In this study, boric acid and borax were combined with a 1:1 ratio to add to PLA. The effect of boron fillers on the thermal properties such as maximum thermal degradation temperature and transition temperature of PLA was studied. 3%, 5%, 8% and 12% in weight of boric acid, and borax combined were added to improve the fire resistance of PLA.

Material and Methods

Commercial PLA (LX175) with lower monomer content and 1.24 g cm^{-3} density was purchased from Total Corbion Company. According to the Company datasheet, PLA has 155 °C meltings, 60 °C glass transition temperature (T_g) and 0.5 in kg CO_2 equation carbon footprint. Boron compounds which are borax, and boric acid received a grant from Eti Maden Company (Turkey). Borax Penta hydrate has $Na_2B_4O_7 \cdot 5H_2O$ formulation and particle size of +1.18 mm -0.075mm.

Biocomposite Manufacturing

Boric acid: borax (1:1) combines (BxBc) were added into the PLA matrix at four different contents which are 3%, 5%,8% and 12% in weight. Table 1 shows the composition of BxBc fillers added biocomposites and pure PLA. A twin screw co-rotating extruder (Microsan Instrument, Turkey) was used to achieve better boron/PLA filler compounding. The extruder has a 25 mm screw diameter, 30 L/D ratios and more than 10 resistances. Pelletized and mixed compounds were fed into the injection molding machine (Hastek Orche BT120, Turkey) at temperatures of 165 to 190 °C. The injection molding machine was run with 50 mm s^{-1} injection speed, 30 s molding time, 50 bar molding and 50 rpm screw speed for each sample. Before each production process, the component is set in an oven to remove possible humidity.

Figure 1 shows the technical drawing of the designed injection molding. The mold consists of two mold cavities which are dog bone shaped for the tensile test and rectangle shaped for the flexural test. The mold was designed according to ASTM 638 D14 and ASTM 790 test standards for tensile and flexural samples, respectively.
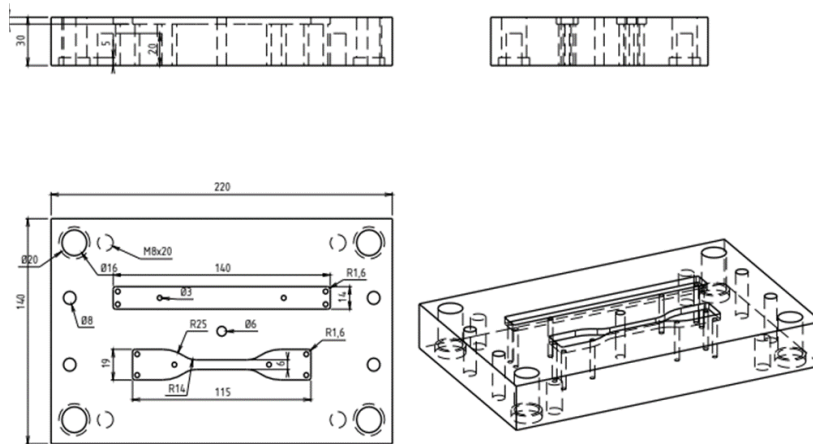
Figure 1. Technical paper of the injection molding

Table 1. Composition of the biocomposites, PLA and their weight percentages

Sample ID	PLA	3BxBc	5BxBc	8BxBc	12BxBc
PLA	100	97	95	92	88
BxBc (1:1)	---	3	5	8	12

Thermo Gravimetric Analysis (TGA)

Thermogravimetric analysis was performed to determine the thermal decomposition temperature and thermal stability of the biocomposites. Samples were analyzed with a heating rate of 10 °C min^{-1}, at a temperature range of 25 °C to 550 °C.

UL-94 Vertical Flame Test

UL94 test was applied to determine the fire resistance of the produced composites and PLA and to examine the effects of boron fillers on both the composite structure on the fire resistance. UL-94 vertical flame test was applied to samples according to the UL-94 test standard.

Differential Scanning Calorimetry

DSC analysis was applied to determine the significant transition temperatures such as melting (T_m), cold crystallization temperature T_c, glass transition (T_g) of biocomposites, and pure PLA. The samples were heated from room temperature to 50°C and held isothermally at the temperature for 1 minute. And then the samples cooled down to -50°C and held at that temperature for 1 minute. Finally, the samples were reheated to 250°C and cooled down to 30°C.

Results and Discussions

DSC Results

In Figure 6.4.1, DSC graphs of boric acid/borax compound composite and pure PLA reinforced to PLA matrix at different ratios are shown. As the boric acid/borax ratio in PLA increased from 3% to 12%, the glass transition temperature gradually decreased from 72°C to 66.4°C. Moreover, the crystallization temperature of the added BxBc PLA decreased from 120.8 °C to 8.5 °C to 112.3 °C. The possible reason for this decrease is that the composites start to crystallize at lower temperatures due to the nucleation accelerator effect of ZB. It is seen that the melting points of the composites increase up to +4.8 °C towards the right as seen in the graphs. In other words, PLA started to crystallize at lower temperatures with the addition of the boron compound. The addition of BxBc increased the melting temperature of PLA from 168 °C to 172 °C.
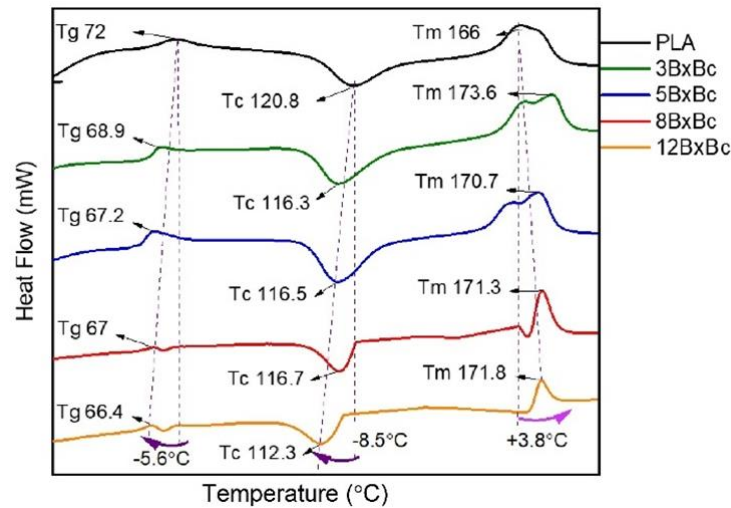
Figure 2. DSC results of BxBc fillers added biocomposites

Thermogravimetric Analysis

Decomposition temperatures obtained from the TGA results of PLA and PLA/boron composites reinforced with different ratios and different types of boron compounds are given in Table 2 and TGA graphs are given in Figure 3.

Table 2. TGA analysis results of boron/PLA composites

Sample ID	The residue remaining after 550 °C (%)	T_5 (C°)	T_d (C°)
PLA	0.0035	321	363
3BxBc	3.05	310.1	361

5BxBc	2.7	300.8	360
8BxBc	3.37	314.3	373
12BxBc	5.59	304.4	373

In general, the addition of boron compounds increased the carbonization amount of PLA from 0.035% to 6%. The thermal decomposition temperature of PLA was found to be 321 °C, and the maximum thermal decomposition temperature was found to be 373 °C.
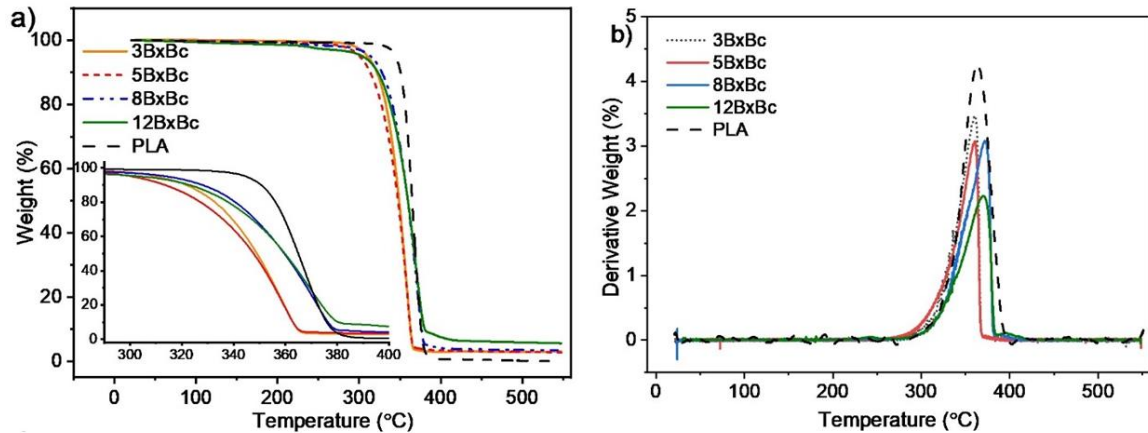
Figure 3. a) TGA graphs of boric acid/borax reinforced composites, b) DTGA graphs

UL-94

Fire resistance and flammability properties of the composites were determined by the UL-94 test. Table 3 UL-94 test results of Boron/PLA composites are shown. The UL-94 value of PLA, which was found as V2, changed to V1 and V0 with the reinforcement of flame-retardant boron compounds. As the mixture of boric acid and borax in PLA increased, the burning times of the composites increased. It was observed that the combustion time of the composite with 12% BxBc flame retardant addition was more than 250 s, it did not ignite and did not drip. It is seen that the composite with the addition of 3% BxBc does not burn the cotton despite dripping. For the automotive industry, the Motor Vehicle Safety standard stipulates that the burning rate of components should not exceed 102 mm min^{-1}.

Table 3. UL-94 test results of biocomposites and pure PLA

Sample ID	UL-94 Rate	Total burning time (s)	Burning speed mm s^{-1}
PLA	--	80	90
3BxBc	V1	150	48
5BxBc	V0	180	40

8BxBc	V0	195	37
12BxBc	V0	250	29

Conclusions

Although the addition of boron compounds into PLA also slightly decreases the maximum thermal degradation temperature, it provides a significant increase in the charring rate of the biocomposites. The DSC analysis results showed that the addition of boron compound initiated the crystallization temperature at least 8 °C earlier than pure PLA. UL94 test was carried out to understand the effects of boron fillers on the fire resistance of the biocomposites. Test results showed that boric acid: borax combines addition could remarkably decrease the fire speed of PLA by about 66%.

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The Effect of Ulexite Compound on the Mechanical Properties of the PLA Matrix

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In this study, ulexite boron filler was reinforced into the PLA matrix at four different contents of 3%, 5%,8% and 12% to understand how they affect the tensile and flexural properties of the PLA. Biocomposites were mixed using a twin screw extruder and manufactured using an injection molding machine. The tensile test of the biocomposite was carried out to determine the significant mechanical properties, such as tensile strength, modulus of elasticity and elongation to break using an Instron tensile device following ASTM D638-14 standard. Three-point bending tests were applied to the biocomposites by a tensile testing machine (Shimadzu AG-IS) equipped with a 50 kN load cell according to the ASTM D790-17 standard. A bending test was performed on the samples to determine the effects of the boron fillers on the properties such as flexural modulus (FM), flexural strength and displacements. A hardness test was found on the surface of the biocomposites using a Shore Durometer. The result showed that the addition of ulexite into PLA in various contents caused to decrease in tensile and flexural strength. However, flexural and Young's modulus of the biocomposites increase with the increasing boron filler rates by about 20% and 22%, respectively. Shore D values of the biocomposites also improve when the addition of ulexite into PLA.

Keywords: Mechanical properties, biocomposites, PLA, boron compound.

Introduction

A typical biocomposite consists of two or more different components one comes from natural resources. Combining two or more materials occurs a new material with high performance over individual components materials [1]. In other words, biocomposites are compounds of various materials used for different tissue engineering and construction applications due to their biocompatibility, biodegradability and outstanding mechanical properties [2]. Biocomposites are commonly employed as building, construction, or automotive materials. Especially, the concept of green buildings to live and work requires an ecologically healthy place, therefore biocomposites are used in green buildings. They also serve as the potential and alternative natural-based material in the interior parts of an automobile [3]. Biocomposites and natural fiber-reinforced composites have significant interest in the automobile industry such as the Porsche sport model and the bodywork

components of the Cayman 718 GT4 CS in 2020 [4]. Poly (lactic acid) (PLA) has an important interest in biodegradable polymers, due to its easy access to raw materials, environmental friendliness, lower CO_2 emission and large production availability. Altough PLA is biodegradable, eco-friendly, and has good mechanical properties, lower CO_2 footprint, and transparency, it has limited such a lower fire resistance and brittle structure [5]. In this study, ulexite was reinforced to PLA matrix at the ratios of 3%, 5%, 8% and 12% to understand how it affects the mechanical properties of PLA. Tensile, flexural and hardness tests were applied to samples to determine changes in the mechanical properties of PLA.

Material and Methods

PLA (LX175) with lower monomer content and 1.24 g cm^{-3} density was supplied from Total Corbion Company. PLA had 155 °C melting, 60 °C glass transition temperature (Tg) and 0.5 in kg CO_2 equation carbon footprint. Ulexite was obtained from Eti Maden Company (Turkey) as a grant.

Biocomposite Manufacturing

Ulexite was fed into the PLA matrix at four different ratios which are 3%, 5%,8% and 12% in weight. Table 1 shows the composition of ulexite fillers reinforced biocomposites and the pure PLA. A twin screw co-rotating extruder (Microsan Instrument, Turkey) was used to manufacture better boron/PLA filler compounding. Pelletized and mixed compounds were fed into the injection molding machine (Hastek Orche BT120, Turkey) at temperatures between 165 to 190 °C. The injection molding machine was run with 50 mm s^{-1} injection speed, 30 s molding time, 50 bar molding and 50 rpm screw speed for each sample. Figure 1 shows injected tensile and flexural specimens, respectively.
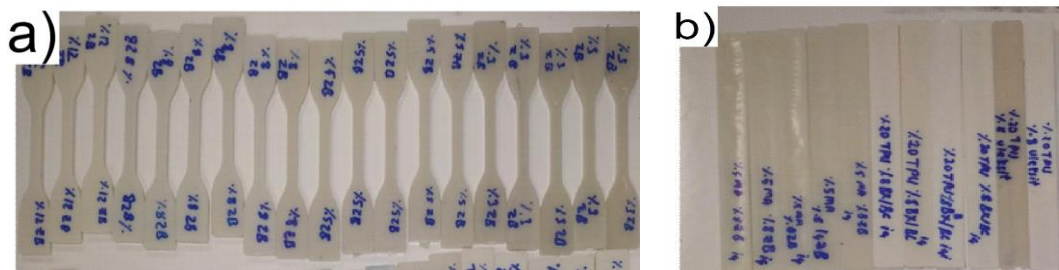
Figure 1. Injected samples; a) Tensile test samples, b) Flexural test samples

Table 1. Composition of the biocomposites, PLA and their weight percentages

Sample ID	PLA	3U	5U	8U	12U
PLA	100	97	95	92	88
Ulexite	---	3	5	8	12

Tensile Test

The tensile test was applied to samples using an Instron tensile device. The tensile test was performed on samples at a speed of 1 mm min^{-1} and room temperature until they broke off. Dog-bone-shaped tensile test specimens were prepared according to ASTM 638-D14 type 4.

Flexural Test

Flexural tests were applied to the samples using a tensile testing machine (Shimadzu AG-IS) equipped with a 50 kN load cell. Bending tests were performed according to the ASTM D790-17 standard. A crosshead speed was found from the standard as 1.75 mm min^{-1} for a 67 mm gauge gap.

Shore D Hardness Test

Shore D test was performed on the surface of the samples using a Shore D device.

Results and Discussions

Mechanical Results

The tensile strength and modulus of elasticity of boron/PLA composites are given in Figure 2. While the average tensile strength of PLA was around 60 MPa, boron compounds added to it caused a decrease in tensile strength. As the proportion of boron compound in PLA increased from 3% to 12%, the tensile strength decreased.

While the elongation at the break of PLA was around 7%, the elongation value decreased with the addition of boron compounds. It is seen that the tensile elongation of 3% and 5% boron-reinforced composites is higher than the others. In general, the percent elongation values of composites vary between 2.5% and 5%. The decrease in tensile strength and tensile elongation of boron compounds can be explained by the incompatibility of boron and PLA.

Table 2. Mechanical test results of the biocomposites and PLA

Sample	Tensile Strength (MPa)	Young's Modulus (MPa)	Shore D	Flexural Modulus (GPa)	Flexural Strength (MPa)
3U	41.3±4	7.54±0.4	77.8±1.5	2.80±0.09	54.0±4.9
5U	35.0±4.3	7.86±0.5	81.2±1.9	3.00±0.21	49.2±20.1
8U	30.7±0.6	8.80±0.7	83.4±1.0	3.14±0.03	24.8±3.5
12U	25.7±2.6	8.54±0.8	84.3±0.8	3.31±0.20	26.5±2.3
PLA	55.2±1.4	5.52±0.3	75.0±5	2.74±0.13	83.6±7.7
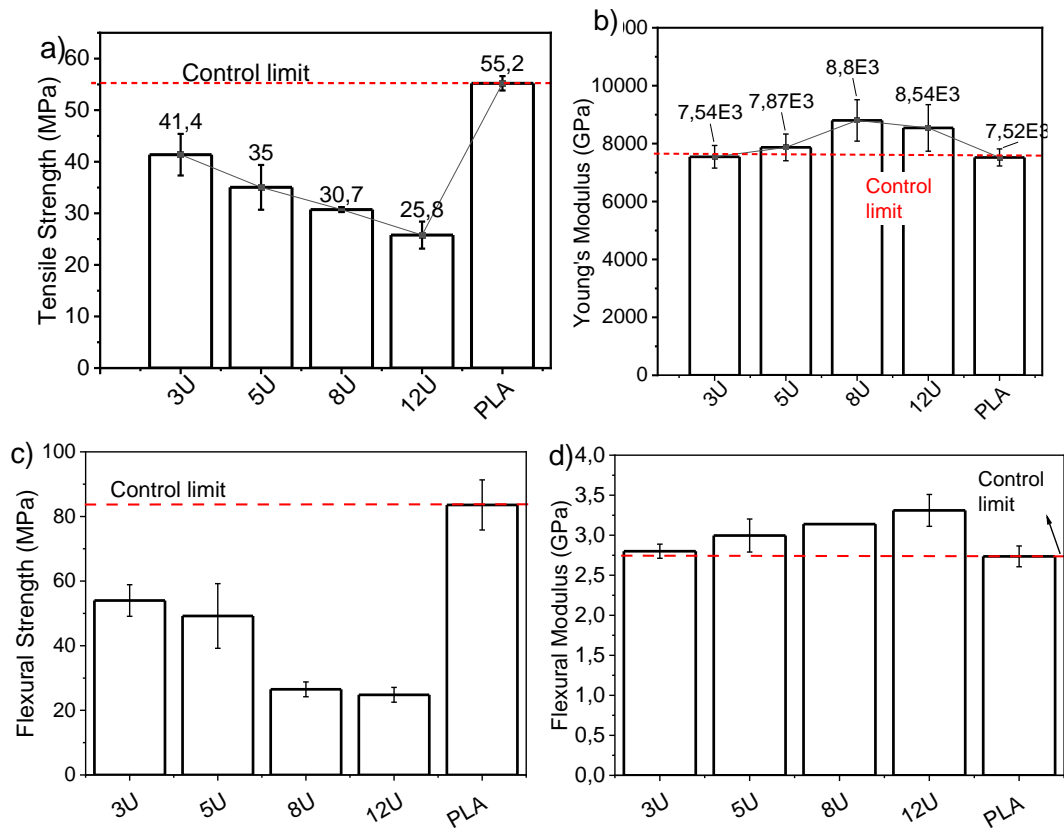
Figure 2. Mechanical properties of the composites; a)Tensile strength, b) Young's Modulus, c)Flexural strength, d)Flexural Modulus

Table 2 shows the test results and Shore D hardness test results obtained after the tensile test of PLA/boron composites. Boron compounds added to PLA increased the stiffness values of the composites, similar to the modulus of elasticity. The hardness values of the ulexite-added composites were significantly higher than the other composites. While PLA had a hardness value of 75±5 Shore D, the value of 3% ZB added composite increased by 11% and was measured as 85±1.4 Shore D.

Conclusions

Due to their mechanical results 3% and 5 wt% ulexite-filled reinforced composites could be employed in the automobile, construction, or plane interior components such as trim parts, indoor parts, air-extraction components or building interior material. Although The addition of boron fillers into PLA increased the elastic and flexural modulus of the composites, it led to reduced tensile and flexural strength of PLA. While it had a Shore D hardness value, the value of the ulexite added composite increased by 10% and was measured as 84.3±0.8 Shore D.

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AGRICULTURE AND BIOLOGICAL SCIENCES ORAL PRESENTATIONS

ID: 131-AOP

Determination of Toxic Effects of *Hyoscyamus Niger* L. Seed Extracts By *In Vivo* Lifespan Test

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Abstract

The unconscious consumption of medicinal plants, which have been used by humans to treat diseases since the prehistoric period, with the idea of ''beneficial to health'' leads to plant-based poisoning. *Hyoscyamus niger* L., which is very important in terms of its pharmacological properties, can also be toxic when used in high amounts. In this study, the toxic effects of water and methanol extracts from *H. niger* seeds on male and female populations of *Drosophila melanogaster* Oregon-R wild strain were investigated by *in vivo* lifespan test. For this purpose, control and treatment groups were prepared. For the treatment groups, water (HN_{wtr}) and methanol (HN_{met}) extracts of *H. niger* were added to Standard *Drosophila* Medium (SDM) at different concentrations (10, 20, 30 and 40 ppm). Experimental studies were started with 100♀ and 100♂ individuals of the same age (3 days) in both control and treatment groups. Applications were made chronically and all viable individuals were transferred to fresh nutrient medium twice a week. According to the results obtained from the control and treatment groups, it was found that the lifespan of individuals chronically exposed to HN_{wtr} and HN_{met} extracts was shortened and this shortening was statistically significant ($p < 0.05$).

Keywords: *Drosophila melanogaster*, herbal extracts, longevity.

Introduction

Plants are one of the most important food sources for humans and various animal organisms to continue their lives, to continue their growth and development in terms of their bioavailability. However, the species in the plant kingdom are used not only as food, but also for the purpose of eliminating health problems. There are many species used for this purpose in the Solanaceae family. *Hyoscyamus niger* L. is a plant originating from Europe and North Africa and is a cosmopolitan plant that spreads in every region of our country. This plant is 30-70 cm tall and has pale yellow flowers (Fig. 1a) and numerous dark seeds in its goblet-like fruit (Fig. 1b). While different parts of the plant show therapeutic characteristics when used in low amounts by boiling, crushing or raw by people, it can be toxic in high amounts. *H. niger*, which grows especially in gardens, vacant lots and

roadsides, is frequently preferred by people due to its soothing, painkilling and cough suppressant effects [1].
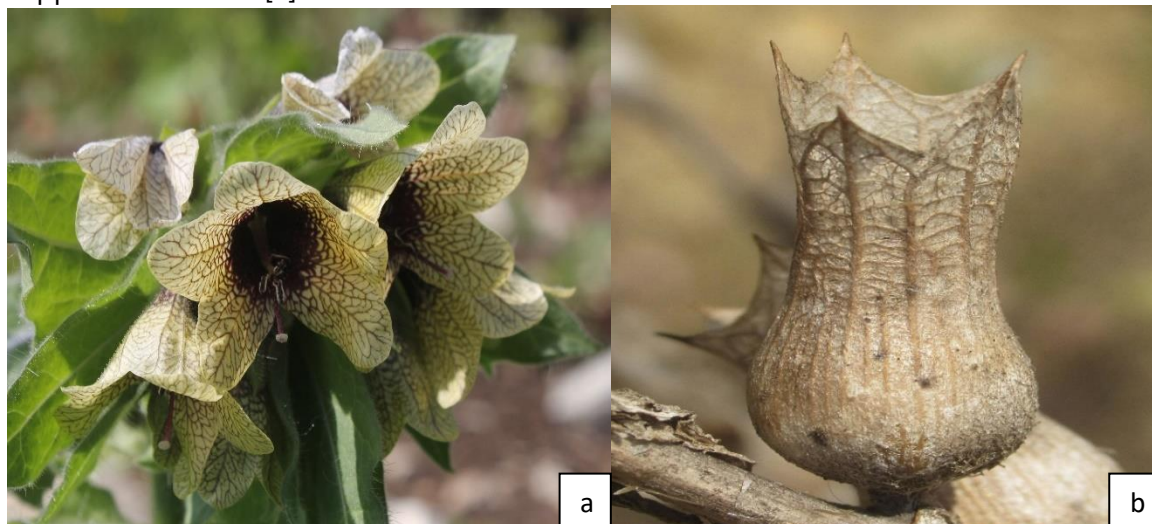
Figure 1. a) Flowers and b) fruit of *Hyoscyamus niger* in the natural environment

In this study, wild type of *Drosophila melanogaster* Oregon-R (fruit fly), one of the model organisms, was used to determine the toxic potential of *H. niger* seeds. Two different extracts of *H. niger* seeds were applied to male and female populations of this strain by *in vivo* lifespan test, which is one of the short-term testing techniques.

Material and Method

Within the scope of this study, application groups were formed by adding water (HN_{wtr}) and methanol (HN_{met}) extracts of dried *H. niger* seeds to SDM at different concentrations (10, 20, 30 and 40 ppm). Also, negative control groups were also prepared by using distilled water and 1% dimethyl sulfoxide (DMSO) used as the solvent of herbal extracts. Then, pre-crosses were made with virgin individuals of the wild type of *D. melanogaster* (P: 10♀ X 10♂). Male and female offsprings obtained following metamorphosis were collected separately for 3 days in 4-hour periods without mating. Studies for the longevity test were started with 100♀ and 100♂ individuals in both control and application groups, synchronously. Male and female individuals were chronically fed on medium containing HN_{wtr}/HN_{met}+SDM separately and transferred to fresh medium twice a week. Individuals who died during transfers were counted and removed from the medium. Chronic applications were continued in both populations until the last individual died. All experiments were performed in triplicate.

Statistical analyzes of the data obtained from the lifespan were performed with the SPSS 13.0 program. Tukey and Duncan tests were used for comparisons of maximum and mean lifespans of both control and treatment groups.

Result

In this study, the maximum and mean lifespans of male and female populations of *D. melanogaster* chronically exposed to HN_{wtr} and HN_{met} extracts were determined. According to the data obtained, it was found that the maximum lifespan for the distilled water control group (1) was 80 days for ♀♀, 79 days for ♂♂ and 77 days for both populations in the DMSO (2) control group (Table 1 and Table 2). However, while the maximum lifespan for 10, 20, 30 and 40 ppm HN_{wtr} applications (3-6) in the ♀ population was 73, 70, 66 and 60 days, respectively, in the ♂ population it was determined as 66, 63, 60 and 53 days. In this study, the mean lifespan was calculated as well as the maximum lifespan. While these values were 65.87±1.43 and 63.02±1.38 days in the ♀ population of distilled water and DMSO control groups, it was found to be 56.67±1.79 days in the lowest application group (10 ppm) and 41.09±1.65 days in the highest application group (40 ppm). In the ♂ population, these values were observed as 58.95±1.63 (1) and 56.34±1.64 (2) days for the control groups, respectively, while 42.50±1.43 and 31.13±1 days were observed in the 10-40 ppm application groups (Table 1).

Table 1. Comparison of Maximum and Mean Lifespan Data of ♀♀ and ♂♂ Populations Treated with HN_{wtr} and Intergroup Significance Controls

	Hyoscyamus niger water extract							
	♀♀				♂♂			
Application groups	Number of individuals	Maximum lifespan	Mean lifespan±SH	*P*	Number of individuals	Maximum lifespan	Mean lifespan±SH	*P*
Control (distilled water) (1)	100	80	65,87±1,43		100	79	58,95±1,63	
DMSO (2)	100	77	63,02±1,38	1-3,4,5,6* 2-4,5,6*	100	77	56,34±1,64	1-3,4,5,6* 2-3,4,5,6*
10 ppm (3)	100	73	56,67±1,79	3-5,6* 4-6* 5-6*	100	66	42,50±1,43	3-6* 4-6* 5-6*
20 ppm (4)	100	70	54,44±1,82		100	63	40,73±1,57	
30 ppm (5)	100	66	49,92±1,69		100	60	37,33±1,51	
40 ppm (6)	100	60	41,09±1,65		100	53	31,13±1,24	
Regression level	R= -0,442				R= -0,534			

SH: Standard error,*: The difference between the values of the mean lifespan is significant at the 0.05 level among specified groups.

The data on the maximum and mean life span of the HN_{met} application are also shown in Table 2. As a result of chronic applications, the maximum life span was 73 days at 10 ppm, 70 days at 20 ppm, 66 days at 30 ppm and 63 days at 40 ppm in the ♀ population, and 70,

66, 63 and 53 days in the ♂ population, respectively. The mean lifespan of male and female populations for HN$_{met}$ application was also calculated. It was determined that these values decreased from 63.02±1.38 days in the ♀ population in the DMSO control group (2) to 50.63±1.48 and 42.53±1.81 days in the 10-40 ppm application groups (3-6), respectively. While the mean life in the ♂ population was 56.34±1.64 days in the DMSO control group (2), it decreased to 42.24±2.10 and 30.08±1.03 days in the treatment groups (10-40 ppm), respectively (Table 2).

Table 2. Comparison of Maximum and Mean Lifespan Data of ♀♀ and ♂♂ Populations Treated with HN$_{met}$ and Intergroup Significance Controls

	Hyoscyamus niger methanol extract							
	♀♀				♂♂			
Application groups	Number of individuals	Maximum lifespan	Mean lifespan±SH	*P*	Number of individuals	Maximum lifespan	Mean lifespan±SH	*P*
Kontrol (distilled water) (1)	100	80	65,87±1,43		100	79	58,95±1,63	
DMSO (2)	100	77	63,02±1,38	1-3,4,5,6* 2-3,4,5,6* 3-5,6*	100	77	56,34±1,64	1-3,4,5,6* 2-3,4,5,6* 3-6* 4-6*
10 ppm (3)	100	73	50,63±1,48		100	70	42,24±2,10	
20 ppm (4)	100	70	45,01±1,69		100	66	40,26±2,07	
30 ppm (5)	100	66	43,48±1,98		100	63	36,51±1,20	
40 ppm (6)	100	63	42,53±1,81		100	53	30,08±1,03	
Regression level			R= -0,468				R= -0,514	

SH: Standard error, *: The difference between the values of the mean life span is significant at the 0.05 level among specified groups.

Discussion

H. niger, which is widely found in different parts of the world, is a pharmacologically important plant due to its tropane alkaloids such as atropine, scopolamine and hyoscyamine [2]. However, these alkaloids can be poisonous and even lethal, as well as showing therapeutic properties. In a case report, a 23-year-old woman who accidentally consumed *H. niger* on the grounds that it resembled lettuce was reported to have symptoms such as dizziness, vision problems, nausea, and vomiting [3]. In another case report, it was stated that a 7-year-old girl had complaints such as inconsistent behaviors, speech disorder and vision problems as a result of consuming this plant [4]. In a study by

Shams *et al.* (2017), symptoms such as tachycardia, confusion, and hallucinations were observed in a 65-year-old female and a 71-year-old male patient who cooked and consumed the root of *H. niger* [5]. Various studies have shown that this plant has toxic effects not only in humans but also in animal organisms. Baharshahi *et al.* (2017) observed in a study that methanol extracts prepared from the stem, flower and leaves of *H. niger* inhibited the growth of *Culex* spp. [6]. It was also stated by Yiğit *et al.* (2019) that methanol extract prepared from *H. niger* leaves had a larvicidal effect on *Culex pipens* [7]. In a similar study by Akkol *et al.* (2020), it was observed that the extract of *H. niger* seeds increased the larval mortality rate in *Lucillia sericata* [8].

Within the scope of the presented study, we think that the shortening observed in the life span of individuals belonging to the wild strain of *D. melanogaster* (Table 1 and Table 2) is due to the alkaloids contained in the HN_{wtr} and HN_{met} extracts. Because alkaloids, which are a group of secondary metabolites and contained in different plants, induce the formation of free radicals and cause oxidative stress. Free radicals produced during normal metabolism can be kept in balance by antioxidant mechanisms [9]. However, if the increase in free radical formation exceeds the antioxidant capacity, it causes damage to organic molecules such as lipids, proteins and nucleic acids. This type of damage, which may be caused by alkaloids, also leads to the formation of somatic mutations [10]. In conclusion, we can say that "the inability to repair these damages, the loss of function of DNA repair mechanisms and the mutation of the TP53 gene, which prevents tumor formation, also shortens life expectancy and causes population aging."

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ID: 140-AOP

Role of Cellular Membrane Damage in Chlorpromazine-induced Liver Injury

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Introduction:

Chlorpromazine (CPZ) is an antipsychotic drug. CPZ is primarily used to treat psychotic disorders such as schizophrenia. CPZ was reported to have liver injury ranging between 0.5%–2% of patients. Patients treated with CPZ faced hepatic necrosis and high plasma aminotransferase levels. However mechanism of CPZ-induced liver injury is still unclear. For this reason, we aimed to investigate role of membrane damage in CPZ-induced toxicity in HepG2 cells.

Material and Methods:

MTT assay was applied in order to determine cytotoxic concentrations of CPZ as described previously (Fotakis, and Timbrell, 2006) with some modifications. In brief, after attachment time (1×10^4 HepG2 cells/well) for 24 h, HepG2 cells were exposed to CPZ at dose-dependent (25, 50, 75, and 100 μM) level for 24 h. Then, the medium was replaced with MTT solution (5 mg/mL in PBS). Further, formazan crystals was dissolved with DMSO and absorbance was measured at 550 nm by using a microplate reader. We also conducted LDH leakage assay in order to investigate membrane damage in CPZ-induced cytotoxicity. This assay was applied with HepG2 cells treated with CPZ as described previously (Hassoun et al., 1993; Fotakis, and Timbrell, 2006) with some modifications. In brief, after attachment (1×10^4 HepG2 cells/well) for 24 h, cells were incubated with 75, and 100 μM CPZ. After treatment time, alterations in NADH absorbance were measured at 340 nm by using a microplate reader for 4 minutes.

Conclusion and Discussion:

In our study, MTT assay showed that 75 and 100 μM CPZ resulted in significant cytotoxicity in HepG2 cells. Therefore, we applied high concentrations of CPZ such as 100 μM for further assay in HepG2 cells in order to observe toxic alterations. LDH leakage assay indicated that 100 μM CPZ distrupted HepG2 membrane. Consequently, we might suggest that membrane damage-induced cell death plays role in 100 μM CPZ-induced liver injury.

Keywords: Chlorpromazine, Liver Injury, Membrane Damage, HepG2 cells, Cytotoxicity.

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ID: 143-AOP

Productivity Analysis of Some Inorganic Materials Used in Soilless Agriculture

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The aim of this study is to examine productivity of some inorganic materials used in soilless agriculture. For this purpose, saturation, pH, electrical conductivity, calcium carbonate, available potassium, available phosphorus, and organic matter of eight different inorganic materials used in soilless agriculture were determined. The saturation values of studied materials vary from 45-500% with mean value of 239.88%. The pH values are between 7.45 and 10.2 with mean value of 8.42. The electrical conductivities of studied materials are between 21.9 μs/cm and 950 μs/cm with mean value of 299.05 μs/cm. The calcium carbonate was not observed in four inorganic materials. The minimum calcium carbonate value is 0.3% and the maximum calcium carbonate value is 1.8% in studied inorganic materials. The minimum values of available potassium and phosphorus are 20.8 mg/kg and 0.8 mg/kg, respectively and the maximum values of those are 2920.3 mg/kg and 69.5 mg/kg, respectively. The mean value of available potassium is 852.96 mg/kg and the mean value of available phosphorus is 12.99 mg/kg in studied inorganic materials. The organic matter values of studied inorganic materials vary from 0.06% to 3.7%. The mean value of organic matter is 1.04% in studied inorganic materials. Obtained these results will be discussed and compared with each other in detailed.

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Regulatory Effect of Tannic Acid Against Doxorubicin-Mediated Change in Glutathione Reductase Enzyme

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Abstract

Cancer is one of the chronological diseases that threaten human life. Cancer treatment strategies include; Cancer treatment includes many strategies such as radiotherapy, surgery, targeted therapy and chemotherapy. Chemotherapy is one of the most studied strategies. Chemotherapy is the killing of cancer cells using chemical agents. The aim of this study is to examine the effect of the chemotherapeutic agent Doxorubicin (DOX) on the glutathione reductase (GR) enzyme in the spleen and to investigate the protective effect of tannic acid (TA), a polyphenol, against change. For this purpose, DOX (5 mg/kg), TA (50 mg/kg) and DOX+TA (5 mg/kg DOX+50 mg/kg TA) were treated to rats. Real-time quantitative gene expression analysis (qPCR) was performed on spleen tissue from rats after treatment and changes in the mRNA expression level of the GR enzyme were determined. In addition, GR enzyme activity was measured in spleen tissues. The data obtained showed that the DOX administration had a statistically significant decrease in the GR enzyme activity and gene expression level in the spleen tissue of rats compared to the control. In addition, it was found that TA application brought the decrease in the gene expression level and activity of the enzyme closer to the control level. As a result, it has been suggested that the DOX used causes damage to the spleen tissue of the rats, but the TA used may be a protective agent that helps to remove the spleen damage.

Keywords: Spleen, Doxorobucisin, Tannic acid, Glutathione Reductase

Introduction

Cancer is the irregular division and proliferation of cells in an organ or tissue. Various cancer treatment methods are applied to eliminate the damage caused by cancerization [1]. These treatment methods are; radiotherapy, stem cell therapy, hormone therapy, surgical methods, biological therapy, immunotherapy, cell-based therapy (cancer vaccines), gene therapy and chemotherapy[2]. Chemotherapy (CT) aims to kill cancer cells with the help of chemotherapeutic agents. Antineoplastic agents have the most important role in this treatment method [3,4]. Doxorubicin (DOX), also known as Hydroxidaunorubicin, is one of the antineoplastic agents. It is the most potent and broad-spectrum drug used in the treatment of both adult and pediatric cancers [5]. DOX is in the

anthracycline antibiotic group, which is widely used in the treatment of acute lymphoblastic leukemia, metastatic breast cancer, hodgkin lymphoma, non-hodgkin lymphoma, ovarian cancer, lung cancer and sarcomas, and impairs the cellular repair process [6]. Thus, it causes an increase in the production of reactive oxygen species (ROS). The imbalance between ROS and antioxidants causes oxidative stress [7] and is associated with diabetes, inflammation, and gastrointestinal disorder. The clinical use of DOX is limited due to the development of myocardial toxicity in patients and its cytotoxic effect on normal cells. It has also been reported that the use of DOX causes spleen contraction. All these cause undesirable side effects that can significantly affect patient health and quality of life. Therefore, protective agents should be used together with DOX to reduce the negative effects [8]. Vitamins, coenzyme Q, flavonoids, polyphenols, and herbal antioxidants are among the most widely used and researched antioxidant compounds against DOX toxicity. [9]. Tannic acid (TA) is one of the antioxidant compounds and is produced as a result of secondary metabolism in many plants. [10]. TA helps to eliminate oxidative damage in kidney tissue due to DOX exposure and can prevent the formation of oxygen-derived radicals [8]. In addition, TA has anti-oxidative [11], anti-inflammatory [12], anti-apoptotic [13] and anti-carcinogenic [14] properties indicate that it may have a protective potential against chemotherapy-induced toxicity. However, the protective feature of TA on spleen damage caused by DOX has not been found in the literature.

Materials and Method

A. Experimental Design

All animal experiments were performed in accordance with the National Research Council's Guide for the Care and Use of Laboratory Animals and were approved by the Atatürk University Local Ethics Council of Animal Experiments (Protocol No: 2019-16/252). Sprague Dawley rats (Rattus norvegicus, male, 9-10 weeks old, 180±20 g) were randomly divided into 4 groups; Con, DOX (5 mg/kg), TA (50 mg/kg), and DOX+TA (5 mg/kg and 50 mg/kg, respectively) [15,16,17,18]. The rats were kept in grid plastic cages at standard light (12h night – 12h day), humidity (40 – 60%), and room temperature conditions throughout the experiment. DOX and TA treatments were carried out for 14 days. End of the application procedure, all rats were killed by cervical dislocation and spleen tissues were taken quickly and put at -80℃.

B. RNA isolation and cDNA synthesis

Total RNA isolation from spleen tissues of rats was performed using a commercial kit (RNeasy Mini Kit, Qiagen, Germany). The manufacturer's protocol was followed at all steps. Concentrations and purity of RNAs were measured on the Nanodrop instrument (Multiskan

GO, Thermo Scientific). cDNAs were synthesized using the iScript cDNA synthesis kit (Bio-Rad according to the manufacturer's protocol.

C. Primer design and qPCR

Primers of target and housekeeping genes were designed using the Primer3 online tool. Relative gene expressions were measured using the SYBR Green (SsoAdvanced Uni SYBR Green Supermix, Bio-Rad) qPCR method in a Rotor-Gene Q (Qiagen, Hilden, Germany). Beta-actin (*Actn*) expression was used for normalization and relative quantification. The relative expression results were analyzed using Livak and Schmittgen's comparative ΔΔCt method [19].

Table 1. List of qPCR primer pairs used

Gene Symbol	Accesion Number	5'–3' primer dizisi
Gr	NM_053906.2	F: AGTTCACTGCTCCACACATCC
		R: TCCAGCTGAAAGAACCCATC
β-actin	NM_031144.3	F: TGTGGATTGGTGGCTCTATC
		R: AGAAAGGGTGTAAAACGCAG

D. GR *specific enzyme activity measurement*

Glutathione reductase enzyme activity was measured according to the method by Carlberg and Mannervik (1985) [20].

E. Statistical analysis

All the measurements were triplicated for each animal and sample. Statistical comparison of the results was performed by one-way ANOVA and Tukey's post-hoc test using Prism software (GraphPad Software, San Diego, CA). Statistically significant differences are presented as follows: not significant (ns); *$p < 0.05$ (significant); **$p < 0.01$ (very significant); *** or **** $p < 0.001$ or 0001 (extremely significant).

Results

In the results of this study, it was observed that exposure to DOX caused changes in *GR* mRNA transcript level and GR specific enzyme activity. As shown in Figure 1, the *GR* mRNA transcript level was significantly reduced with DOX administration compared to the control and TA treatment groups (**$p < 0.01$). On the other hand, the decrease in mRNA expression of *Gr* re-elevated significantly with TA assistance.
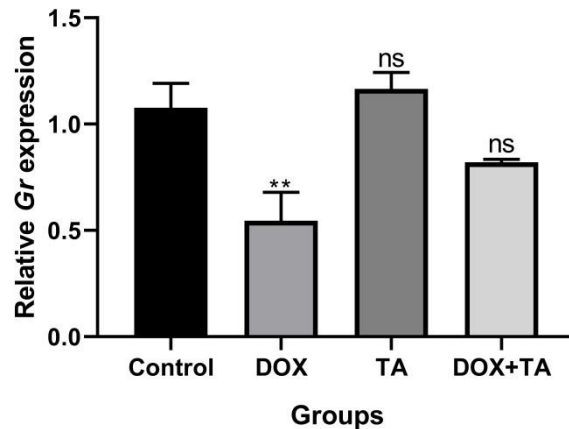
Figure 1. Relative gene expression level of *Gr* gene. Con; Control, DOX; doxorobucisin, ns: not significant; *p < 0.05, **p < 0.01, *** or **** p < 0.001 or 0001

GR-specific enzyme activity was significantly decreased in the DOX-treated groups (Figure 2). When the DOX+TA group and the DOX group were compared, the GR-specific enzyme activity increased significantly in the combined group. In TA group rats, however, it showed only a mild decrease over the course of the study.
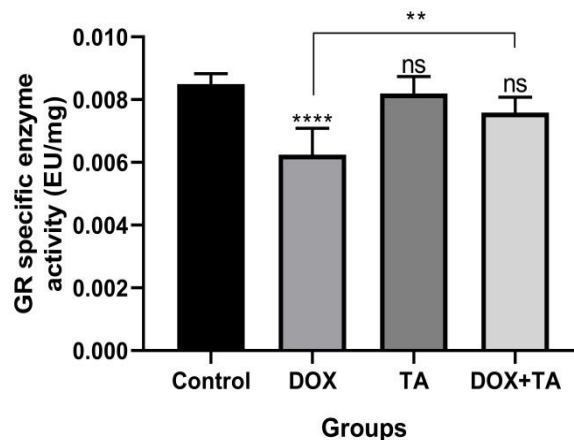
Figure 2. Specific enzyme activity of GR. Con; Control, DOX; doxorobucisin, TA; Tannic acid. ns: not significant; *p < 0.05, **p < 0.01, *** or **** p < 0.001 or 0001

Discussion

Although anticancer therapy targets rapidly growing cancer cells, the chemotherapeutic drugs used can also damage other healthy and normal cells [21]. Since this damage causes deterioration in hemostasis, it may cause undesirable physiological results and may cause adverse effects in many organs [22,23]. Therefore, it is necessary to explain only the development of targeted therapeutics or the identification of ancillary agents that can

reduce the destructive toxicity of the drug used without changing the efficacy and protective mechanisms of the treatment [24].

Reactive oxygen species (ROS), produced during mitochondrial oxidative metabolism, is present at a certain level in healthy cells and acts as a signal [25]. However, when faced with any stress factor, the amount of ROS increases and becomes harmful for the cell. Glutathione reductase (GR) is one of the antioxidant enzymes responsible for the removal of increased ROS [25]. GR converts oxidized glutathione (GSSG) to GSH via the ascorbate-glutathione cycle [26]. Studies have shown that inflammation and oxidative damage are induced by DOX and cause tissue damage [27]. In this study, a significant decrease in GR-specific enzyme activity and GR mRNA expression levels was observed in spleen tissues of rats exposed to DOX. TA application, on the other hand, strengthened the antioxidant defense system by adversely affecting the responses resulting from DOX exposure. These data suggest that TA can repair the cellular antioxidant system damaged by DOX.

Conclusions

Considering the findings, it was shown that the exposure to DOX causes negative results in the spleen by changing the specific activity and gene level of the GR enzyme, while TA can help to eliminate the negative effects in the spleen.

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Evaluation of the Effect of Tannic Acid on mRNA Expression of Some Heat-Shock Protein Genes in Doxorubicin Exposed Rat Kidney Tissues

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Chemotherapy is the most preferred treatment for cancer, the second leading cause of death worldwide [1]. Doxorubicin (DOX), which is widely used in chemotherapy, can cause undesirable toxicities as well as its clinical efficacy [2]. Therefore, it is very important to develop various methods and agents to prevent drug-induced side effects. In this study, we aimed to explore whether tannic acid (TA) could exert a modulatory role on genes encoding some heat-shock proteins (*Hspaa1a, Hspa4, Hpsa5*, and *Hspa90aa1*) in rat kidneys in response to DOX. The nephrotoxicity rat model was generated by six different intraperitoneal injections of DOX (18 mg/kg cumulative). In addition, TA alone (50 mg/kg) and a combination of DOX+TA were administered to other groups. After the administration, RNA isolation was performed to create a cDNA library from kidney tissues taken from all groups. The gene expression intensities were measured by quantitative PCR using gene-specific primers. We observed that DOX treatment significantly repressed HSPs mRNA expression in the kidney tissue. However, DOX-induced kidney-specific downregulation of HSPs was markedly ameliorated after TA treatment. In conclusion, our findings indicate that dysregulation of HSPs, which provides the first line of protection for cells under stress conditions, can be restored by TA. Thus, this study suggests that tannic acid can be an alternative and natural therapeutic agent in alleviating the nephrotoxic effects of DOX treatment in cancer patients.

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A Novel Research on Developing Ready-To-Use LAMP Diagnostic Mix for Virus Detection

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Wheat dwarf virus (WDV) is one of the important viral diseases of cereals and a member of the *Mastrevirus* genus within Geminiviridae family [1]. WDV is a DNA virus that is persistently spread by *Psammotettix alienus*, however it does not multiply inside of leafhoppers or spread to eggs [2]. In this study, a one-step LAMP (loop mediated isothermal amplification) detection mixture was obtained and investigated how long it can be used successfully in detection of WDV. Several types of detection mix for WDV detection were developed with the essential components of a LAMP reaction including dNTPs, $MgSO_4$, primer sets, isothermal amplification buffers and thermopol reaction buffers. Appropriate temperature and reaction incubation time were determined and optimized for the diagnostic mixtures obtained with different contents. Finally, an optimized LAMP detection mix was developed that permits a succesfully detection of WDV. This novel detection mix was stored at different temperatures and used for the detection of DNA of WDV at 1, 3, 6 and 12 months respectively. The novel detection mix developed for WDV yielded successful and reliable results for the accurate detection of WDV in the tested time intervals. Studies on the testing capability of this mixture, which is promising for the rapid and accurate diagnosis of WDV still in progress. We believe that this new approach will pave the way for the identification of other plant pathogenic viruses with WDV reference.

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Development and Nutritional Analysis of Fiber Rich Syrup

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A phenomenal decrease in intake of fiber through daily diet has lead to an elevation in instances of various digestive disorders associated with the upper as well as lower gastrointestinal tract. These issues are generally addressed through usage of laxatives for relieving the symptoms of the disorders. Since most of the laxatives are synthetic in nature, the present study attempted to develop fiber rich syrup that may act as a natural laxative. Different variations of fruit concentrates were developed by incorporation of dates, figs, pectin, ginger extract, barley water and wood apple as the main ingredients. The developed products were subjected to sensory evaluation via the 9-point Hedonic scale and the most approved product was further biochemically tested for its nutritional composition. The prepared syrup displayed significant amounts of macronutrients, total dietary fiber (19.41%), minerals including iron (19.66mg/100gm), calcium (74.2 mg/100gm), magnesium (9.23mg/100gm) and phosphorous (35.13mg/100gm), vitamins such as vitamin C and β carotene as well as energy (191.3Kcal) compared to the basic product making it a potential natural laxative. Moreover the developed syrup also manifested prebiotic potential hence further potentiating as a gut healthy product. Consumption of the prepared syrup may help in alleviation of digestive disorders with minimal side effects.

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Comparative Effects of Processing Methods on the Nutritional Quality of Earthworm Powder

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Abstract

Earthworm powder is used in traditional medicine and as livestock feed supplement. However, adequate information on the effects of different processing methods on the nutritional quality of earthworm powders are not readily available. In this study, we compared the nutritional qualities of earthworm powders prepared by sun-drying, oven-drying, and freeze-drying methods. Results showed that the freeze-dried earthworm powder had the highest percentage fat, protein and fibre, while sun-dried powder had the least. Similarly, freeze-dried earthworm powder had the highest concentrations of amino acids. These results showed that adequate attention need be given to the appropriate processing methods that would yield the desired earthworm powder quality.
Keywords: Earthworms, Livestock feed, Amino acid.

Introduction

Earthworms and their products have continued to gain increasing applications in medicine, environmental health management, and livestock feed supplement. Earthworm powder is obtained when fresh earthworms are processed into powder by drying out their water or moisture content. Earthworm powders have been used in medicine and agriculture with good results [1]**.** It was observed that that *Pheretima posthuma* and *P. excavatus* powders inhibited pathogenic bacteria growth, and are therefore potential sources of drugs to suppress antibiotic-resistant bacteria [2]. Similarly, earthworm powders are now receiving attention for use as livestock feed supplements [3]**.** There are three major procedures used to process fresh earthworms to earthworm powder; these are oven-drying, freeze-drying, and sun-drying methods. Though these three methods are randomly used in research, information on their comparative effects on powder quality is not readily available. Hence, we aimed to compare the nutritional qualities of earthworm powders obtained by oven-drying, freeze-drying, and sun-drying methods.

Materials and methods

Collection and processing of earthworms to powder

The earthworm species used for this study was *Alma millsoni*, a tropical wetland species. The earthworms were collected, by digging and hand sorting, from the main campus of the University of Lagos, Nigeria. The earthworms were put in dechlorinated tap water for about two hours, to void their gut [4]**.** Gut-voided earthworms (Figure 1) were processed to earthworm powders using three protocols: (1) oven-drying, (2) freeze-drying, (3) sun-drying.

Oven-dried earthworm powder was prepared by weighing 500 g of gut-voided worms into a petri dish and kept in an oven at 70°C for 24 hours. The dried worms were thereafter homogenised into powder [5]. Freeze-drying protocol was adapted from Prakash *et al.* (2008) [6]. Sun-drying method was after Bansal *et al.* (2015) [2].

Figure 1. Fresh, gut-voided earthworm (*Alma millsonia*)

Determination of nutritional composition of earthworm powder samples

The percentage composition of protein (crude protein), fat (crude fat), fibre (crude fibre), ash, total carbohydrates, and moisture was determined according to the procedures outlined in the Official Methods of Analysis by AOAC [7]**.**

Determination of amino-acid profiles in earthworm powders

Homogenized earthworm powder samples were first extracted using phosphate buffer solution, before amino acids profiling. The amino acids content in the extracted earthworm powder were separated by thin layer chromatography method. The quantitative estimation or determination of the amino acids (profiles) was done through the colorimetric method of Rosen (1957) [8].

Statistical analysis

The data generated from the nutritional and microbial analyses of earthworm powders were subjected to descriptive analysis using the Analysis of Variance (ANOVA). The mean differences were separated using Duncan Multiple Range Test at 5% level of significance ($p < 0.05$). All statistical analyses were performed using IBM SPSS v 26 (IBM Corporation, New York).

Results

Nutritional composition of earthworm powders

Freeze-dried earthworm powder had the highest percentage of fat (14.20±0.07 %), protein (66.60±0.06 %), and crude fibre (0.18±0.01 %). Sun-dried earthworm powder had the least percentage ash (4.90±0.07 %), fat (10.93±0.04 %), protein (59.92±0.05 %), and fibre (0.14±0.01 %), but the highest percentage carbohydrate (11.86±0.48%) and moisture (12.27±0.33 %).

Table 1. Nutritional composition of earthworm powders

Earthworm powder type	Proximate composition					
	Moisture (%)	Ash (%)	Fat (%)	Protein (%)	Crude fibre (%)	Total carbohydrate (%)
Oven-dried	9.07±0.02a	5.93±0.04a	12.70±0.07a	61.93±0.15a	0.17±0.01b	10.22±0.21a
Sun-dried	12.27±0.33b	4.90±0.07b	10.93±0.04b	59.92±0.05b	0.14±0.01a	11.86±0.48b
Freeze-dried	10.90±0.57c	5.58±0.04c	14.20±0.07c	66.60±0.06c	0.18±0.01b	2.66±0.39c
F	35.90**	217.17*	1433.44**	2389.54**	17.33*	338.40**

Each value represents mean of three replicates ± standard deviation; values with different letters are significantly different (ANOVA; Duncan multiple range test, **$P < 0.01$, *$P < 0.05$.

Amino acid profile of earthworm powders processed by different methods

Of the seventeen amino acids found in the earthworm powder samples, glutamic acid occurred in significantly highest ($p < 0.05$) concentrations of 7.00±0.04 mg/g, 7.17±0.04 mg/g, and 7.57±0.08 mg/g in oven-dried, sun-dried, and freeze-dried samples, respectively (Table 2). Next to glutamic acid in concentrations, were iso-leucine (oven dried: 2.92±0.00 mg/g, sun-dried: 3.06±0.04 mg/g, freeze-dried: 2.52±0.95 mg/g), and aspartic acid (oven-dried: 2.81±0.00 mg/g, sun-dried powder: 2.92±0.08 mg/g, freeze-dried: 3.06±0.04 mg/g). Earthworm powder prepared by freeze-drying method had the highest concentrations of almost all the amino acids (lysine, valine, phenylalanine, methionine, leucine, lyrosine, histidine, threonine, arganine, aspartic acid, glutamic acid, serine, proline).

Table 2. Amino acid profile of earthworm powders processed by different methods

S/N	Types of amino acids	Amino acids concentrations (mg/g) in earthworm powder types			
		Oven-dried	Sun-dried	Freeze-dried	F
	Essential				
1	Lysine	1.43±0.04a	1.38±0.27b	1.71±0.04c	2.43
2	Valine	1.32±0.04a	1.38±0.04ab	1.49±0.04b	8.63
3	Phenylalanine	1.06±0.04a	1.14±0.08ab	1.27±0.04b	7.88
4	Methionine	1.65±0.04a	1.78±0.00b	1.87±0.04b	23.07*
5	Iso-leucine	2.92±0.00a	3.06±0.04a	2.52±0.95a	0.52
6	Leucine	1.11±0.42a	1.19±0.07ab	1.32±0.04b	7.84
7	Histidine	2.84±0.04a	2.94±0.04a	3.11±0.04b	23.83*
8	Threonine	1.29±0.07a	1.32±0.04a	1.44±0.04a	4.37
9	Arganine	1.24±0.07a	1.30±0.08a	1.46±0.07a	4.9
	Non-essential				
10	Tyrosine	0.64±0.40a	0.95±0.04a	1.16±0.10a	2.38
11	Cysteine	0.41±0.04a	0.54±0.07a	0.46±0.04a	3.44
12	Aspartic acid	2.81±0.00a	2.92±0.08ab	3.06±0.04b	12.42*
13	Glutamic acid	7.00±0.04a	7.17±0.04a	7.57±0.08b	55.65*
14	Serine	2.41±0.04a	2.49±0.08ab	2.62±0.04b	7.79
15	Alanine	0.89±0.04a	1.00±0.04a	0.95±0.04a	3.74
16	Proline	1.81±0.04a	1.87±0.04a	2.03±0.04b	16.22*
17	Glycine	0.12±0.08a	0.07±0.01a	0.10±0.01a	0.62

Each value represents the mean of three replicates ± standard deviation; Values with different letters are significantly different (ANOVA; Duncan multiple range test, **$P < 0.01$, *$P < 0.05$.

Discussion

The high nutritional composition recorded by the earthworm powders agrees with many previous studies [3,9]. The higher protein and fat levels recorded by freeze-dried earthworm powder may be attributed to the low temperature employed in the drying process, which might have inhibited microbial reactions involved in decay of macromolecules.

The variations in nutritional qualities of the earthworm powder types indicates that attention needs be given to the appropriate method that would yield the best desired results. If nutrient richness is of paramount importance, then, freeze-drying protocol should be considered. However, when multiple factors are taken together, including equipment, duration, and ease of processing, then, oven-drying protocol may be a choice of balance. This is because oven-drying protocol required less time (24 hours), yielded earthworm powder of relative higher nutritional composition, and at the same time, required less sophisticated equipment. Sun-drying protocol is the least recommended, as it required a longer time (36 hours) and yielded earthworm powder of least nutrient composition.

Conclusions

We compared the nutritional qualities of earthworm powders obtained by oven-drying, freeze-drying, and sun-drying methods. The nutritional and amino acids of the earthworm powders varied significantly. Freeze-dried earthworm powder recorded the best nutritional status, while sun-dried powders recorded the least. The variations in nutritional qualities of the earthworm powders indicates that attention needs be given to the appropriate method that would yield the best desired products.

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Investigation of *BMP15* Gene Polymorphism in Central Anatolian Merino Sheep

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It has been observed that mutations determined in some major genes (BMP1B, BMP15 and GDF9), which are members of the TGFβ superfamily that affect the ovulation rate, cause multiple lambing or infertility according to the inheritance patterns. As a result, it is important to examine the fecundity genes in terms of increasing the yield related to fertility characteristics, stabilizing the optimum number of offspring, identifying reproductive genetic disorders in sheep and using them as a model for humans. The aim of this study was to determine mutations for BMP15 gene and its effects have been studied in more detail in Central Anatolian Merino sheep bred in various enterprises in Eskisehir Province Sivrihisar District of the Central Anatolian Merino Sheep Breed Sub-Project carried out with the support of the Ministry of Agriculture and Forestry. After DNA isolation from blood, PCR assay was performed with the relevant primers and the products of the relevelant primers and the PCR products were visualized on agarose gel electrophoresis. PCR products were sequenced using the Automated DNA Sequencer and genotypes were determined. CTT deletion for exon 1, T>C missense mutation which are very close to the FecXG allele, for exon 2 and FecXH mutations, were determined by comparing the obtained sequences with the Genbank data.

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Lıfe of *Escherichıa Colı* Under Photooxıdatıve Stress At Dıfferent Ph

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Escherichia coli, commonly known as coli bacillus, is one of the enteric bacteria species living in the large intestine of mammals. In *Escherichia coli*, genes involved in the cellular response to environmental stress (acid shock, base shock, starvation stress, osmotic stress, oxidative stress and DNA damage) are expressed. In this study, the role of methylene blue and pH stress was investigated in wild type *Escherichia coli* W3110 and mutants of cad A, cad B, cad C, gad B, gad C, adi A. Survival experiments on wild type and mutant strains were carried out at 2 different pH (pH 6 and pH 8), by colony counting method in petri dishes. No sensitivity was observed in wild-type and mutant strains in pH 6 phosphate buffer, but it was observed to be effective only in pH 8 phosphate buffer. It was determined that in all strains containing pH 8 methylene blue, there was 2 logarithmic decrease at the end of 8 hours, but the maximum decrease was seen in the ordinary A mutant, the initial value of 6.59 logarithm decreased to 2.78 at the end of 8 hours, and the t99 value was calculated as 4.19. While it was observed that methylene blue was not effective in pH 6 phosphate buffer, it was found to be effective in wild type and all gene regions in pH 8 phosphate buffer medium. These results show that cad A, cad B, cad C, gad B, gad C and adi A genes are associated with pH stress.

Keywords: *E. coli*, pH, Methylene blue, Stress, Photooxidation

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Ecological and Biogeochemical Studies of The Soil Cover from The Mercury Province Aydarken (Kyrgyzstan)

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Currently, Kyrgyzstan is one of the leading in the world antimony-mercury provinces and has significant potential to increase these metals. However, the problem of mercury safety is an ecological and social problem. The distribution, transport, and transformation of mercury in ecosystems require special attention. This article presents the results of physical and chemical studies on the sites of the mercury province of Aydarken, Batken region, the Republic of Kyrgyzstan. Collection and research of the sample carried out in 2013-2017. The types of soils and the mechanical components of the soil above sea level at an altitude of 1684 m to 2078 m are determined. The results of the mercury in the soil cover by the atomic absorption method presented. It was found that in all studied areas the concentration of mercury in the soil cover more than in the background plots and maximum allowable concentration (MAC), and their values depend on the remoteness of the pollution source, especially in the area of the tailing dump and the metallurgical plant.

Keywords: mercury, soil cover, tailing dump, biogeochemistry, maximum allowable concentration

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A Karyological Study on *Tussilago Farfara* L., a Monotypic Taxon

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Tussilago farfara (Astereceae) is the only species of the genus. It occurs naturally in Europe, West Asia and West Africa. *T. farfara* (coltsfoot) is a rhizomatous perennial herb, 5–50 cm tall, characterized by a long stalk and hoof-shaped leaves with angular teeth on the margins. It is known that this plant is used in diseases such as respiratory tract diseases, skin, viral infections, fever, rheumatism and gout. It is a known medicinal plant used in Europe as an expectorant and for the treatment of various chest diseases [1]. The main material of investigation is *T. farfara* collected from Tunceli province (Turkey), Aktuluk district (1000m), roadside, in early spring. Herbarium material (MA 2021) is stored at Munzur University. Colchicine dye was used for dark staining of metaphase chromosomes. Acetic alcohol (1/3) was used as pretreatment solution. Chromosome photographs were taken under the Olympus BX 53 microscope. Levan et al. were taken as reference for chromosome terminology [2]. As a result of the investigations, the diploid chromosome number of the species was determined as 2n= 60. In addition, when the chromosome morphology of the species was examined, it was observed that it had dotted median (M), median (m) and submedian (sm) centromeres. The mean chromosome length and centromeric asymmetry of the species were calculated. As a result of this study, chromosome morphology and chromosome number of *T. farfara*, a monotypic genus distributed in Turkey, were revealed.

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Investigation of The *FecB* Gene Mutation Prolific Ewes

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Abstract

With recent advances in molecular genetics, the selection of animals with high reproductive performance especially in livestock farms, has gained a great influence on the rapid growth of the herd. The productivity of animals is one of the most important factors in this regard. In sheep, large differences can be observed in the number of lambs at birth among different breeds or in a same breed. The Booroola gene, also known as *BMPR-1B*, is a mutation that occurs with a single nucleotide change. It is additive for ovulation rate and partially dominant for lamb rate per birth, with the FecB mutation affecting fertility in sheep. It has been determined that the *FecB* gene increases the ovulation rate and the number of lambs at birth with a single gene copy.

In this study, it was aimed to help the breeding of twin or triple lamb ewes in the elite herds of Central Anatolian Merino bred in Eskişehir province by investigating polymorphisms on the 7th exon of the *BMPR-1B* gene by DNA sequence analysis method. As a result of the research, it was determined that the examined sheep did not have the *FecB* mutation.

Keywords: DNA sequence analysis, fecondity gene, *FecB*, sheep.

Introduction

It has great economic value in terms of sheep meat, milk, wool and leather production in Turkey and many countries of the world growing demand for animal products worldwide. Prolificacy is closely associated with follicular development and ovulation rate. Ovulation rate and litter size are crucial reproductive traits with high economic value. It is controlled by various factors like Single gene mutations, age, season and environmental change, nutrition, hormonal factors, fertilization rate, embryonic and fetal development.

Some mutations have been identified in sheep that affect both ovulation rate and litter size [1]. These include; Bone Morphogenetic Protein Receptor Type 1B (*BMPR1B*) (as *BMPR-1B, FecB*), Growth Differentiation Factor 9 (*GDF9*), Bone morphogenetic protein 15 (*BMP15*)

(as *GDF9B- FecX*), Beta- 1,4 N-acetylgalactosaminyltransferase 2 (*B4GALNT2*) (*B4GALT* and *GALGT2*), Coilin *(COIL),* Follicular Stimulating Hormone Receptor *(FSHR),* Guanylate cyclase 1 soluble subunit alpha-1 *(GUCY1A1),* Histone cell cycle regülatör (*HIRA),* Inhibin subunit beta-B, (*INHBB),* Leptin Receptor (*LEPR),* Kisspeptin (*KISS1),* Negative elongation factor E (*NELFE),* Solute carrier family 5/sodium glucose cotransporter 1 *(SLC5A1), Smad1*, Prolaktin (*PRL), and* Prolaktin receptor *(PRLR).* It has been observed that mutations determined in some major genes (*BMP1B*, *BMP15* and *GDF9*), which are members of the *TGFβ* (transforming growth factor beta) superfamily that affect the ovulation rate, cause multiple lambing or infertility according to the inheritance patterns [1].

In the early 1980s, research conducted on fertility and litter-size in Merino sheep revealed that there was a major autosomal gene with a positive effect on ovulation rate and on prolificacy. Those sheep that received one copy of the so-called, but unidentified 'Booroola gene' (called B or FecB) from each of their parents produced 1.5 more ovules and one lamb more than any other sheep in each lambing [2].

The *BMPR1B* gene is also known as ALK6 (activin receptor-like kinase 6) and is located on ovine chromosome 6: 29361947-29448079, with 12 exons, is annotated with 15 domains and features and is associated with 23 variations [3]. The Booroola mutation is caused by a single nucleotide change in the BMPR-1B gene. The BMPR-IB gene is a replacement of the Adenine nucleotide at position 746 with Guanine (A>G), located in exon 7 (GenBank accession No. NC_040257.1; Ensembl ENSOART00020031365.1:c836 A>G;). The amino acid Glutamine encoded from this point in wild sheep (FecB++) was converted to Arginine in sheep carrying the Booroola gene (FecBBB). While the ovulation rate increased by 1.3-1.72 in case of heterozygosity, it increased by 2.7-3.0 in case of homozygous mutation. It has been determined that the number of lambs born increases 0.9-1.32 times in case of heterozygous mutation, while it increases 1.1-1.7 times in case of homozygosity [2].

It has spread from Garole breed known as the source of FecB in India, to Javanese (Indonesia) Booroola (Australia), Bonpala, Deccani, Kendrapada, Nellore Nilagiri and Shadabadi, (India) sheep. It is thought that In China, the FecB mutation have spread from the Hu breed to Small-Tail Han, Duolang, Zeller black, Vadi, Mongolian, Cele black, Altay, and Bayanbulak breeds [2].

FecB has been exported with Booroola Merino sheep, as live animals, embryos or semen from Australia and New Zealand to France, Canada, Israel, South Africa, Uruguay, USA, UK, Germany, Hungary, Poland, Czechoslovakia and Spain. Based on the evidence for an important gene for productivity in Booroola Merino, there is great international interest in using these sheep in crossbreeding programmes. It is known that *FecB* is still present in at least 48 sheep breeds in 19 countries (Table 1) [2].

Goodwine (2020) reported (Table 2) that two different mutations, 199T and 250T, were detected in the 7th exon of the FecB gene, as well as other mutations at amino acid positions T250K in the 8th exon and 288Y in the 9th exon [1]. Mutations in the BMPR1B gene have been identified for exon 8 in Mehraban in Iran [5], and for exon 9 in Dorset, Mongolian, Small-Tail Han sheep breeds in China [6].

In many studies [6; 7; 8; 9; 10; 11; 12] conducted in Turkey sheep population, the *FecB* mutation in the BMPR-1B gene was investigated by PCR-RFLP method, but the *FecB* allele could not be detected.

The aim of this study was to determine mutations for FecB gene and its effects have been studied in more detail in Central Anatolian Merino sheep in various enterprises in Sivrihisar District of Eskisehir Province.

Table 1. Sheep breds that have FecB in the World [2].

No	Breeds	Country
1	Merino	Australia, New Zealand, Chile, Uruguay
2	Finn	Canada, USA
3	South Australian Merino	Australia
4	Border Leicester	Australia, New Zealand
5	BLM (Border Leicester–Merino)	Australia
6	Romney	New Zealand, UK, Brasil
7	Columbia	USA, Canada
8	German Mutton Merino	Germany, Belgium
9	Scottish Blackface	UK
10	Merino d'Arles	France
11	DLS (Dorset–Leicester–Suffolk)	Canada
12	Romanov	France, Canada
13	Dorset Horn	Australia, Canada, UK
14	Ile de France	UK
15	Columbia	USA, Canada
16	German Mountain	Germany
17	Hyfer (Dorset–Merino)	Australia
18	Suffolk	UK, USA, Chile, Canada
19	Polypay	Canada
20	Small Tail Han	China
21	Assaf	Israel
22	Borderdale	Australia
23	Merinoland	Germany
24	Corriedale	New Zealand, Poland, Uruguay
25	Olkuska	Poland
26	Western Whiteface	USA
27	Czechish Merino	Czech Republic
28	Dohne Merino	South Africa
29	Polwarth	Uruguay
30	Targhee	USA
31	Rambouillet	USA, Canada
32	Awassi	Israel
33	Perendale	New Zealand
34	Welsh Mountain	UK
35	Cheviot	UK

36	Texel	Hollanda, Belgium, UK
37	Poll Dorset	New Zealand
38	German Blackhead Mutton	Germany
39	Hungarian Merino	Hungary
40	Polish Merino	Poland

Material and Methods

The study was carried out in the laboratory of Department of Agricultural Biotechnology, Faculty of Agriculture, Eskişehir Osmangazi University. The research includes isolation of genomic DNA from blood samples collected from sheep, PCR amplification of the 7th exon of the *BMPR-1B* gene, and determination of mutations by sequence analysis methods of PCR samples.

Material

In the study, 175 Central Anatolian Merino sheep in various enterprises in Sivrihisar District of Eskişehir province under a project called Central Anatolian Merino Sheep Breed Sub-Project (II) (2011OAM26-02) supported by the Ministry of Agriculture and Forestry were used. The project was conducted in five elite herds and, twin or triple lambing (n=30) and sterile (n=5) ewes were selected from each flock, a total of 175 merino ewes. Approximately 5 ml of blood samples were taken from the vena jugular of sheep and collected in EDTA tubes.

Table 2. *BMPR-1B* gene polymorphism [1].

Gene	Exon	Allele	Mutation	Breeds
BMPR-1B	7. Exon	*FecB* (Booroola)	Q249R	-Booroola Merino (Australia). -Small-Tail Han, Hu, Duolang, Zeller black, Vadi, Mongolian, Cele black, Altay, Bayanbulak (China). -Javanese (Indonesia). - Garole, Bonpala, Kendrapada, Nilagiri, Shadabadi, Deccani, Nellore (India). - Kalehkoohi (Iran)
			199T	- Mehraban (Iran)
			250T	-Mehraban (Iran)
	8. Exon		T250K	-Mehraban (Iran)
	9. Exon		288Y	-Dorset, Mongolian, Small-Tail Han (China)

Methods

Phenol-chloroform extraction method was used for isolation of genomic DNA molecule [13]. After DNA isolation, PCR assay was performed with the relevant primers [14] (F: 5'-GTCGCTATGGGGAAGTTTGGATG-3' and R: 5'-CAAGATGTTTTCATGCCTCATCAACACGGTC-3). Amplification was undertaken as follows: initial denaturation at 94 °C for 5 min, followed by 35 cycles 94 °C for 30 s (denaturation), 61 °C for 60 s (annealing), and 72 °C for 60 s

(elongation), with a final extension step at 72 °C for 10 min. The PCR amplifications were performed in a 50-µL reaction mix volumes that contained 100 ng DNA, 0.5 µM each primer, 1 u Taq DNA polymerase (Promega, Madison, WI), and 5 µL 10x PCR buffer. The PCR products were visualized on agarose gel electrophoresis. PCR products were sequenced using the Automated DNA Sequencer and genotypes were determined.

Results

After DNA extraction from sheep blood samples, the DNA were visualized and checked by electrophoresis in 1% agarose gels, using 1x TBE buffer (Fig 1). The 300 bp products obtained from the PCR reactions were visualized by electrophoresis in 2% agarose gels, using 1x TBE buffer (Fig 2). PCR amplicons representing banding patterns from sheep were sequenced in both directions at the private DNA sequencing facility. Sequence analysis and genotype determination were made using Codon Code Aligner [15] and MEGAX [16] software programme. The resulting sequences were aligned using the Codoncode software was shown Fig 3.
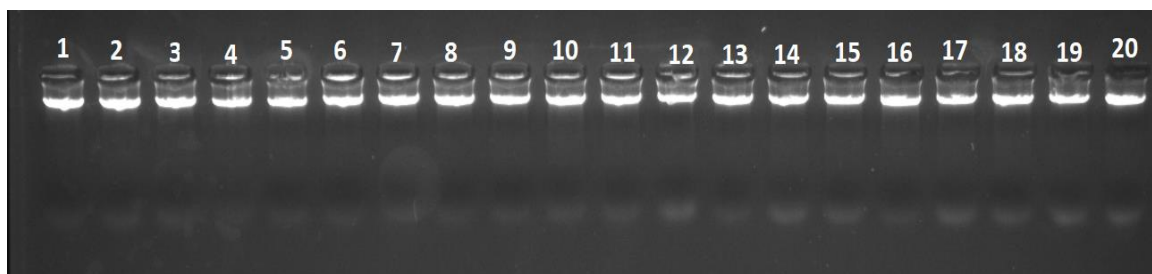
Figure 1. Sheep DNA samples checked in gel.
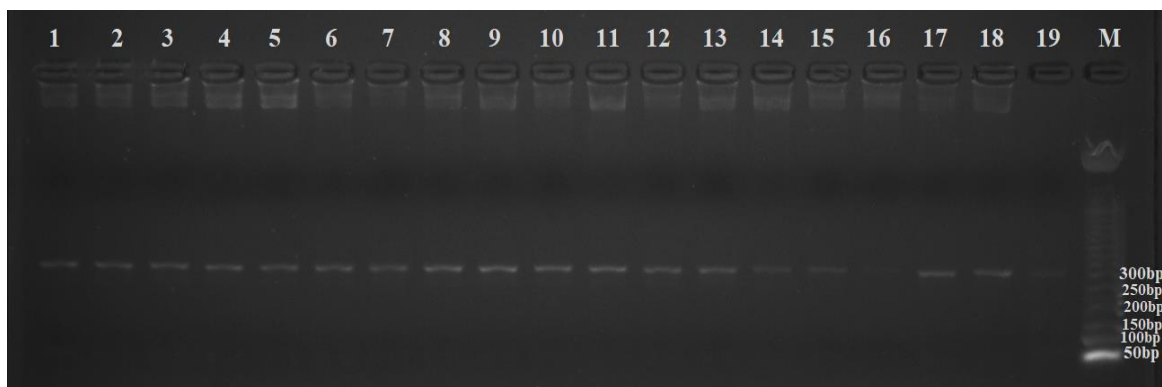
Figure 2. *300 bp PCR product of BMP1R* gene Exon 7 on the agarose gel (%2'lik) (M, 50 bp Fermentas® GeneRuler SMO241 DNA Marker).

After DNA sequence analysis of the samples, the sequences were examined and no polymorphism was detected in the 7th exon of the *BMPR*-1B gene in 175 Central Anatolian Merino sheep samples.

Conclusion

It is known that major fecundity genes have a significant influence on multiple lambing traits in sheep. In order to contribute to the increase in the number of lambs at birth in the elite herds raised in the Sub-Project of Public Breeding of the Central Anatolian Merino Sheep Breed, which is known for its productivity, the 7th exon of the *BMPR-1B* gene was examined by DNA sequence analysis and none sheep with the *FecB* allele was detected in the study.

Except for one study [12] in Turkey, in the other studies [6; 7; 8; 9; 10; 11] the presence of the *FecB* allele had been investigated in various sheep populations by PCR-RFLP but did not determine the allele. In this study, the elite herds of Central Anatolian Merinos were examined by DNA sequence analysis method, which was sampled from 175 sheep by checking at their past births (single, twin and triplet lambs), but *FecB* allele was not found. Using a DNA sequence analysis method instead of PCR-RFLP, which examines a single point mutation and is mostly applied in genetic polymorphism studies in Turkey, could identify possible mutations. It is thought that data obtained from DNA sequence analysis to investigate SNPs related to fecundity in sheep can contribute to the breeding of animals. As a result, it is important to examine the fecundity genes in terms of increasing the yield related to fertility characteristics, stabilizing the optimum number of offspring, identifying reproductive genetic disorders in sheep and using them as a model for humans.

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Figure 3. Samples DNA aligment of FecB gene Exon 7 (6:34010859).

AOP

ID: 239-AOP

The Use of Macroinvertebrate Based Biotic Indices and Diversity Indices to Evaluate the Water Quality: The Example of Balıkdamı Wetland, Turkey

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Benthic macroinvertebrates have limited mobility, and thus they are indicators of local environmental conditions. Their communities react rapidly to pollution-affected in freshwater systems. They are one of the most important bioindicators for ecological status of both rivers and lakes and their abundance, species composition and distributions' are shown inland water quality. Turkey is one of the most important zoogeographical regions in Palearctic with having inland water sources and paleogeographic and hydrogeographic structure of these sources. As in many other countries of the world, water resources are also under anthropogenic pressure in our country. Balıkdamı Wetland is also important aquatic habitats located in Sakarya Basin of Turkey. Agricultural and domestic wastewater negatively affect the water quality of Balıkdamı Wetland. In this study, some biotic indices based on benthic macroinvertebrates and also diversity indices were used to evaluate water quality of Balıkdamı Wetland. Samples were collected in 7 stations between November and August on 2021. Biotic indices were calculated with ASTERICS software. Totally 11643 benthic macroinvertebrate individuals belong to 30 families were identified in the area. The dominant taxa in basin-wide were determined as Gammaridae family members with 16.84% dominancy value, followed by Chironomidae and Lymnaeidae members with 15.50% and 13.12%, respectively. Most part of identified species are alpha and beta mesosaphrobic species. Results for the zoobenthic community structure indicate that Balıkdamı Wetland has generally class of III of water quality. Especially two stations (station 1st and 5th) located in south part of Balıkdamı Wetland have IV. quality water class. In these two stations, individuals of Lymnaeidae and Gammaridae which are typical groups of beta- and alpha-mesosaprobic zones were dominant taxa. 1st station is located on Göksu Stream and there are many picnic areas around. Also, 5th station is a region where agricultural lands are dense and scattered settlements dominate, and animal husbandry is also carried out in this region. Therefore, it can be said that anthropogenic pressures and naturally the pollution load are higher in this region compared to other sampling stations. Also, Shannon Diversity Index values were varied between 1.10 and 2.27.

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Determination of Enzyme Activity of Neocallimastix sp. on Different Substrates with High Tannin Content

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Abstract

In this study, *Neocallimastix* spp. fungi samples were developed in different carbon sources and their effects on enzyme activity and fungal growth (Orpin, 1975) were investigated by looking at the feed additives artutan, farmaton, red pine artutan, which have higher tannin content than other carbon sources.The enzyme assay was performed according to the DNS method. Anaerobic fungi showed high activity on the 5th day in the medium with farmatan additive with a higher tannin content, while they showed optimum activity on the 3rd day in the medium with Artutan and red pine artutan.

Keywords: Enzyme, Xylanase, Carboxymethylcellulose, Neocallimastix, Tannin.

Introduction

Anaerobic fungi have an important place in the rumen flora with their cellulose-destroying feature [1,2]. They are important microorganisms that increase the feed efficiency of the animal in animal nutrition [3]. Feeds with high tannin content lower the rumen pH and may lead to acidosis. It is considered important to determine the enzyme activities of the fungi developed in the tannic environment so that we can see the ability of the fungi to survive in this suppressive environment of the grain and to use their energy sources. In this study, *Neocallimastix* spp. Fungi (Figure 1) samples were developed in different carbon sources and their effects on enzyme activity and fungal growth were investigated by looking at the feed additives artutan, farmaton, red pine artutan, which have higher tannin content than other carbon sources.

Methodology

Anaerobic rumen medium was prepared by adding energy sources in concentrations of 5 mg/ml, 2,5mg/ml, 1.5mg/ml, 1mg/ml, 0.5mg/ml per liter with artutan, farmaton and red pine artutan additives [1]. To determine xylanase and CMCase enzyme activity, enzyme assay was performed at 30 40 50 60 70 80 °C for 45 minutes [4]. The optimum temperature was determined as 50 °C in enzyme assay processes with all additives. The samples showed

the highest activity at the concentration of 5mg/ml. Samples growing at 5mg/ml concentration were subjected to enzyme assay process with xylan and cmc substrates. The enzyme assay was performed according to the DNS method [2].

Results and Discussion

The possibilities of using artutan, farmaton and red pine artutan additives in the field of nutrition and zootechnics were examined to see what effects they had on the rumen microbial population, more precisely on the fungal population. Anaerobic fungi showed high activity on the 5th day in the medium with farmatan additive with a higher tannin content, while they showed optimum activity on the 3rd day in the medium with Artutan and red pine artutan.

Although the rate of hydrolyzed tannin was higher in the farmatan additive than in artutane, the enzyme activity was higher because the sugar content was higher. Fungi enzyme activity was found to be lower in the red pine artutan additive, which contains a lower sugar ratio than the other two additives. Despite the tannin effects, the sugar content in it supported the growth of the fungus, which was reflected in the activity. As a result, it is thought that the isolated fungus may be resistant compared to the suppressive property of the grain. In this respect, by transferring different fungi species to different ruminants, the rate of nutrient utilization in animals fed with foods with high tannin content can be increased.

Table 1. *Neocallimastix* spp. xylanase activity in high tannin content medium

	Xylanase							
	Total activity				Spesific activity			
	3	5	7	9	3	5	7	9
Artutan	**6,03±0,15**	1,41±0,08	0,60±0,006	0,56±0,21	**65,01±8,93**	13,22±2,28	6,95±0,45	5,75±3,53
Farmaton	0,36±0,17	**2,23±0,16**	1,16±0,14	**0,81±0,22**	5,59±2,63	**35,12±3,67**	**21,95±0,88**	**18,43±2,84**
Red pine artutan	2,25±0,54	1,4±0,12	**0,89±0,22**	0,29±0,02	21,45±6,25	9,80±4,67	8,63±2,45	2,87±0,28

Table 2. Neocallimastix spp. CMCase activity in high tannin media

	CMCase							
	Total activity				Spesific activity			
	3	5	7	9	3	5	7	9
Artutan	**1,62±0,092**	**1,90±0,33**	**1,08±0,35**	0,68±0,01	**30,38±7,52**	28,41±5,38	11,90±5,46	8,50±0,16
Farmaton	0,68±0,11	3,17±0,12	0,90±0,05	**0,89±0,7**	10,73±1,43	**49,68±0,44**	**14,21±0,39**	**13,49±0,5**
Red pine artutan	0,68±0,03	0,42±0,019	0,20±0,11	0,097±0,02	7,60±2,24	5,19±1,7	2,08±1,06	1,19±0,44

In the enzyme assay made with xylan substrate, the xylanase activity of the organisms growing in the medium with artutan added with a lower tannin rate remained lower than the other additives (Table 1). In the enzyme assay made with CMC substrate, organisms growing in the medium with high sugar content of farmatan were determined at higher

levels than the mediums with artutan and red pine artutan. Red pine artutan, whose tannin ratio is close to artutan, showed a lower value than other additives due to the low sugar content (Table 2).

Figure 1. Neocallimastix spp. (100X)

Conclusions

Although the rate of hydrolyzed tannin was higher in the farmatan additive than in artutane, the enzyme activity was higher because the sugar content was higher. Fungi enzyme activity was found to be lower in the red pine artutan additive, which contains a lower sugar ratio than the other two additives. Despite the tannin effects, the sugar content in it supported the growth of the fungus, which was reflected in the activity. As a result, it is thought that the isolated fungus may be resistant compared to the suppressive property of the grain. In this respect, by transferring different fungi species to different ruminants, the rate of nutrient utilization in animals fed with foods with high tannin content can be increased.

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Molecular Detection Methods of Epidemics and Biological Threat Agents

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The idea was discussed that we have a lot of information about the general properties and treatment methods of most pathogens that could cause epidemics in the last century and therefore there will not be a pandemic of epidemic proportions in this age. But the ongoing SARS-CoV-2 epidemic, which has threatened the world and claimed many lives in recent years, has changed these views. However, factors such as bioterrorism, war, pollution, climate change, uncontrolled population growth and globalization continue to pose significant threats to public health [1]. Early detection is the most critical phase in the prevention, protection, prophylaxis, and post-exposure therapy of an epidemic agent or biological agent without impacting public health. With the growth of nucleic acid technology, there has been an increase in the very sensitive and specific detection of harmful bacteria and viruses [2]. Molecular detection methods are based on the unique nucleic acid sequence (DNA/RNA) of a biological agent [3]. These methods can be listed as Polymerase Chain Reaction, Amplification Assays, DNA/RNA Sequencing Technology, and Sensor Technologies [4-8]. In addition, these methods tend to be more sensitive than other methods used today. This review provides an overview of current molecular methods used for the rapid and accurate detection and identification of epidemics (pathogenic bacteria and viruses) and biological threats (bioterrorist factors). As a result, molecular techniques have revolutionized the diagnosis of epidemic diseases and biological threats. Various viruses could emerge in the future and cause a devastating epidemic. Therefore, there is a need to develop techniques to prevent the emergence of new viruses or to minimize the health impact of the introduction of new harmful viruses.

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Use of Endophite Bacteria Against Angular Leaf Spot Disease of Cucumber

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Angular leaf spot disease in cucumber, which is widely observed around the world, causes significant losses in cucumber. Conventional methods for the control of the disease do not always give the expected result and have adverse effects on the environment. The use of beneficial bacteria can enable to sustainable approach as it reduces the input of synthetic pesticides and fertilizers. The study investigated the potential use of endophyte bacteria (EB) to control cucumber leaf spot disease caused by Pseudomonas syringae pv. lachrymans (Psl). The studies were carried out in a climate chamber. For this purpose, EB V33K2, V33K1, T2K2, WCS365, and T12K1 isolates were used. Cucumber (Cucumis sativus) cv. Octavia seeds were grown in a 2:1 peat-perlite medium. The suspension (10^8 CFU / mL) prepared from 24-48 hour EB cultures was applied twice by drenching method at 10mL/plant volume while cotyledonous leaves were forming and the first true leaf was beginning to appear. The suspension (108 CFU / mL) of the pathogen Psl CFBP 2262 isolate prepared from a 24-48 hour culture in KB medium was applied by spray method after the first true leaves. Seedlings with no treatment were evaluated as Negative Control (NK), and those with the pathogen was treated as Positive Control (PK). Psl disease severity was evaluated with a 0-6 scale at the end of the experiment. Plant shoot, root fresh and dry weight, chlorophyll content, and stem length were determined at the end of the experiment. According to the results obtained, T2K2 and V33K2 isolates were the most successful isolates by suppressing disease by 43% and 40%, respectively. Of the EB isolates, V33K2 increased fresh root weight, V33K1 increased stem length, and T2K2 increased the amount of chlorophyll significantly even under disease pressure. The study determined that EB isolates have significant potential in controlling cucumber leaf spot disease.

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Surfactant Ability of Alceae calvertii (Boiss.) Boiss. (Malvaceae)

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Surfactants are divided into two groups according to their sources: Synthetic surfactants are derived from petrochemical compounds and biosurfactants are directly obtained from plants, animals, and microorganisms without any further chemical treatments. Synthetic surfactants are generally toxic for environment and non or low biodegradable. Therefore, interest in biosurfactants has increased in recent years. *Alcea calvertii* (Boiss.) Boiss, known as "hiro, gülhatmi" in Anatolia, is included in the Malvaceae family. The objective of this study is to reveal the surfactant ability of *A. calvertii.* For this purpose, the dried parts of the plant (root, leaves, flower, and seed) were extracted separately by boiling method, then foaming properties and surface tension measurements were made. As a result of the study, surface tension values for flower, leaves, root, seed and mixture of whole extracts were measured as 74.21, 61.72, 55.16, 55.16 and 68.02 mN/m, respectively. However, the foam stability (parameter R5) was only determined for the root part of the plant (35.71). In fact, foam formation was also observed in the seed part, but the R5 parameter could not be determined because the extract was not sufficient to measure. As a result, the surface tension values obtained are not low enough for the plant to be considered as a good surfactant source. There are varying amounts of surfactant activity in all parts of the plant, but we conclude that the plant or parts of it should be also tested with different extraction methods in order to be evaluated as a good biosurfactant.

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Metagenomic Microbiome Profile and Organic Acid Compositions of Apple Cider Vinegar

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Vinegar is a natural product produced by fermentation of foods with rich carbohydrate content. Many studies have shown that this natural product has the potential to be used in the treatment of different health problems such as obesity, diabetes, cardiovascular disorders, cancer, and infectious diseases. In this study, the microbial biodiversity of the apple cider vinegar sample produced by the slow fermentation process was determined by the next generation sequencing (NGS) analysis technique. By evaluating the obtained sequence analysis results, microorganisms belonging to *Acetobacter, Lentilactobacillus, Lactobacillus, Liquorilactobacillus* and *Schleiferilactobacillus* genera were listed. In addition, the organic acid composition of the vinegar sample was determined using liquid chromatography technique coupled with tandem mass spectrometry (LC-MS/MS). During the qualitative and quantitative analysis of organic acids, two different multiple reaction monitoring (MRM) techniques were applied using the electrospray ionization (ESI) interface. For this purpose, 55 different organic acid standards were used. In this process, acetic acid and formic acid samples could not be scanned because they contain 2 and 1 carbons, respectively. Despite this situation, a total of 35 different organic acids were found in the apple cider vinegar sample. When the chromatograms and obtained results were examined, it was observed that 2-OH-glutaric acid, pyruvic acid, succinic acid, lactic acid, 3-phenyl lactic acid, P- OH-phenyl lactic acid samples were the dominant components. When all these results were evaluated, it was observed that vinegar sample had a rich organic acid content. In the next process, detailed studies are needed to determine the functional therapeutic potential of these dominant organic acids.

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Effects of Organomineral Fertilizers on Agricultural Production in the World and in Türkiye

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Organic matter content differs in the vast majority of our country's soils. However, with the widespread use of chemical fertilizers, the resources that were used in the past and that contributed to the organic matter content of the soil became unusable and even these resources began to be considered as waste. Soil organic matter is one of the key indicators not only for agricultural productivity but also for environmental resilience. Intensive monoculture agriculture, erosion, tillage, unconsciously and excessively applied chemical fertilizers and pesticides reduce soil organic matter.

The basis of sustainable agricultural practices is based on practices that protect and improve the amount of organic matter and soil organisms. One of these applications is the use of organominerals in fertilization.

Organomineral fertilizer; It can be defined as solid and liquid products formed as a result of the reaction or mixture of one or more organic fertilizers with one or more single, composite, secondary or micro plant nutrient chemical fertilizers. While organomineral fertilizers reduce the loss of nutrients by washing, they also increase the efficiency of the mineral fertilizers used by improving the fertility of the soil. The common view in studies on the subject is that organomineral fertilizers are the best alternative to chemical fertilizers in terms of their potential to provide plant nutrients and improving soil properties.

Studies have shown that the effects of organomineral fertilizers on yield are variable. Accordingly, in some studies, it resulted higher yields than mineral fertilizers, and in the other studies lower yields were observed. On the other hand, it also noted that the yield values obtained from organomineral and mineral fertilizer applications are mostly close.

Although some limited information exists on the use of organomineral fertilizers in grain crops, most research has been conducted on vegetables, fruits, and specialty crops. Overall, research has shown that organomineral fertilizers can improve plant growth parameters such as yield and nutrient uptake to a greater degree than when manure or fertilizers are used alone. This article provides a review of the current literature on the use of organomineral fertilizers for food production.

Key words: Organomineral fertilizers, soil fertility, plant measurements.

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EDUCATION
ORAL PRESENTATIONS

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Adolescents Who Hide Themselves: Nickname Analysis

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Discovering motivations for nickname using will help us better understand users' internal attitudes towards society (Jensen Schau ve Gilly, 2003). Because individuals driven by social interactions can disguise themselves with nicknames or they can form friendships with like-minded friends by associating their nicknames with their personalities (Zhou ve diğ., 2021). Also, nicknames are used in different ways by different groups of people. It is not possible to understand the depth of their interface with their own society without examining their demographic and social structures and the cultural environment in which their use emerges (Holland, 1990). It is thought that evaluating the nicknames used by adolescents in the context of the culture they live in will help us understand how the next generation of the society we live in defines itself. Because adolescents may not always reflect their mood in the environment they are in. In this study, it is aimed to describe the moods of adolescents through nicknames. In this context, as a result of the interviews made with 312 adolescents studying in high schools in Ağrı City Center, they were asked what they used as nicknames and the answers received were categorized. The relationship between categorized nicknames and various variables was examined by Chi-square analysis. According to the findings, it was seen that there was no significant difference according to gender, class level, and having a room of their own. In addition, it was concluded that the adolescents used nicknames in eight different categories.

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Parental Patience Scale Validity and Reliability Study

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In daily life, people face many negative situations. While some people overreact to these situations, others can maintain their calmness in the face of negative situations. Schnitker (2012) defines patience as the tendency to wait calmly in the face of disappointment, distress or suffering. In their study, Schnitker and Emmons (2007) found a positive correlation between patience and well-being, they stated that patient individuals were less depressed. Peterson and Seligman (2004) stated that there is a relationship between patience and positive social characteristics, and that patient individuals display a more empathetic and grateful attitude. Situations that require patience include mundane activities such as waiting in traffic or waiting in line, as well as important long-term situations such as battling a serious illness or parenting. Patience is seen as an important skill in parenting. Patience has an important place for parents to withstand and control their children's developmental tasks or negative reactions and behaviors. In this study, it is aimed to develop a measurement tool that can measure the level of patience of parents with children who go to primary school towards their children. For this purpose, data were collected from 320 parents with children attending primary school in Konya city center. Data from 157 parents were used for exploratory factor analysis. Data from 163 parents were used for confirmatory factor analysis. In this context, it was concluded that the 18-item scale, one of which was reverse, had approximately 41% explained variance. In addition, a 2-factor structure consisting of Time and Responsibility sub-dimensions with a total internal consistency coefficient of .798 emerged.

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A Review of Child Abuse News Published in Internet News

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Abstract

Developing technology has paved the way for journalism on the internet to take more place than in print media. Considering the communication of the Internet with the internet of the subjects, the importance of news with children's content in the virtual environment comes to the agenda. A societal problem such as child abuse is one that requires interdisciplinary work. To increase the awareness of abuse in the society and to prevent and treat abuse, in addition to educators, health professionals, lawyers and psychologists, studies should be carried out by including tools that distribute messages on a mass scale. The way the victimized children are presented in the news environment is important because it can expose children to abuse again, as well as being a protective and public awareness tool. The aim of the research is to examine how much child abuse is included in internet news and how victims are presented in the news. Within the scope of the research, the qualitative research method was adopted, and document analysis was applied from the types of content analysis on the news about the children exposed to abuse. Within the scope of the research, 145 news related to "child abuse" were examined by considering the internet news site with the highest circulation that was determined by the criterion sampling method, which was determined by the criterion sampling method from the purposeful random sampling methods. In 28% of the news examined within the scope of the research, the names and surnames of the victim children were shared, while in 28% the photographs and in 52% the information about the province and district where they lived were shared. The fact that the media is more careful about protecting the privacy of the child victim and their family members can be considered as a factor that can prevent the child from being subjected to secondary abuse by benefiting from protecting their rights.

Keywords: Internet journalism, news, child abuse, content analysis

Introduction

Child abuse, which is a social problem in many respects from past to present, is a sensitive issue that does not lose its importance. Child abuse, defined as physical, emotional, and sexual abuse that harms a child's health, survival, development, and dignity [1], is a traumatic process that affects the rest of the child's life, even for his or her family or those who witnessed it. In addition to the physical problems that arise in the short term in the victimized child, long-term negative consequences such as sleep disorders, increase in aggressive behaviors, developmental retardation, depression, and proximity to suicide can be seen [2; 3].

It is widely accepted that there are three types of child abuse: physical, emotional, and sexual abuse. Even if their types are separated by definition, they cannot be considered independent of each other. As a matter of fact, a child who is exposed to one type of abuse is likely to be affected by other abuse. According to Koçtürk (2016), a child who is a victim of sexual abuse may also be subjected to emotional or physical abuse [4]. Similarly, it is possible for a child who is a victim of physical abuse to be emotionally abused.

A societal problem such as child abuse requires interdisciplinary work. To increase the awareness of abuse in the society and to prevent and treat abuse, in addition to educators, health professionals, lawyers and psychologists, studies should be carried out by including tools that distribute messages on a mass scale. The increasing technology network can be seen as a dangerous element that increases the awareness of the society about child abuse, which is a sensitive issue, as well as normalizing the abuse. The protection of the child from the negative effects of the media can only be possible if the media employees comply with ethical principles [5].

In the mass media, whose target audience is increasing day by day, the child appears as both a means and an end for the transmission of the desired message. The vulnerable presence of the child in these environments through pictures, writings or videos has brought about regulations within the scope of media ethics. The Declaration of Rights and Responsibilities of Journalists of Turkey, in this context; has renewed the rules that in the case of crimes or sexual assaults involving children, the names and photographs of child victims, defendants or witnesses shall not be published. In addition, they have shown their sensitivity to transform media content for the benefit of the child and to protect the child-family by adding a clause to the declaration on the point of not interviewing the child and not taking images (www.tgc.org.tr) without the permission of the family. At this point, the news prepared by paying attention to media ethics also helps to protect the rights of the child and raise public awareness.

Method

Within the scope of the research, document analysis from qualitative methods and content analysis types was applied on the news about children exposed to abuse. Internalanalysis has been defined as a systematic technique in which the document is categorized by rules-based codings to determine the existence of certain words or concepts within the text or texts [6]. Document review enables the analysis of documents produced within a certain period on a research problem or documents produced by more than one source and at different intervals on the relevant subject based on a wide period [7]. In a primitive form, the collected data can be analyzed with the help of computer programs, as well as by the researcher himself. Content analysis includes the definition of the problem, the selection of examples, the creation of categories, the coding, the preparation, and analysis of the data [8].

Data collection procedures

Within the scope of the research, the data collection tool was determined by criterion sampling from the purposeful random sampling methods. Google News, which is the news site that people click the most and download the application through the internet search engine, contains different national news sources in alternative view.

In the research, the news about children exposed to physical, emotional, and sexual abuse within the scope of child abuse were discussed. In the archive section of the relevant site, a total of 1377 news emerged with the keywords "child" and "abuse" limited between 01.08.2019 and 01.11.2019 were accessed; 145 news related to "child abuse" were included in the evaluation by removing news such as regional reports, interviews with experts, news covering topics other than abuse and information meetings.

Data analysis

In this study, where document analysis method is used from content analysis types, the data obtained in child abuse news in the content of internet news were converted into numerical data. In the news in question, information such as the title of the story, information exposing the victim or suspect, information about identity information (initials or no name sharing, etc.) or the presence of photographs or videos related to the incident were evaluated.

Findings

In this part of the research, the findings obtained regarding the purpose are included in the form of a table.

Table 1. Examining the way victims' personal information is covered in the news

Status Review	N	f
Number of news sharing entire names	41	28
Number of news not sharing names	35	24
Number of news where initials of names are shared	62	43
Number of reports where all names and initials of last names are shared	7	5
Number of news with information about his age	115	79
Number of news where photos or videos of the victim have been shared	33	28
Number of news where photos or videos of the victim have been blurred	22	19
Number of news where there are no photos or videos of the victim and instead representative photos	40	34
Number of news of family members of the victim sharing photos or videos	6	5
Other images (courtroom, crime scene photos)	17	14
Number of news where country, city, district information is shared	76	52
Number of news where neighborhood, street information is shared	34	23
Number of news where school, hospital, court, etc. information is shared	27	19
Number of news without shared address information	8	6

Table 1 shows the ways in which information about the victim is included. While the rate of sharing the names of abused children in the news is 28%, it is seen that the rate of news that their names are never shared is 24%. While the news that gave only the initials of the surnames was 5%, it was found that the rate of news that gave only the initials of both the name and surnames was 43%.

While the age information of the children who are victims of abuse was given at a rate of 79% in the news, it was found that 52% of the large-scale venue information such as

country, city or district was given, the more restrictive venue information about the village, neighborhood, street or even the door number was given at the rate of 23%, and the news that the child's living spaces such as schools, hospitals or courts could be determined was 19%.

When Table 1 was examined about the contents of the visuals included in the abuse news, it was found that the visuals of 28% of the children who were victims were shared openly, while the visuals of 19% were blurred. Among the visuals in the news, representative photographs such as a girl covering her face with her hands, a child sitting alone, a teddy bear held by a small child or images of hands appearing behind the glass (Figure 1) were included in 34% of the cases.

Figure 1: Representative photographs in abuse news

Table 2. Examining of the Ways in which the Abused Suspect's Personal Information Appears in the News

Status Review	N	f
Number of news sharing names	33	23
Number of news not sharing names	45	31
Number of news where initials of names are shared	67	46
Number of news where photos or videos have been shared	32	33
Number of news where photos or videos have been blurred	26	27
Number of news with representative photos or videos	40	41

In Table 2, the information of the people who implemented the abuse or who were suspicious was examined. While 31% of the news did not share the names of the abuser, 46% were only the initials of their names and 23% were the news that included all the names.

While 33% of the news reports included the photo and video of the abuser, 27% included an image of his whole body or face being blurred. It was seen that 41% of the news did not contain photos or videos, but representative photos of the relevant news.

Discussion

One of the most important issues to be considered when covering child abuse in internet news is to protect the privacy of the child victim. It is important that the child's personal information is included or the way the photos are included in the news. In 28% of the 145 news examined within the scope of the research, the names and surnames of the victim children were shared, while photographs were shared in 28% and information about the province and district where they lived were shared in 52%. In other researches, 50% of the news reports use photographs of abused children and their families, and 43% show district information about the settlement areas of the victimized children [9, 10]. Sharing information about the families of the child, which is the factor that increases the recognition of the child; interviewing family members, sharing their names and giving address information can contribute to the decipherment of the child. Similarly, knowing the identity and address information of the abuser can lead to the indirect recognition of the victim child [10]. As a matter of fact, in the study, it was seen that the names and surnames of the abusers were shared at a rate of 23%, while the sharing of photos and videos was 33%.

Like the content of a news, its headline is a factor that increases newsworthiness. When we look at the title of the news in the study, "Disastrous event! The little boy has become like this, Damn the event! Two children drowned in the pool, Disgrace at school! Horror on the street! The boy stabbed the boy in the throat and killed him! The child who was wounded in the throat with a cutting tool died, the disgusting incident in Izmir, the sexual abuse with the threat of low grades, the point where humanity ends..." It seems that remarkable words such as etc. are chosen. Making news with children's content with the concern of being clicked to attract the attention of the reader creates problematic news headlines.

With the researches carried out, it was stated that 77% of children's news violated ethical rules and that news inappropriate for children was included [11, 12]. These news, which can be counted as a violation of children's right to protection and may harm their privacy, may cause the victimized child to be exposed to abuse by the media again. The way child abuse is shown in the news, the content and language of the news can encourage violence and abuse [13].

As a result of the content analysis, the ways in which child abuse is included in the news were evaluated. Although ethical principles are tried to be followed in the content of the abuse news, it can still be said that there is inadequacy in this regard. The fact that the media is more careful about protecting the privacy of the child victim and their family members can be considered as a factor that can prevent the child from being subjected to secondary abuse by benefiting from protecting their rights. The suggestions that can be given in line with the results of the research can be listed as follows.

The use of news language focused on children's rights should be widespread.

It is thought that it will be useful to analyze the research related to the examination of news content related to children in different years.

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Pre-School Education Institutions from the Perspective of Parents

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The effects of the education received in the pre-school period on the future life of the individual are known. In the education of children in this period, pre-school education institutions are needed as well as the family. Achieving success in the education of the child requires the cooperation of the family and pre-school education institutions. This point makes the opinions of parents whose children attend pre-school education institutions important. The aim of this research is to determine the views of parents about pre-school education institutions. The survey model, which is one of the quantitative research methods, was used in the research. The sample of the study consists of parents with 64 children whose children attend pre-school education institutions. An open-ended questionnaire developed by the researcher was used as a data collection tool in the research. Content analysis was used in the analysis of the data obtained from the research. As a result of the research, it has been determined that a significant part of the parents have the opinion that attending pre-school education improves children's social skills. In the study, it was also determined that the parents had the idea that ensuring family participation in pre-school education institutions would increase the quality of education. It is among the suggestions that parents should learn more about the importance of pre-school education and increase the rate of schooling in pre-school education.

Keywords; Pre-School Education Institutions, Pre-School Education, Parents of students

Opinions of Primary Teacher Candidates on Working in Village Schools

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The problems experienced by teachers in the education system are frequently mentioned by different segments. Being a classroom teacher in village schools increases these problems many times over. This research was carried out in order to determine the opinions of primary school teacher candidates about working in village schools. Special case method was used in the study. The research was carried out with 12 pre-service teachers studying in the 3rd grade of classroom teaching. Semi-structured interviews were used as data collection tool in the research. The data obtained from the research were subjected to content analysis. As a result of the research, it has been determined that a significant part of the primary school teacher candidates want to work in village schools. Despite this, it was concluded that the majority of pre-service teachers found themselves insufficient to teach in village schools. In the research, it was also found that the multigrade classes, environmental difficulties and limited opportunities in village schools could reduce their motivation for the teaching profession. It is among the suggestions of the study to provide pre-service teachers with practical pre-service training about village schools and multigrade classes and to have them do internships in village schools.

Keywords; Village Schools, Prospective Teachers, Multigrade classes

ID: 215-EDP

Examining The Relationship Between Entrepreneurship Perception and Reflective Thinking Skills of Pre-Service Teachers

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The purpose of this study is to examine the relationship between entrepreneurship perception and reflective thinking skills of pre-service teachers. Many studies in recent years have been conducted on the importance of 21st century skills and students' proficiency. Well-equipped individuals with meeting the necessities of the age, literate of technology, open to innovations, and taking responsibility have played a crucial role on existence of both society and future. Therefore, schools encourage students to be successful both academically and socially. At this point, teachers are involved to transfer or guide students 21st century skills as well as their field knowledge. Considering the teachers' responsibility, pre-service teachers need to be educated in a way of overcoming the deficiencies and being well-equipped before their professional experience.... Entrepreneurship and reflective thinking skills are among the required skills for pre-service-teachers. This study aims to reveal how pre-service teachers perceive entrepreneurship and what their reflective thinking skills are. The results could provide educators and academicians to determine the deficiencies of pre-service teachers and decide how they should act to overcome these deficiencies. To examine the relationship between the variables, the study has been designed as a correlational survey model (Sönmez & Alacapınar, 2017). The study is in progress. The sample will consist of 4th grade undergraduate students studying at Ağrı İbrahim Çeçen University Faculty of Education in 2022-2023. The data will be collected through the "Reflective thinking tendency scale" (YANDE) developed by Semerci (2007) and the "Individual entrepreneurship perception scale" developed by Yalçın İncik and Uzun (2017). The data obtained will be analyzed statistically and published in tables.

Key words: Reflective Thinking, Entrepreneurship, Pre-service teacher, 21.st century skills

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ID: 216-EDP

Investıgatıng The Dıgıtal Cıtızenshıp Levels Of Pre-Servıce Teachers

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This study aims to determine the digital citizenship attitude and perception of the students studying at Ağrı İbrahim Çeçen University, Faculty of Education. The study may contribute to lead educational policies intending to equip individuals with 21st skills by examining digital citizenship level and filling the present gap in the literature. As data collection tool, both semi-structured interview and survey will be utilized because the study is quantitatively designed by benefiting from qualitative way. The "Digital Citizenship Scale" developed by Choi, Glassman & Cristol (2017) and adapted by Erdem and Koçyiğit (2019) will be used to determine the levels of pre-service teachers on digital citizenship. The scale includes 18 items consisting of the factors of Political Activism on the Internet, Technical Skills, Local/Global Awareness, Critical Perspective and Network Effectiveness. The interview questions were developed by the researchers. The 15-question final version was revised after an expert review and its application. After applying the scale, semi-structured interview will be performed with volunteers. The participants consist of 4th grade students studying at the Education Faculty of Ağrı İbrahim Çeçen University. If the data is normally distributed, parametric tests will be used; otherwise, if it does not show normal distribution, non-parametric tests will be used. The results will be presented in tables and published.

Anahtar Kelimeler: Digital Citizenship, Pre-service Teacher, Perception, Attitude.

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ID: 217-EDP

The Investigation of Graduate Theses (Master's Degree) Related to Drama Education in Turkey

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In this study, it is aimed to analyse the postgraduate theses (master's) published in the field of drama education in Turkey. In this context, 342 postgraduate theses (master's) which have been published between 2010-2022 and made available to access at the Higher Education Council (YÖK) national thesis centre are included in the scope of the study. This research is a qualitative research and data were collected by document analysis technique. The sample of the study was determined by the criterion sampling method, which is one of the purposive sampling strategies. In order to examine the theses reached, "Thesis Review Form" was developed by the researchers for the purpose of the study, including university, year, gender, study group, method and data collection tool. While analysing the data, it was analysed in terms of frequency (f) values according to the categories in the postgraduate thesis review form prepared in Microsoft Excel. The findings obtained from the theses, full texts of which were reached, were compared in terms of similar and different results, and a common conclusion was revealed. As a result of the analysis, the findings were presented in tables in order to provide better understanding. The results obtained from the research are as follows: Gazi University (15.5%) ranks first among 70 universities that have published postgraduate theses (master's) in the field of drama education. The most postgraduate theses (master's) on drama education was written in 2019 (27.5%). Female researchers (74.6%) worked more in this field than male researchers. Quantitative research method (44.4%) is the most preferred research method in postgraduate theses (master's). Those who wrote thesis in the field of drama education preferred secondary school students (33.3%) more as the research group. Scale (26.9%) and achievement test (28%) are the most used data collection tools in research.

Keywords: Drama Education, Postgraduate, Thesis.

ID: 228-EDP

The Investigation of 3th-8th Grade Science Course Outcomes With Respect To 21st Century Skills

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It is inevitable for individuals to have some skills in order to stand out in the complex life and work life of the 21st century. These skills were grouped by the P21 community into three main categories: "Learning and innovation skills", "Information, Media and Technology Skills", and "Life and Career Skills". In this study, it is aimed to examine the 2018 third-eighth grade "Sciences" Course outcomes (SCO) in terms of 21st century skills. The sample of the study in which the qualitative research model was used consists of 302 outcomes in the curriculum. The 21st Century Skills fields named by the P21 platform were used as the data collection tool, and the descriptive analysis approach was followed in the analysis of the data. The definitions of 12 sub-skill areas were taken into account in the study. The findings showed that 21st century skills are not included at a high level in SCO. It has been determined that "learning and innovation" skill are highly included in the outcomes, but "life and career skill" is the least in 21st century skills. It can be advocated from the results that SCO is prepared to develop "Information Literacy Skills", "Critical Thinking and Problem Solving Skills", and "communication Skills" from the 21st century skills. Moreover, it was found that the outcomes of "Leadership and Responsibility Skills" and "Entrepreneurship and Self-Management Skills" are not sufficiently included in the curriculum and that "Information, Media and Technology Literacy basic skill" area which serves to train individuals who keep up with the rapidly developing technology is represented at a very low rate in the curriculum. In addition, considering that it is very easy to access media resources nowadays, it can be suggested that the outcomes of "Information Communication and Technology Literacy skills", which provide the selectivity with respect to the development of this skill area and the messages emitted by various communication channels, are not sufficiently included in the curriculum.

HEALTH SCIENCE
ORAL PRESENTATIONS

ID: 117-HOP

Thulium Laser Vapoarization in Elderly and Comorbid BPH Patients

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In this abstract, we will describe one surgical strategy for treating BPH in elderly patients with comorbidities. A new technology known as the high-powered Thulium laser makes it possible to vaporize tissue quickly (200 W). Following a retrospective analysis of all laser prostatectomy procedures performed in our clinic in 2022, the data of three Thulium laser prostatectomy patients over 75 years of age were recorded. Patient's demographic information, ASA score, Charlson Comorbidity Indices, prostate size, amount of bleeding, Clavien Dindo Classification, and hospital stay duration were recorded. The ages of our patients ranged from 76 to 82. Due to BPH, all three patients used catheters. The ASA score for each of the three patients was 3. The corresponding Charlson comorbidity indices were 4, 5, and 6. Anticoagulants were being taken by two of the patients. Three different prostate volumes were measured: 76, 83, and 95 cc. With a Quanta Cyber TM 200W, Thulium Laser configured to vaporize the prostate, the prostatic passageways of three patients were opened. An average laser session lasted 26.3 minutes. The patient's hemoglobin level did not drop, and there was no evidence of bleeding. No complications were noticed. On the first postoperative day, the catheters were taken out of all 3 patients. Urine flow that occurred spontaneously was observed. They were discharged the same day because there was no visible significant post-void residue. Due to its quick recovery period and low risk of bleeding, high-power Thulium laser (200 W) vaporization may be an alternative for elderly and comorbid BPH patients. This treatment does not gather tissue samples for pathological investigation, and it should be emphasized. First and always, the risk of prostate cancer should be ruled out. In this method, controlled, randomized studies with a large number of patients are required.

ID: 123-HOP

Male Infertility

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Infertility is the inability of a couple to conceive after one year despite having regular sexual intercourse without using any birth control method. The presence of infertility can also cause serious psychological problems between couples. Reproductive health is vital to the continuation of the species. The male reproductive system includes the complex hormonal relationships between the hypothalamus, pituitary gland and testis. Etiology of infertility includes pre-testicular, testicular, post-testicular and idiopathic causes. In our presentation, we touched on the details of these. In terms of approach to the patient, endocrine tests (FSH, LH, testosterone) and spermiogram evaluation following the anamnesis and systemic examination are of great importance. In terms of treatment approach, medical (Hormonal, immunological, adenoma treatment) and surgical treatment (Varicocelectomy, TUR-ED, vasovasostomy, etc.) methods and assisted reproductive methods are available for correctable and non-correctable pathologies. Methods such as PESA (Percutaneous epididymal sperm aspiration), MESA (Microsurgery aspiration), TESA, micro-TESE (Testicular sperm extraction) are used to obtain sperm from the testis. In our presentation, we tried to evaluate the subject of infertility in general aspect.

ID: 124-HOP

Relationship of Lipid Metabolism, Mitochondrial Fatty Acid Oxidation and Carnitine Palmitoyltransferase 1A (CPT1A)

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Lipids are the building blocks of cellular membranes. Because the Golgi apparatus is the membranes of organelles such as endoplasmic reticulum, mitochondria, lipid homeostasis is significantly controlled. Mitochondria is an organelle that produces energy in the form of ATP, participates in various cellular processes and is the main intracellular source of Reactive Oxygen Species (ROS) production in cells. Mitochondrial dysfunction causes oxidative stress by increasing intracellular ROS levels, and increased oxidative stress and decreased antioxidant capacity of mitochondria bring about aging. Aging caused by ROS-mediated oxidative stress leads to mitochondrial dysfunction, energy deficiency, lipid peroxidation and metabolic disorder. Impaired lipid metabolism has been associated with many other disorders, including an imbalance in energy homeostasis and age-related diseases. Recent studies show that fatty acid oxidation has important effects in many types of cancer. Carnitine palmitoyltransferase (CPT) has an important place in the fatty acid oxidation process. The CPT system consists of two separate proteins located in the outer (CPT1) and inner (CPT2) mitochondrial membranes, and CPT1 plays an important role in mitochondrial fatty acid β-oxidation. CPT1A is one of three isoforms of CPT1 classified according to their different distribution and structure. Studies showing the effects of metabolic disorders and various types of cancer on the CPT1A-mediated fatty acid oxidation pathway have been reported. It has been stated that CPT1A is involved in cell proliferation during decidualization in mice, lipid accumulation and fatty acid oxidation can induce senescence in joint tissue cells, and CPT1A is highly expressed in aging chondrocytes and cartilage tissue. As a result, lipid metabolism has a significant effect on cells, tissues and organs. Irregularity in CPT1A, which is involved in the functioning of this effect, affects lipid metabolism, causes oxidative stress and causes degenerations by accelerating the aging process.

Keywords: CPT, CPT1A, Lipid Metabolism, Oxidative Stress, Mitochondria.

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The Role of a Pediatric Nurse in Ensuring Parental Interaction Newborns with Down Syndrome

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Abstract

Down Syndrome (DS) is a condition that occurs when a baby has an extra chromosome in the 21st pair of chromosomes. It is seen in one in 750-1000 births in the world and in our country. DS can cause physical growth retardation, characteristic facial appearance, and moderate mental retardation. Although some of the symptoms are more common in DS than in normal infants, it is difficult to make a definitive diagnosis based on appearance alone. Older mothers are more likely to have a baby with DS than younger mothers. Regardless of the level of health or disability, families with disabled children should be provided with information and support. It has been determined that more than half of parents with disabled children have great difficulties or have difficulty interacting with their children. The most important point in the interaction to be established is to ensure that babies are brought together with their parents after birth. Pediatric nurses have a great responsibility in providing parent-child interaction. Support from other family members and nurses providing primary care is very important for families to take responsibility for the care of a child with a disability. Families with disabled children state that they are under physical and emotional pressure and experience insomnia. Families should be encouraged to spend more time with their children to relax. Parents who are in the process of getting used to their parenting roles have direct contact with their children for the first time during this period. In the first minutes of life, the interaction between mother and baby is extremely important. The mother's seeing, touching and feeling the warmth of her child helps to correct many problems, especially pain. As neonatal nurses, they have an important role in supporting both parents and children with disabilities during stressful times. Families with disabled children should be introduced to other families and supported to express their feelings.

Keywords: Baby, Child, Down Syndrome, Nurse.

Introduction

The process of forming the emotional bond between mother and child is universal in all cultures. Research results in the literature have shown that this situation is related to evolution [1]. Man is born, grows, develops, and dies in the process of life. All these stages

proceed sequentially. The first stage is during pregnancy. During pregnancy and before childbirth, parents are often worried; but with positive expectations. In the next period, the period that includes the love and compassion they display for their babies begins [2]. Parents who are in the process of getting used to their parenting roles have direct contact with their children for the first time during this period. In the first minutes of life, the interaction between mother and baby is extremely important [3]. Newborns born at term and healthy begin to move towards the nipple to suckle. This is an innate reflex. In those without any developmental problems, this occurs spontaneously in the first hours of life without the need for any clinical intervention [4]. It is important to reinforce mother-infant bonding during this period. The mother's seeing, touching and feeling the warmth of her child helps to correct many problems, especially pain [5]. Those who have the opportunity to bond immediately after birth (the first half hour after birth) are more successful in breastfeeding. Therefore, she adapts better to the role of mother. This has positive effects on the baby. As long as babies receive stimuli from their parents, they will continue to have developmental responses. For example, newborns manage to focus with their eyes at the age of a few days, at a month; they can smile and continue to focus, then turn their head, begin to move. This triggers positive praise and satisfaction responses in the parents and the surrounding social environment that reinforce the child's love, fondness, and pride [6]. This process can be disrupted due to many environmental factors originating from the mother or the newborn child. The addition of a new member to the home is a source of happiness for the family [6]. However, if there is a congenital defect or a developmental anomaly in the newborn, this may change and the emotional bond and bonding process between the mother-father and the baby may be interrupted. Such situations are more evident when these differences are visible, as in children with Down's Syndrome (DS). Nurses should develop programs that help and strengthen attachment from the moment the condition is identified and immediately after birth. Nurses have an important role in informing the family in professional care practices and helping to establish a bond to be established. Activities such as skin-to-skin contact and effective breastfeeding, which are the main features of individualized developmental care, should be applied effectively in home or care environments, especially in clinics.

Down Syndrome

DS is one of the most common chromosomal abnormalities that causes a wide range of physical and mental difficulties. It was the configured physical symptoms that led to his identification, until noted by Doctor Down. Although Doctor Down was not the first person to describe this syndrome, the report he published in 1866 had a wide repercussion in the world [7]. It continues to be widely used to describe this disorder until today. While working in the UK, Down met with children with intellectual disabilities and worked to include them in a classification because of the natural differences in their faces. In the list he prepared, he mentioned that the face in children is flat and wide; the cheeks are round and the placement of the eyes is different. He also stated that the lips were wide and thick in children, and the tongue was long and very rough. He stated that these symptoms would be sufficient to diagnose a baby with DS. While many of the conditions that caused mental

disability were not known in the 1800s, it is known that many different causes such as birth trauma, genetic defects and malnutrition are triggers today. Down's work in this area led to the discovery of the cause of a common mental disability. In individuals with this disease, there are differentiations into the 46 set of chromosomes that belong to humans. DS is a condition that occurs due to the presence of an extra chromosome in the 21st chromosome pair in a baby. It is seen in one in 750-1000 births in the world and in our country. DS can cause physical growth retardation, characteristic facial appearance, and moderate mental retardation. Although some of the symptoms are more common in DS than in normal infants, it is difficult to make a definitive diagnosis based on appearance alone. Older mothers are more likely to deliver a baby with DS than younger mothers [8]. It has been reported that the rate of giving birth to a baby with DS in all mothers younger than 26 years of age increased significantly from 1961 to 1975 [9]. In countries where the proportion of older women giving birth is increasing, the rate of DS is also increasing.

Prenatal Scans and Controls

In many countries, prenatal screening is routinely performed in the first and second months to detect birth defects [10]. In these scans, ultrasound and blood tests are combined in the first three months. Blood tests 9-12 of pregnancy. done in weeks. If the fetus has DS, deviations in some parameters are observed in blood tests. Ultrasound is usually done at the 12th week of pregnancy. In some countries, such as Australia, another screening test called a non-invasive prenatal test (NIPT), in which a small blood sample is taken from the mother's arm, is performed at 9 weeks pregnant. The blood sample is then analyzed for DNA fragments from the fetus. This test has 99% confidence in showing whether the mother is at risk of having a baby with DS [10]. In the second trimester, the maternal serum screening test, also known as the triple or quadruple test, is performed at 15-20 days. It is based on blood tests done around the week of pregnancy. Prenatal screening and diagnostic tests are not capable of assessing all the effects of developmental delays or DS-related problems. No screening procedure can accurately detect all individuals with the abnormality and excludes those who do not. This means that there will inevitably be false positive and false negative results [11]. False-positive testing with an ultrasound examination for Down syndrome can cause strong anxiety reactions and even pregnancy rejection. While fetal screening for Down syndrome raises sensitive issues, unlike the results of other screening procedures, there is no cure for Down syndrome other than selective termination of pregnancy. Women who make a decision about invasive diagnostic testing following high-risk screening should consider the risk of having Down syndrome in pregnancy along with the risk of miscarriage from invasive testing [12].

Impact of Disabled Child on Parents

Learning that their child is disabled and having to live with this reality affects parents' quality of life, gender role, economy, employment. The birth of a disabled child creates a crisis for the family [13]. It is stated that having a disabled baby in the family environment ends all expectations regarding a normal baby, and families who do not already have

experience with having a disabled child have to undertake different functions. Diagnosing a child with a disability is expressed as a traumatic situation for the family [14]. The question of how to meet the needs of a new and special child comes to mind by destroying the normal child perception that families expect and forgetting all they know. They will face many problems that will continue in every period of life rather than needs, and the process of adaptation to the disabled child, which continues throughout life, will begin with the diagnosis of "disabled" [15]. For this reason, the importance of how this information is given, which will create a shock effect and cause complex emotions, is emphasized. It can be said that the family's learning about the child's disability, the reactions given afterwards and the process of accepting the child are very important for both the family and the other stages of the life of the disabled individual. In the literature, it is stated that families with disabled children follow the processes of shock, denial, pain and depression [14]. It is emphasized that the prolongation of the acceptance process negatively affects the disabled child, especially the self-perceptions of the disabled children and their sibling relationships. It has been observed that most of the parents with disabled children are under intense stress and their mental health has deteriorated. In general, there are eight stressors that families with disabilities are likely to encounter. These are economic difficulties, strained emotional relationships in the family or spouses' failure to share the burden of care for the disabled child, changes in family activities, limitation of social life, caregiver's time limiting for other activities, disappointment and despair in the process of meeting with specialists, grief and depression [16].

The Responsibility of the Pediatric Nurse in the Parental Interaction of the Disabled Child

There are many individual and environmental variables that affect the psychological state of the family with a disabled child. It can be said that family-centered interventions that take into account the needs of the family will inevitably be more effective. Some research results have shown that families of children with disabilities need more information on how to acquire social support and coping skills, how to develop the skills of the disabled person, how to accept the disabled person and the disabled in general, and how to learn about disability-specific educational practices [17]. In the literature, it is stated that nurses can evaluate the individual and the family with a holistic perspective, especially within the scope of their roles as vocational educators and counselors, and therefore, they have a high potential to provide care, improve health and provide psychosocial support [18]. Particularly, active participation of pediatric nurses and psychiatric nurses in specialized training and rehabilitation institutions for disabled individuals will contribute significantly to family education and family support programs [19].

Conclusions

Having a chronically disabled child presents different challenges for families. All factors causing such obstacles should be investigated and their formation should be prevented. Situations that may cause DS, such as consanguineous marriage, should be avoided.

Parents should be supported to cope with the difficulties they will experience in caring for such children. It is very important for politicians and those involved in the provision of services to the disabled to consider the issue carefully. Different studies should be conducted on the effects of a disabled child on family members and society. Here, services should be organized by applying family-centered care. Such services should first be routed to regions with limited access to such services. If there is a disabled person in the family, it is important to establish parent-child interaction at an early stage in order to ensure the adaptation of the parents. It is thought that the creation of policies that will provide family-centered rehabilitation instead of treating the disabled and DS children will increase awareness.

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Reflexology as a Bioenergy Method in Pediatric Nursing and Its Use in Children

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Although complementary and alternative medicine (CAM) is not a permanent part of the health system, it is widely used to support the care practices of many patients. The use of CAM to treat patients with acute and chronic diseases is increasing, especially in western countries. In recent studies in the literature, it has been reported that the use of CAM in children in Europe is lower than in adult patients. As a result of a study investigating the use of CAM in 20 European countries, it was determined that the most popular CAM treatments were homeopathy, herbal medicine, acupuncture, and reflexology, which is one of the bioenergy methods. The present results show that little is known about the use of bioenergy in children. It has been determined that many studies on this subject have been carried out on children living in Europe and the USA. Reflexology is a bioenergy movement. With reflexology, some special parts of the body (such as the ears, hands, and feet) are stimulated by massage. In this way, healing can be achieved at all levels of the body. Small muscle groups are activated by stimulating regional points with pressure. In this way, energy can be released and relaxation can be achieved. All body systems are trying to be balanced by stimulating the inactivated areas or calming the over-activated ones. Reflexology is one of the treatments that requires special training. After a certain training or course is taken, it should be put into practice. In our country, except for the scientific studies on reflexology, no reflexology practice has been encountered in nursing practices. The possible consequences of nurses integrating this method into their care practices should be addressed with different research results. Thus, the best possible care practices can be standardized and incorporated into clinical procedures.

Keywords: Bioenergy, Child, Complementary and Alternative Medicine, Nurse.

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The Effect of Acetozolamide on PON1 in HT-29 Cell Line

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Colorectal cancer is the third most common type of cancer in the world, with a high mortality rate [1]. There is a strong CA-IX expression in colorectal cancer, having an important role in the proliferation, invasion and metastasis of tumor cells. CA-IX catalyzes the reaction of carbon dioxide to bicarbonate ions and protons. Thus, it helps to manage intracellular and extracellular pH, stimulating carcinogenic process [2]. PON1 is an antioxidant enzyme, responsible for the destruction of lipid peroxides [3]. Lipid peroxidation is stimulated by decreasing extracellular pH in the cell. There is a relation between acidification and lipid peroxidation in the cell [4]. The aim of this study is to determine the effect of CA-IX inhibitor, Acetazolamide, on PON1 enzyme. In this study, HT-29 colorectal cell line was cultured. WST-1 test was performed to find the appropriate Acetazolamide dose. CA-IX inhibition by AZA in HT-29 cells was performed by CA-IX ELISA assay. PON1 enzyme levels were examined with Epoch Microplate Reader. According to our results, The appropriate dose of AZA, was found to be 34.71 µM. The CA-IX protein levels were 6.6 ng/µl and 4.6 ng/µl in the HT-29 cell lines without and with AZA applied, respectively ($p \leq 0.05$). PON1 levels in untreated and treated cells were 79.52 and 45.57 U/L, respectively ($p \leq 0.05$). In our study, we suggest that inhibition of CA-IX with AZA reduces acidification, thus decreasing lipid peroxidation and decreasing PON1 activity.

Key words: Colorectal cancer, Carbonic anhydrase-IX, Paraoxonase1

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Determination of Antiproliferative Effect of *Rosmarinus officinalis* L. Essential Oil on Caco-2 Cancer Cell Line

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Abstract

Rosmarinus officinalis L. is a perennial, shrub-type plant native to the Mediterranean, in the *Lamiaceae* family. It is widely used in cosmetics and traditional medicine preparations, especially in the food sector all over the world. It is known that it is used in traditional medicine for gastrointestinal system diseases, rheumatic diseases, circulatory system regulation, and wound healing. Scientific studies have reported that *Rosmarinus officinalis* L. extracts have anti-microbial, antioxidant, anti-inflammatory, and anti-depressant effects. This study, it was aimed to determine the antiproliferative effect of *Rosmarinus officinalis* L. essential oil on the human colorectal cancer cell line Caco-2.

After drying and grinding the aerial parts of *Rosmarinus officinalis* L. collected from Alanya/Antalya during the flowering period, its essential oil was obtained using a Clevenger system. Caco-2 cells were grown in 96-well plates in a medium prepared using DMEM/F-12, fetal bovine serum, and 1% penicillin-streptomycin. After the cells achieved 90% density, Rosmarinus officinalis L. essential oil doses (100 µg/mL, 250 µg/mL, 500 µg/mL, 750 µg/mL, 1000 µg/mL) was applied. 40 µM doxorubicin was used as the control drug group. MTT test was performed to evaluate the viability of Caco-2 cells. Optical density was determined by a spectrophotometer at 570 nm. TOS and TAC ELISA kits were used to measure the level of oxidative stress in cell mediums. Data were statistically analyzed (IBM SPSS 20.0).

In the studies, 100 µg/mL, 250 µg/mL, and 500 µg/mL doses of *Rosmarinus officinalis* L. essential oil decreased cell viability compared to the untreated group. The 750 µg/mL and 1000 µg/mL doses showed a significant anti-proliferative effect compared to both the untreated group and the doxorubicin group. A statistically significant difference was determined between groups.

Keywords: Antiproliferative, CaCo-2, Essential oil, *Rosmarinus officinalis* L.

Introduction

The prevalence of cancer has been increasing in recent years. Colorectal cancer accounts for 10% of cancer deaths in the world and is considered the fourth deadliest cancer type. Although it is associated with genetic predisposition, inflammatory bowel disease, abdominal radiation history, lifestyle, obesity, colon microbiota, and environmental factors, the reasons for the increase in the incidence of colorectal cancer are not fully understood [1,2]. Because colorectal cancer is an asymptomatic disease, it is difficult to detect until symptoms appear. Patients are mostly present with various complaints such as rectal bleeding (occult or overt), anemia, change in bowel habits, abdominal pain, and weight loss. Colonoscopy, CT colonography, laboratory, and pathological analyzes are used in the diagnosis of the disease [3].

Protective factors recommended for reducing the incidence of colorectal cancer include smoking and alcohol cessation, regular physical activity, a Mediterranean diet, dairy products, vitamin D, B6, and magnesium intake. In addition, based on scientific research, regular use of pro-inflammatory foods such as garlic, ginger, onion, thyme, turmeric, rosemary, caffeine, tea, and non-steroidal anti-inflammatory drugs is recommended [2]. Essential oils are a mixture of plant secondary metabolites with important bioactive properties widely used in traditional medicine. It has been used in food preservation, perfume making, and the treatment of various diseases since ancient times. *Rosmarinus officinalis* L. is a perennial shrub-type plant from the *Lamiaceae* family, native to the Mediterranean [4]. In addition to being considered sacred and healing by various civilizations, Rosemary was elected the Herb of the Year by The International Herbs Association in 2000 [6]. It is known that it is used in traditional medicine in the treatment of gastrointestinal system diseases, rheumatic diseases, and respiratory diseases, regulation of the circulatory system, and wound healing. In scientific studies, it has been reported that *Rosmarinus officinalis* L. essential oil (RoEO) exhibits antioxidant, antibacterial, antifungal, anti-inflammatory, and antiproliferative effects [6,7]. Secondary metabolites are affected by the region where the plant grows and environmental conditions, which also change the yield and bioactivity of essential oils. It has been reported that the main components of RoEO grown in Turkey, Tunisia, Morocco, and Italy are 1,8-cineol, α-pinene, camphor, β-pinene, and caryophyllene [8]. In this study, the antiproliferative effect of RoEO against the human colorectal cancer cell line Caco-2, which is an important common cancer type, was investigated.

Methodology

Collection of the plant and essential oil extraction
Rosmarinus officinalis L. collected from Alanya/Turkey which is the flowering period was dried in a shade and cool environment. The plants were kept in closed containers so that they do not lose their volatile components. After grinding the dried and powdered aerial parts (leaves, flowers) of *Rosmarinus officinalis* L., they were subjected to water distillation

for 3-4 hours in a Clevenger type apparatus (Thermal Laboratory Equipment, Turkey). The obtained *Rosmarinus officinalis* L. essential oil (RoEO) was stored at +4°C for studies [9].

Cell culture dose studies

For cell viability MTT (3-(4,5-Dimethylthiazol-2-yl)-2,5-Diphenyltetrazolium Bromide) test, normal human colorectal cancer cells (Caco-2 ATCC, USA) were maintained in Dulbecco's Modified Eagle Medium/Nutrient Mixture F-12 (DMEM/F-12) supplemented with 10 ml/L Penicillin-Streptomycin, 10% fetal bovine serum. Caco-2 cells were cultured and kept under an atmosphere of 5% CO_2 and 95% air incubator at 37 °C. Cells were grown in 96-well flat-bottom plates at a density of approximately 2 x 105 cells/well and incubated until 80% confluence was reached. After the medium was removed from the wells, it was washed with phosphate-buffered saline (PBS). RoEO prepared separately in DMEM/F-12 at doses of 100 µg/mL, 250 µg/mL, 500 µg/mL, 750 µg/mL, 1000 µg/mL was added to each well at 100 µL. 40 µM doxorubicin was used as the control drug group. After the cells were incubated for an additional 24 hours, the treated mixtures were removed and washed with PBS to remove chemical residues. 10 µl of MTT (5 mg/ml in PBS) reagent was added to each well and incubated for an additional 4 hours at 37 °C. Finally, formazan crystals were dissolved in 90 µl of Dimethyl Sulfoxide (DMSO) and absorbance values were measured in an ELISA reader (Multiskan™ GO Microplate Spectrophotometer reader) at 570 nm. All experiments were performed in triplicate and the mean values of all experiments were statistically analyzed [10].

Biochemical analysis

TAC (Total Antioxidant Capacity) and TOS (Total oxidant status) activities were measured from the 24-hour medium obtained from the cell culture, in accordance with the TAC and TOS commercial kit procedure produced by Rel Assay Diagnostics® (Gaziantep, Turkey). The results obtained were analyzed using the SPSS 20.00 program.

Results

It has been determined that RoEO, which is applied to Caco-2 cell culture, has an antiproliferative effect depending on the dose. The doses of 100 µg/ml, 250 µg/ml, and 500 µg/ml RoEO reduced cell vitality according to the non-treatment group. However, it was determined that cell viability was higher at these doses than in the control drug doxorubicin group. In doses of 750 µg/ml and 1000 µg/ml, it has been determined that RoEO's cell vitality decreased significantly according to both the non-treatment group and the Doxorubicin group $p < 0.001$ (Figure 1).
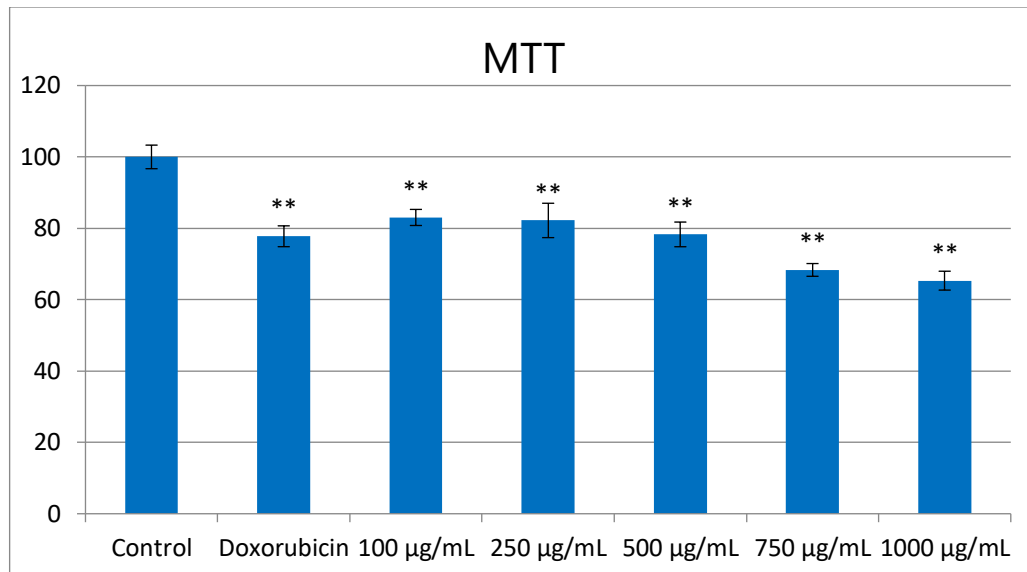
According to the PostHoc LSD test, it has a significance level of $p < 0.001$.

Figure 1. The effect of different doses of RoEO on cell vitality

Antioxidant foods and food supplements play a significant role in the prevention of cancer development and in the postoperative period. In Caco-2 cells treated with RoEO, the TOS level was found to be low compared to the group treated with Doxorubicin. At low doses, RoEO showed an antioxidant effect (Figure 2, Figure 3).
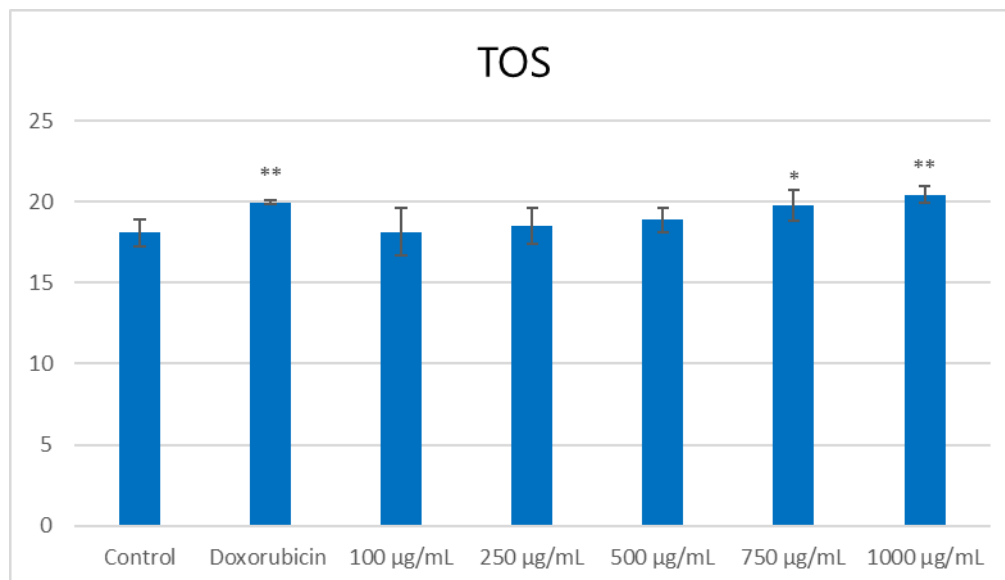
According to the PostHoc LSD test, it has a significance level of $p < 0.05$.
According to the PostHoc LSD test, it has a significance level of $p < 0.001$.

Figure 2. TOS analysis results
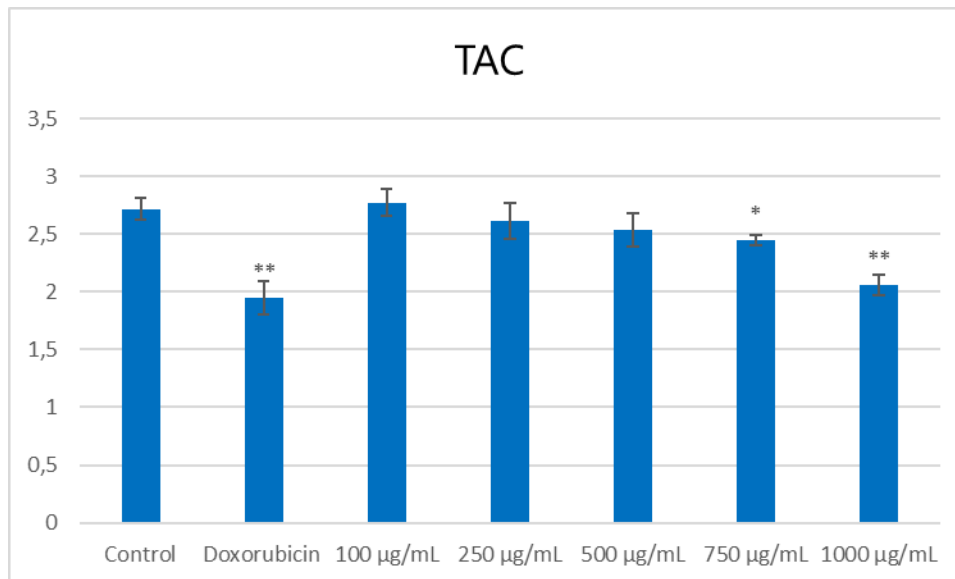
According to the PostHoc LSD test, it has a significance level of p<0.05.
According to the PostHoc LSD test, it has a significance level of p<0.001.

Figure 3. TAC analysis results

Discussion

The incidence of cancer is increasing all over the world. Colorectal cancer ranks first among other cancer types in terms of morbidity and mortality. In recent years, it has been reported that colorectal cancer screenings carried out by feces tests (like the fecal immunochemical test, Guaiac test) reduce the incidence and mortality in some European and northern American countries. However, the increase continues in the rest of the world. Studies on the dissemination of cancer screening and the development of risk prediction models focus on early diagnosis of the disease and determining treatment strategies [11, 12].

Rosmarinus officinalis L., which has a significant place in the Mediterranean diet, contains bioactive diterpenes, flavonoids, and phenolic acid. In the studies in the literature, the *in vitro* and *in vivo* anticancer effects of different extracts of Ro were investigated. Ro extract has been reported to contain high rates of rosmanol, carnosol, rosmarinic acid, and carnosoic acid [13, 14]. In a study, it has been reported that Ro extract application causes cytotoxicity on Caco-2 and U937 cell lines [15]. In another study conducted on Caco-2, HT29, and Lovo colorectal cell lines, Carnosoic acid of COX-2 MRNA expression has been reported to have a more powerful antiproliferative effect than Rosmarinic acid and RO ethanol extract [16]. The main components of RoEO are 1.8-Cineole, α-pinene, camphor, β-pinene, and caryophyllene. It has been proven in studies that each of these components has strong antioxidant, antiproliferative and anti-inflammatory effects [6, 8]. Researchers reviewing the bioavailability of Ro components have determined that some components are metabolized in the body [17]. On the other hand, in a study evaluating the intestinal permeability of polyphenols and terpenoids obtained from Ro extract in Caco-2 cell

monolayers, they reported that flavonoids and diterpenes had high permeability values, while triterpenoids exhibited lower permeability values [18].

In this study, the antiproliferative effect of *Rosmarinus officinalis* L. essential oil on the human colorectal cancer cell line Caco-2 was investigated for the first time. According to the findings, it was determined that all doses of RoEO had an antiproliferative effect compared to the untreated group. It was determined that RoEO at doses of 750 µg/mL and 1000 µg/mL was more effective in preventing proliferation than the control drug group doxorubicin. Consistent with the MTT test, it was determined that the oxidative stress level increased with increasing doses.

Conclusions

Despite their bioactive properties, essential oils are not suitable for direct use due to their possible toxicity. However, essential oils are natural mixtures that allow the development of nanoemulsion-based food preservatives, delivery systems, and drug formulations. It is thought that RoEO, which was determined to have an antiproliferative effect on human colorectal cancer cells in this study, will provide a source for the treatment systems and preservatives to be developed.

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Experimental Alzheimer's Disease Models

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To better understand the potential of diseases and create innovative treatments, experimental animal models play a crucial role. Transgenic models are typically utilized in Alzheimer's disease (AD) research. Almost all animal models only result in Aβ buildup. These models lack pathogenic characteristics such NFTs development, which results in neural and cognitive deficits. It is vital to explore animal models that correlate with AD results in people in order to better understand the neuropathology of the illness because it is challenging to visualize the extensive metabolism or pathology of AD in these animals.

There have been fewer rat models generated than mouse ones. Cerebrospinal fluid collection, electrophysiological tests, and imaging techniques are simpler to utilize because of their larger brains. Due of its more complex behavioral motions than mice, it provides a greater chance for investigation. In terms of physiological, physical, and genetic traits, they also resemble humans more.

The major problem in transgenic mice used in mouse models is the absence of diffuse neurodegeneration and local brain atrophy. Another problem is that tau protein in mice and humans shows only 88% homology, so NFTs is not formed in mice despite having hyperphosphorylated tau.

Intracerebroventricular-Streptozotocin (ICV-STZ) Model: It is an experimental model widely used in rodents. ICV-STZ application causes deterioration of memory and administrative functions. Researchers have reported that STZ induces Aβ aggregation and increases taupathy. It has also been suggested that STZ administration causes memory disorders due to disruption of Akt/GSK-3β signaling in the hippocampus. It has been determined that the increase in AChE activity in AD modeled with STZ also causes learning and memory problems.

Aluminum is a neurotoxic substance and often accumulates in the brain, blocking blood flow to the hippocampus and causing the symptoms of AD. It has also been reported that aluminum reduces the amount of Na^+/K^+ ATPase and Ca^{+2} ATPase in the brain of experimental animals to which the Aluminum Chloride Model is applied, leading to a decrease in anti-oxidative ability.

In the scopolamine model, blockages occur in the cholinergic system after administration and memory impairment occurs. Scopolamine administration induces apoptosis in hippocampus cells.

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Review: Use of Psychotropic Drugs During Pregnancy and Lactation

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Abstract

Psychological disorders are more prevalent in women in society. Particularly in women of childbearing age, its incidence is rising. Some psychological disorders are also predisposed to by pregnancy and puerperium. Any treatment that is administered during pregnancy and puerperium, which is a unique time in a woman's life, requires careful decision-making in terms of infant health. Untreated mental illnesses during pregnancy and puerperium can lead to deterioration in quality of life, loss of functionality, negative effects on the mother-baby relationship, and even suicide. In cases where treatment is given, risks of neonatal toxicity, premature and stillbirth, and teratogenicity may occur. The benefits and risks of psychopharmacological treatment during pregnancy and lactation should be evaluated, its effects on teratogenicity and lactation should be considered, the lowest possible dose and the least number of drugs should be used during this period, and the fetus/infant should be closely monitored.

Introduction

Psychological disorders are frequently seen in women between the ages of 18-45. The fact that these are childbearing ages means that mental illnesses frequently occur during times of pregnancy and lactation. In addition, pregnancy and puerperium also predispose to some psychological disorders. This circumstance results in some restrictions on drug use. Psychological disorders during pregnancy are mostly observed in the second trimester. Pregnant women who are particularly susceptible should undergo a thorough psychological evaluation during this period. Mental illnesses may go unnoticed during pregnancy because some somatic complaints can be attributed to rising hormone levels and pregnancy physiology. Untreated mental illnesses during pregnancy and puerperium can lead to deterioration in quality of life, loss of functionality, negative effects on the mother-baby relationship, and even suicide. The benefits and risks of psychopharmacological treatment during pregnancy and lactation should be evaluated, its effects on teratogenicity and lactation should be considered, the lowest possible dose and the least number of drugs should be used during this period, and the fetus/infant should be closely monitored.

When deciding whether to treat a mother who has a mental illness, it is important to consider the potential risks to both the mother and the unborn child as well as the

treatment's potential effects on the fetus. Untreated mental illnesses during pregnancy can lead to an increase in malnutrition, maternal smoking, alcohol, drug abuse, self-harm, and obstetric complications. Depression and anxiety can cause low birth weight, intrauterine growth retardation, premature birth, and catecholamines' impact and placental hypoperfusion are thought to be the causes of this. Concerns about how the prescribed medication will affect the fetus and pregnancy arise when it is decided to begin treatment during pregnancy due to the risks of going untreated that have been mentioned. The given medications may reach the fetus directly through the placenta. Due to the fact that the liver enzymes of the fetus have not yet reached sufficient capacity and the plasma protein level is low, a higher drug level occurs in the fetus than in the mother's blood. As a result, risks for teratogenicity, premature birth, and neonatal toxicity may manifest. According to gestational age, there are different teratogenicity risks; the all-or-nothing principle is in effect for the first 2.5 weeks following fertilization. The risk of teratogenicity is greatest during the first trimester because that is when organogenesis occurs. It is considered that the risk of teratogenicity is relatively lower in the second and third trimesters. It should be kept in mind that postpartum withdrawal syndrome may develop in the baby of a mother who uses psychotropic drugs at the end of the third trimester.

Mood Disorders

The prevalence of depression during pregnancy ranges from 7.4% to 12.8%. Diagnosis may be challenging as the physiology of pregnancy may cause symptoms like fatigue, excessive sleeping, loss of energy and desire, and eating disorders. In this case, pessimism, thoughts of worthlessness, anhedonia should be questioned, and the previous psychiatric history should be taken in detail. Also, the frequency of postpartum depression is around 13%.
First and foremost, psychotherapy or non-drug treatments should be prioritized as treatment options. Secondly medical treatments and ECT may be preferred. Especially in the first trimester, the risk of teratogenicity and how a drug-free depressive episode will affect the mother and baby should be carefully weighed. SSRIs are the first drug group to be chosen in cases where drug use is mandatory. In order to use the least possible drug, if there is a drug that the patient has previously benefited from, it will be correct to choose it first. Although SSRIs are thought to be safe during pregnancy, the pregnancy category was changed from C to D group because of the correlation between first trimester use of 'Paroxetine' and cardiac malformations. Fluoxetine, sertraline, escitalopram can be used as first choice. Bupropion may be preferred in cases where the use of serotonergic antidepressants is contraindicated. However, it should be kept in mind that bupropion may lower the epileptic seizure threshold. Numerous studies have shown that using TCA while pregnant has no increased teratogenicity. However, miscarriage, craniofacial anomalies and extremity defects were found in some animal experiments with imipramine, doxepin, and amitriptyline. It is known that the use of TCA in the last trimester may cause urinary retention, tachycardia, restlessness, and irritability in the baby, and also there are reports that paralytic ileus develops in the baby. Babies whose mothers used TCA or SSRI during pregnancy were found to not have intelligence issues.

TCA passes largely into breast milk because it is lipid-soluble. ECT, which is thought to be safe for both mother and child, can be used in cases of severe depression, psychotic depression, or catatonic depression, when medical treatment is ineffective or when the patient refuses medical treatment.

Bipolar Disorder

The effect of pregnancy on bipolar disorder is controversial, however but the risk of recurrence increased during the lactation period.

Among the mood stabilizers, only Lamotrigine has pregnancy category C and is regarded as relatively safe. It is stated that the blood level of lamotrigine decreases in the later stages of pregnancy. This case should be kept in mind during the treatment and dose should be increased starting from the second trimester. Other mood stabilizer's pregnancy categories are D. Babies of pregnant women using valproate can have cardiac anomalies, skeletal anomalies, carniofacial defects, and neural tube defects. In addition, fetal valproate syndrome with facial abnormalities, joint deformities and neurodevelopmental defect has been described. Carbemazepine use has also been associated with neural tube defects, facial defects, urinary system anomalies, and cardiac deficits. The teratogenic effects of carbamazepine are dose-related, so it can be used in low doses with folate supplementation when necessary. It has been reported that lithium use in the first trimester of pregnancy increases all congenital anomalies 3 times and cardiac anomalies 8 times, and it is said that lithium use causes Ebstein anomaly. However, recent studies have revealed that the risk of teratogenicity is not as high as thought. Other problem related to lithium use during pregnancy; since the baby's kidney functions are not yet sufficiently developed, lithium can reach very high toxic doses in the baby; It is the fluctuations in the blood lithium level that may occur due to vomiting in the first trimester in the mother and increase in urination in the later stages of pregnancy. Therefore, the use of lithium is not recommended during pregnancy, and it is considered appropriate to reduce the dose and discontinue it when pregnancy is planned.

Although it had previously been explicitly contraindicated during lactation, the American Academy of Pediatrics Committee on Drugs advised lithium's cautious use in 2001. Lithium is excreted in milk at a rate of 24–72% of its plasma level, and the infant's blood level is regarded as being half that amount. It should be considered that the blood level will increase in cases of dehydration such as possible diarrhea and vomiting in the baby. The ratio of valproate in breast milk varies between 10-40% and it is observed that the level in breast milk decreases as breastfeeding continues. It has been shown that thrombocytopenic purpura and anemia may develop in infants of mothers using valproate. Carbamazepine has been found to be 7-95% in breast milk in various studies. It would be appropriate to perform routine LFT and hemogram follow-ups in infants of mothers using carbamazepine due to the risks of cholestatic jaundice and hyperbilirubinemia. Oxcarbazepine appears to be safer during lactation. The ratio of breast milk lamotrigine to serum lamotrigine varies between 0.35 and 0.65 in users. In a study conducted in 2008, mild thrombocytosis was found in seven of eight children, but no problem was encountered that required discontinuation of the drug. Apart from medical treatments,

ECT should be kept in mind as a safe treatment modality due to its advantages such as low side effects and rapid effect both during pregnancy and lactation.

Anxiety Disorders

The frequency of anxiety disorders during pregnancy varies between 9% and 30% in various studies. Although pregnancy seems to be protective for panic disorder, the risk of panic disorder increases in the postpartum period. OCD gets worse both during pregnancy and after delivery. When many OCD patients are questioned, it is seen that the first onset of the disease is pregnancy or puerperium. Untreated anxiety can lead to complications such as SGA baby, variable APGAR scores, fetal movement disorders, preeclampsia, premature rupture of membranes, cervical dyskinesia.

Psychotherapy and non-drug treatments are the first choices for anxiety disorders. When medication is required, the first choice should be an SSRI other than paroxetine. The use of benzodiazepines in the first trimester has been associated with cleft palate-lip, and withdrawal syndrome has been observed in the last trimester of use. It is known that benzodiazepine use closely birth causes floopy baby syndrome accompanied by lethargy, hypotonia, feeding difficulties, hypothermia and respiratory distress.

Benzodiazepines are extensively excreted in breast milk. For these reasons, it is not advised to use benzodiazepines while pregnant or nursing.

Psychotic Disorders

The first psychotic episode in pregnancy is extremely rare, however, the rate of relapse during pregnancy increases in patients with psychosis. In addition, patients with psychosis are at high risk for unplanned pregnancy due to both high-risk sexual behaviors and sexual abuse. The rate of unplanned pregnancy in psychotic disorders can reach up to 60%. For this reason, both patients and their families with a diagnosis of psychosis should be informed about this issue and the risks that may be encountered should be explained.

Antipsychotics chlorpromazine and haloperidol have been used at low doses in the treatment of hyperemesis gravidarum. It has been observed in studies that chlorpromazine used between 4-10th weeks increases the risk of major malformations. Although there are different results regarding use in the remaining weeks of pregnancy, the high trend is that the risk of major malformations is not much different from psychotic patients who do not use drugs. In a study conducted with pregnant women using 1-2 mg/day haloperidol with the diagnosis of hyperemesis gravidarum, it was observed that the risk of major malformations did not increase, and the gestational age and birth weight were not affected. On the other hand, there are some case reports in which extremity anomalies were detected in the babies of pregnant women using haloperidol. In a study in which children exposed to typical antipsychotics were followed up to the age of five, no difference was found in IQ levels with their peers. However, neuroleptic malignant syndrome, dyskinesia, neonatal jaundice, postpartum intestinal obstruction, arrhythmia, respiratory and feeding problems may be encountered in newborns. It can be said that the use of typical antipsychotics in bipolar disorder is safer than mood stabilizers. In two studies with

atypical antipsychotics, it was thought that the birth defects of atypical antipsychotics were mild and non-specific and could not be associated with teratogenicity. The largest study was conducted with 700 pregnant women on risperidone and it was concluded that it did not increase the risk of fetal anomaly. However, in some animal studies, there are findings that risperidone may cause agenesis of the corpus callosum. Intensive care hospitalization was observed at a rate of 30% in infants of mothers using olanzapine. In addition, high birth weight was found in infants of mothers using olanzapine, but it was not different from infants of psychotic mothers who did not use drugs. There are case reports reporting that olanzapine causes diabetes and metabolic problems during pregnancy. In a study involving 523 pregnant women with clozapine, metabolic problems and perinatal side effects in 22 pregnant women indicate that the drug is safe. The possibility of postpartum agranulocytosis and epileptic seizures should be kept in mind. In a study involving 53 pregnant women with zisperidone, malformation in one baby and stillbirth in one baby were reported. In a study on ability of transport of antipsychotics through the placenta, olanzapine had the highest concentration with 72.1% and the lowest concentration of quetiapine with 23.8%. In the study on quetiapine exposure, which included 151 pregnant women, malformations were observed in 8 babies. In a few case series, there is information that it does not cause malformation. There are no detailed studies on other atypical antipsychotics.

The breastmilk/serum ratio of haloperidol and chlorpromezin were measured as 2.8-3.6, 1.2-1.6 respectively. Babies of mothers who used haloperidol alone had no significant issues, but some babies of mothers who used chlorpromezin showed signs of sleepiness and lethargy. The combined use of the two medications was found to cause neurodevelopmental retardation. Therefore, monotherapy would be appropriate in patients. While no abnormality was detected in the babies of 2 of 4 mothers who used clozapine during lactation, one baby had excessive sedation and another had agranulocytosis which resolved with discontinuation of the drug. It has been shown that the breast milk/serum ratio of olanzapine is between 0.1 and 0.84, and it is immeasurably low in the infant. Although many case series say that olanzapine does not have any side effects during lactation, in a review published in 2008 based on the data available in the database of the company Lilly, it was recommended that it should not be used during lactation because it may cause unexpected effects in the baby, including extrapyramidal side effects. The breastmilk/serum ratio of quetiapine was measured as 0.29. There are case reports reporting that no unexpected effects were observed in the infants of mothers using quetiapine during breastfeeding, however, there are opinions that neuronal development may be delayed. The breastmilk/serum ratio of risperidone was found to be 0.21-0.42 and case reports were shared about no unexpected effects in infants. There are no adequate studies on the use of other atypical antipsychotics during lactation.

Conclusion

Treatment decision and drug selection during pregnancy and lactation are very sensitive issues. It is a common situation that psychiatric diseases coincide with pregnancy and lactation periods in terms of age group. Family doctors who provide primary care , must

conduct a thorough mental examination of each patient, particularly during pregnancy, when there are numerous psychological and physiological changes. Pre-pregnancy counseling should be prioritized for individuals who are currently receiving psychiatric treatment, and when pregnancy is discovered, these individuals should be referred to a psychiatrist in order to receive the most effective care. This is crucial for the health of both the mother and the unborn child.

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Histopathological Examination of the Effect of Pioglitazone on the Rat Spleen with Metabolic Syndrome

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The metabolic syndrome (MS) is linked to a wide range of metabolic conditions, particularly type 2 diabetes mellitus, central obesity, insulin resistance, hypertension, dislipidemia, and cardiovascular diseases (T2DM). Numerous organs, including the liver, heart, spleen, pancreas, and adipose tissue, are damaged by MS [1,2,3]. Pioglitazone (PGZ), a TDZ that belongs to the class of anti-diabetic drugs, lowers blood glucose levels in T2DM patients' peripheral circulation. PGZ is used either alone or in combination with another drug's active ingredient, such as metformin, insulin, or another [4]. The pathophysiology and mechanisms of MS are still being researched, though. We aimed to investigate the effect of pioglitazone (PGZ) on the spleen of rats with MS. Male Wistar rats were divided into three groups, such as the control group, MS, and MS+PGZ groups. Metabolic syndrome was induced by providing drinking water that was 32% sucrose for 18 weeks. In order to detect the effect of pioglitazone, rats were given intragastric PGZ for 8 weeks. All of the animals were exposed to a 12 h light–12 h dark cycle. Abdominal obesity and glucose intolerance have been measured as markers of metabolic syndrome. At the end of the treatment period, animals from each group were sacrificed and embedded in paraffin for histopathological analysis. The MS rats had altered body weight, abdominal obesity, and glucose intolerance, indicating the successful establishment of our MS model. Histopathological analysis was evaluated by ImageJ and was used by GraphPad Prism statistically. The typical rat spleen had the normal arrangement of red pulp and white pulp structures. The number of follicles, marginal zone area, fibrosis, and red pulp size area were significantly increased in MS rats and decreased in MS+PGZ rats. In future studies, the detailed effect of pioglitazone can be supported by histochemical, immunological, and molecular biological studies.

Keywords: Metabolic syndrome, spleen, pioglitazone

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A Case of Papillary CA with Hyperthyroidic Lymph Nodule Metastases

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Cases of malignancy are exceptions in hyperthyroidic patients due to thyroid physiology. In this study, a case of papillary CA with lymph nodule metastases despite being hyperthyroidic is presented. A 56-year-old female patient was admitted to an external center with the complaint of cardiac palpitation, and after cardiac pathologies were excluded, her laboratory values (TSH 0.01 µU/ml, ST4 5.2 ng/dL) were found to be correlated with hyperthyroidism. Benign multinodular goiter was diagnosed in the ultrasound performed during the diagnosis and treatment of hyperthyroidism. Afterward, the patient was started on medical treatment with propycil (Propilthiouracil) and dideral (Propranolol HCl). The result of the patient who underwent a thyroid biopsy was benign. In the control ultrasound performed at the 6th month follow-up, lymph nodes were detected in the neck, and scintigraphy was taken due to hyperthyroidism. As a result, a diagnosis of the pathological lymph node in the neck and multinodular goiter with ultrasonographic criteria of malignancy was made. Total thyroidectomy and radical neck dissection were planned for the patient who was euthyroid under medical treatment because thyroid gland and lymph node biopsy showed benign thyroid and lymph node carcinoma metastasis. In the pathology after surgery, thyroid papillary CA and 5 metastatic and 30 reactive lymph nodes were reported. Radioactive iodine treatment of the patient, who was referred to the endocrinology clinic after discharge, continues.

The most common metastasis in thyroid cancers is to the cervical lymph nodes. Neck dissection and total thyroidectomy are indicated in case of pathological carcinoma metastasis reported in lymph node biopsy and sonographic nodules in the thyroid gland. Although the malignancy risk is low in hyperthyroidic multinodular thyroid patients, the possibility of malignancy should not be ignored.

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Evaluation of the Relationship Between Position of Mandibular Impacted Third Molars and External Root Resorption of Second Molars and Mandibular Canal by Cone Beam Computed Tomography: A Retrospective Study

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Aim: The aim of this study was to determine the relationship between the position of mandibular impacted third molars and the external root resorption of the second molars and the mandibular canal in patients who applied to Atatürk University Faculty of Dentistry, Department of Oral and Maxillofacial Radiology between January 2022 and October 2022. retrospective evaluation of images.

Method: In this study, Cone Beam Computed Tomography (CBCT) images of 120 patients who applied to our clinic were examined. Of 120 patients whose images were analyzed, 60 had impacted right mandibular third molar teeth and 60 left mandibular third molar teeth were impacted. The position of the impacted mandibular third molars, the relationship between the mandibular canal and the external root resorption of the mandibular second molars were investigated.

Results: In the retrospective study, the patients were between the ages of 15-60 and the mean age was 27.83 ± 8.552. Of the 120 patients examined, 72 (60%) were female and 48 (40%) were male. It was determined that 25 (20.8%) of 120 mandibular impacted third molar teeth were related to the canal and 95 (79.2%) were not related to the canal. A relationship was determined between the resorption of the mandibular second molar and the position of the mandibular impacted third molar tooth (p< 0.001).

Conclusion: Knowing the positions of the mandibular third molar teeth in the bone and their relationship with the mandibular second molar and mandibular canal prevents complications and determines the right approach during treatment. For this reason, three-dimensional examination of the positions of the mandibular third molar teeth and their relationship with neighboring anatomical structures helps the physician in diagnosis and treatment. When planning endodontic and surgical procedures in this region, CBCT can provide important information to ensure the continuity of anatomical structures and prevent complications.

Keywords: Mandibular 3rd molar, Mandibular Canal, Retrospective

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(EMES, AĞIZ et al.)
(Gürler, Delılbası et al. 2017)

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Investigation of the Effects of Naringin on Human Melanoma Cancer Cell Line

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Purpose: Melanoma is a malignant skin cancer arising from differentiation of melanocytes (1). Flavonoids are a class of phenolic compounds produced in the plants. Naringin is a kind of flavonoid which found in grapefruit, lemons, and oranges (2). Naringin and its derivatives have an anti-proliferative effect on prostate, colon, lung, stomach, liver, cervix and bladder cancers (3). The aim of the present study was to investigated the effects of naringin on human melanoma cells.

Method: SK-MEL-30 human melanoma cell line was used in the study. Cells were seeded (2×10^4 cells/well) in 96-well plates and cultured with the concentration range of naringin at (6, 12, 25, 75 μg/ml) for 24 hour. Untreated cells were used as control group. After incubation, cell proliferation and death were analyzed by using MTT assay and immunohistochemical method, respectively.

Findings: MTT assay showed that naringin treatment (12 and 25 μg/ml) for 24 h decreased the proliferation of SK-MEL-30 human melanoma cells. Furthermore immunoexpression of apoptotic marker caspase 1 and caspase 9 was significantly increased with the treatment of 12 and 25 μg/ml naringin.

Conclusion: We can say that naringin may have anti-proliferative and apoptotic effects on human melanoma cells however further studies should be performed in the future.

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The Highly Dangerous Presence of NDMA in FDA Withdrawal Drugs

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The International Agency for Research on Cancer has classified N-nitrosodimethylamine (NDMA) as a possible carcinogen due to multiple animal studies showing negative consequences from prolonged exposure to NDMA, including cancers of the liver, lungs, and stomach. Methyldiazonium, a byproduct of NDMA metabolism in the liver, rapidly chelates to DNA and other macromolecules. Cytochrome P450 families CYP2E and CYP2A are thought to be important mediators in the synthesis of this metabolite. Data on human liver samples *in vitro* metabolism indicate that the methyldiazonium metabolite's production is comparable to that of laboratory animals, suggesting that NDMA may likewise be a procarcinogen in human patients. The FDA was first made aware of the existence of NDMA in marketed medications in 2018 when an American producer of the drug valsartan, an angiotensin II receptor blocker (ARB) often used to treat hypertension and heart failure, notified the agency that NDMA had been found. The FDA requested the immediate withdrawal of all ranitidine products (commonly known by the brand name Zantac) and other drugs like Ranitab, Ragasit, and Raniver in April 2020 while continuing to evaluate the potential affected medications. The FDA did this because it believed that high temperatures, such as those that might be experienced during distribution, handling, or even standard storage conditions, could result in an increase in NDMA levels. NDMA levels were found to be potentially acceptable at the manufacturing site but at danger of rising at the time of consumption, according to evaluations. Although the greatest NDMA value was still significantly below the upper limit of valsartan dosages, the small study group of ranitidine products continued to create rising quantities of NDMA until the experiments 14-day end. Continued openness is essential, especially given differences in NDMA levels between laboratories, even while the FDA continues to produce proactive industry advice to be put into practice so that all medications may have a consistent NDMA risk assessment.

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About the Rare Genetic Diseases

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Although the definition of rare diseases varies in various regions of the world and even from country to country, diseases that affect 1 person in 2,000 people in our country are defined as 'rare diseases'. Rare diseases are chronic, progressive disorders that affect approximately 6-8% of the general population. About 80% of rare diseases are of genetic origin. Globally, between 6,000 and 8,000 rare diseases have been described (www.eurordis.org). It is estimated that approximately 350 million individuals in the world and around 5 million individuals in Turkey have any rare disease. The most important problem with rare diseases is the correct diagnosis. Accurate diagnosis of rare diseases is necessary not only for specific care and treatment, but also for conscious family planning. In this regard, 'next-generation sequencing, NGS' technologies have been promising developments for patients as they enable rapid and inexpensive diagnosis. Understanding the molecular pathways of rare diseases also plays a key role in understanding the molecular events involved in the pathogenesis of common diseases. As most of the rare diseases do not have an effective drug, the development of personalized, innovative drugs for these diseases involves a very expensive, long and difficult process. On the other hand, due to the nature of rare diseases, far fewer patients can be included in clinical drug trials. Despite all these difficulties, the development of personalized drugs based on small molecules, antibodies, RNA and gene therapy in recent years offers promising approaches for the treatment of genetic diseases.

Keywords: *Rare disease, Genetic disease*

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Current Pharmacological Approaches to the Treatment of Parkinson's Disease

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Parkinson's Disease(PD) is the second most common neurodegenerative disease after Alzheimer's disease. It is thought to affect between 7 and 10 million people worldwide, with around 60,000 new cases diagnosed each year. PD was first described as "shaking palsy" in an article published by London physician James Parkinson in 1817. The disease occurs as a result of degeneration of cells in the Substantia nigra region of the midbrain. With the damage of these cells, dopamine levels decrease up to 80% and slowly progressive motor and non-motor symptoms occur. There are four main motor symptoms (bradykinesia, rigidity, tremor, postural instability) evident in the disease.

The current treatment approach in PD includes six groups of medical options, such as levodopa, dopamine agonists, MAO-B inhibitors, catechol-o-methyl transferase inhibitors, anticholinergic drugs, and amantadine, as well as it also includes various surgical treatments such as deep brain stimulation, apomorphine infusion, and levodopa-carbidopa intestinal gel. However, today, all of these approaches aim to relieve symptoms, and the search for a radical treatment method continues.

As current treatments provide only symptomatic relief for PD, the situation of clinical trials should be analyzed to explore new therapeutic approaches. Today, 41% of the studies are in Phase I, 53% are in Phase II, and 6% are in Phase III. Of these, 61.7% are pharmacological treatments, 34% are surgical treatments such as gene therapy, stem cell therapy, and vaccines, and 4.3% are herbal treatments. Various examples of current pharmacological approaches are shown in Table 1.

Table 1. Examples of current pharmacological approaches in the treatment of Parkinson's disease

Category	Drug	Approval Date/Phase	Mechanism
Levodopa	Inbrija® Ritary® Acordion pill	**2018** **2015** **Phase III**	Inhaled levodopa powder Slow and prolonged release levodopa/carbidopa combination Multilayered levodopa capsule form
Dopamine Agonists (DA)	Neupro® Kynmobi® Tavapadon	**2012** **2020** **Phase III**	Transdermal DA with rotigotine Sublingual DA with apomorphine Selective D1-D5 receptor agonist/ partial DA
MAO-B Inhibitors	Xadago®	**2017**	Inhibition of glutamate release by safinamide
COMT Inhibitors	Nebicapone Ongentys® (Opicapone)	**Phase III** **2016**	They prevent the disintegration of levodopa.
Amantadine	Gocovri® Osmolex®	**2017** **2018**	Prolonged release NMDAR antagonist capsule form Prolonged release NMDAR antagonist tablet form
Adenozine-2A Receptor Antagonist	Nurianz® (Istradefylline) Caffeine	**2019** **Phase III**	It modulates GABAergic transmission, reducing the excitability of the indirect pathway. Reduces neurotoxicity by blocking A2RA
Anti-apoptotic	TCH346 Minocycline	**Phase II** **Phase II**	Inhibits apoptosis/neuroprotective Reduces oxidative stress and neuroinflammation
Kinase Inhibitors	CEP-1347 K0706	**Phase II** **Phase II**	Semi-synthetic kinase inhibitor/neuroprotective Selective tyrosine kinase inhibitor/neuroprotective
Antidiabetic	Insulin Exenatide	**Phase II** **Phase III**	Reduces reactive oxygen species/neuroprotective Reduces dopaminergic neuron degeneration

With a better understanding of the etiopathogenesis of PD, its treatment gradually develops. Current pharmacological treatments stand out with their prolonged release, easy use, and low side-effect profiles. However, the fact that there is still no radical treatment for this disease, which has been defined for more than 200 years, suggests that surgical methods such as stem cell therapy, gene therapy, immunotherapy, and adaptive deep brain stimulation will be more prominent in the future.

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Laparoscopic Treatment of Postoperative Hematoma in Gallbladder Surgery

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Gallbladder pathologies are the most common cause of abdominal right upper quadrant pain in elderly and female patients. In this study, the advantage of using laparoscopy in primary and secondary surgery of gallbladder pathologies is presented.

A 65-year-old female patient with heart failure and coronary artery disease, to the emergency service with abdominal pain in the right upper quadrant and general condition deterioration that had been going on for about ten days. CT and USG images of the patient who presented with a septic picture reported diffuse fluid in the abdomen, decreased internal pressure of the gallbladder, and suspected perforation of the gallbladder, and the patient was taken to emergency surgery. Laparoscopic exploration revealed necrotic, perforated gallbladder, and diffuse fluid in the abdomen. Laparoscopic cholecystectomy and abdominal aspiration were performed in accordance with the protocol. It was observed that there was oozing bleeding from the liver bed, the bed was cauterized and two surgesal were applied to the lodge. A drain was applied to the subhepatic region and a total of 300 cc hemorrhagic drainage from the drain for 2 days. Hemoglobin level dropped from 12 g/dL to 9 g/dL. On the third postoperative day, the drain did not come, vitals were stable, an ultrasound was taken and a 4x2cm hematoma was reported in the operation area. A control ultrasound was performed on the seventh postoperative day. Ultrasound results were reported as hematoma organized and 10x3 cm. The patient underwent laparoscopic aspiration and washing. It was observed that there was no massive bleeding in the liver and the areas of infiltration stopped. Loja surgesal was applied and a drain was placed. Ultrasound was performed 3 days after the last operation, there was no hematoma, and the patient was discharged in good clinical condition. On the tenth day controls, the laboratory was stable, and the ultrasound was reported as normal.

With today's medical technology, laparoscopy has preceded laparotomy in primary and secondary examinations in intra-abdominal operations and has become the most important method of surgeons in the treatment of patients regardless of age group and disease.

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Determination of Antigocoma Potential of *Bryoria Capillaris* Extract

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Carbonic anhydrase (CA) isoenzymes are considered as remarkable therapeutic targets in drug design due to their role in important physiological/pathological processes in human tissues and their widespread distribution in all tissues. Pharmacological agents that inhibit CA isoenzymes are called carbonic anhydrase inhibitors (CAIs) [1]. CAIs are highly effective drugs that have been in clinical use for many years as diuretic, antiglaucoma and antiepileptic agents. However, since these drugs do not have CA isoenzyme selectivities, they cause serious systemic side effects on humans. Therefore, studies on the synthesis of new CAI drugs with isoenzyme selectivity that can be used in the treatment of edema, glaucoma and epilepsy are still ongoing. In particular, molecules that selectively inhibit the CA II isoenzyme are used in the treatment of glaucoma [2]. It is known that *Bryoria capillaris* (BC), one of the most common lichen species in North East Anatolia, is used as flour and tea in traditional medicine. In this study, acetone extract of BC was obtained. The inhibition effects of the obtained extract on human CA I (hCA I) and II isoenzymes were investigated. IC_{50} values were determined to determine the inhibition level. The IC_{50} value for hCA I was determined as 8.77 µM, and the IC_{50} value for hCA II was determined as 7.56 µM.

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