Research Article

Biosynthesis of Nano Silver byalga *Pithophoraoedogonia*

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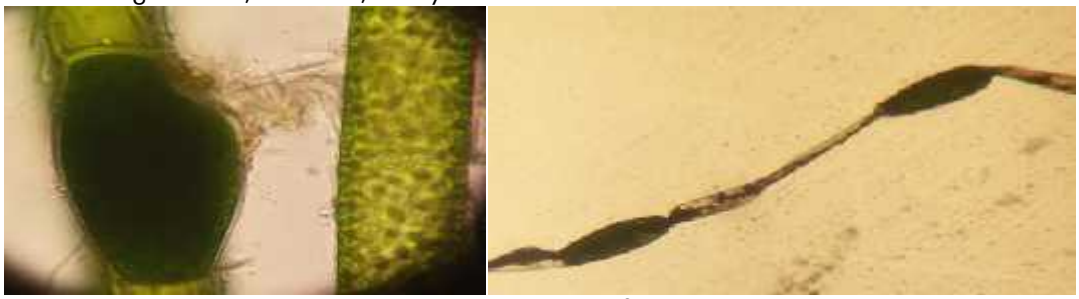
ABSTRACT
The present study aimed at elucidatingalga*Pithophoraoedogonia*.(Montagne)Wittork (CHLOROPHYTA) on the synthesis of silver nano particles (Ag Nps) . There results showed that ability dynamically when dry weight when incubation at room temperature 25 m for 72 hours away from light, and sensitivity test results showed bio-nanotechnology ability of synthetic vital to work as an antidote vital disincentive to the growth of both bacteria *Proteus mirabilis* and more efficiently than inhibition of the bacterium *Staphylococcusaureus* compared with antibiotics (NIT, CTR, IPM, AK), where the results showed that the nano-synthetic vital the most efficient of the Ant NIT in inhibiting bacterium*Proteus mirabilis* while the less efficient inhibition antihistamines.

INTRODUCTION

Recently , these have been continuous efforts to develop clean , reliable , nontoxic and eco – friendly procedures for synthesis and assembly of silver Nano particle with desired sizes and shaped to expel it biological or medical applications [1].biosynthesis of (Ag NPs) consider one of the most modern technologies introduced to biology all around the world . This biotechnology depend on many factors related with tested organisms like higher Plant , Algae or Microorganisms [2] . Nano silver isone of most important Nano materials at commercial scale , the median production about 320 tons per year (1). It may due to highly antimicrobial activity many of products related with (Ag NPs) like , household water filters , clothing, cosmetics , smart phones detergents , clothes and toys . Manyproducts exploit the anti-microbial properties of (Ag NPs)[3].*Pithophoraoedogonia* (*CHLOROPHYCEAE*) is one of attached(sometimesfree floated) filament algae inhabits the shallow waters like ponds ,rivers which contain high level of phosphorous and nitrates [4][1] . continuous Needing to developed new alternative substances to reduce, control . pathogenic microorganisms , in this , study silver nano particles (Ag NPs) synthesis from *PithophoraOdogonia* was test against *Staphylococcus aureus* and *Proteus mirabilis* in the presence of some antibiotics as control [6.5]

Experimental

Collection of algae , the eukaryotic filamentous green alga *pithophoraoedogonia* (montagne) wittrock was collected from rice fields of Al-Mishkhab in Al-Najaf Province , Iraqi which belong to
Phylum Chlorophyta
Subphylum Chlorophytina
Class Ulvophyceae
Order Cladophorales
Family Pithophoraceae
Genus Pithophora.[8,9]
The multiple – antibiotic , resistant .bacterialisolates of *Staphylococcus aureus* and *Proteus mirabilis*collected from AL-Diwaniyalaboratory hospital .Axenic culture of *PithophoraOedogonia*was obtained according to (7) figure (1) :



Algae cultivation : These stepwas done by inculted the algae filments in (250) ml flasks of Modified CH-10 medium table and Inhbated at (25)c^0 and 37 Mexfor days . the growth curve of strdied algae was followed by optical density (O.P) at 650 nm by using TRSP – 721 spectrophtometer Nano silver Production , the algae biomasis were harvested at stationly phase (1) days of cultivation as mentioned

conditions . (10) gram of dried wet of biomass was resupened in 100 ml of D.W in 250 ml flasks then heated at 60 c^0 for 15 min, at oven the resulted filtrate were incubated with 1 Molar of silver nitrate solution (AgNO3) at room temperature 25 C^0 for 72 hours in the dark condition . The resulted brown color solution refers to production of (Ag PNs) Figure (2)

B- -A - -

Figure: (2) Leaky algaPithophora Sp. With added 1 Mola irrigation of silver nitratesolution AgNo3 - A - before incubation -B - after incubationnano solution .

the fennel step was the purification of (Ag PNs) by centrifugation at 15 rpm for 20 min . for (VIS-UV), (FTIR) spectral analysis 5 ml at the samples of suspension were experimented after 5 day . [8.9].

Characterizationof Ag NPs

-UV-VIS spectrophotometer

Silver lore Ag^+ - lore reduction was - motored by measuring the UV-VIS (SHIMADZU , UV – 1650 pc , Japan) . spectrum of reaction medium after 30 . As mall aliquot of the sample was taken for this Analysis at (30 – 700) nm .

-Fourier Transform Infrared Spector analysis (FTIR) :

This analysis was carried out using (SHIMADZU , FTIR – 8400S , Japan) . the range from (4800 – 400) cm^{-1} .

- Antibacterial Activity

The Testing of antibacterial activity of (Ag NPs) was caredout by Agar diffusion method by dried filter paper discs 0.6 cm diameter important with Ag PNs (NIT , CTR , IPM and AK) antibiotics . The inoculate were prepend by diluting 13 gm. in 250 ml at deionized D.W then autoclaved at 100 c^0 , 121 bar for 30 min , then diluted by (Na cl 0.85%) to produce (10^7 back , em^3) conic . these tested discs (Ag NPs) and Antibiotics , them distributed on tectorial plants and incubated at 37 c^0 for 24 hrs. the zone of inhibition was measured and expressed in mm .

Results and Discussion

The current study showed that *P.oedogonia*has the feasibility to biosynthesizednano Silver after 72 hours of incubation with silver nitrate(AgNO3) at room temperature the reduction of Silver ion Ag (I)toAg(0) during incubation period,the this result was visually noted by color changing of solution from green to pale brown ,this may due to formation of surface Plasmon resonan (SPR) phenomenon fig:2(B) ,theU.V_Vis spectroscopy exhibit an absorption peak at eave length 420-430 nm as shown in Fig: (3),which is typical of silver nano particles and corresponds to silver reduction [10]

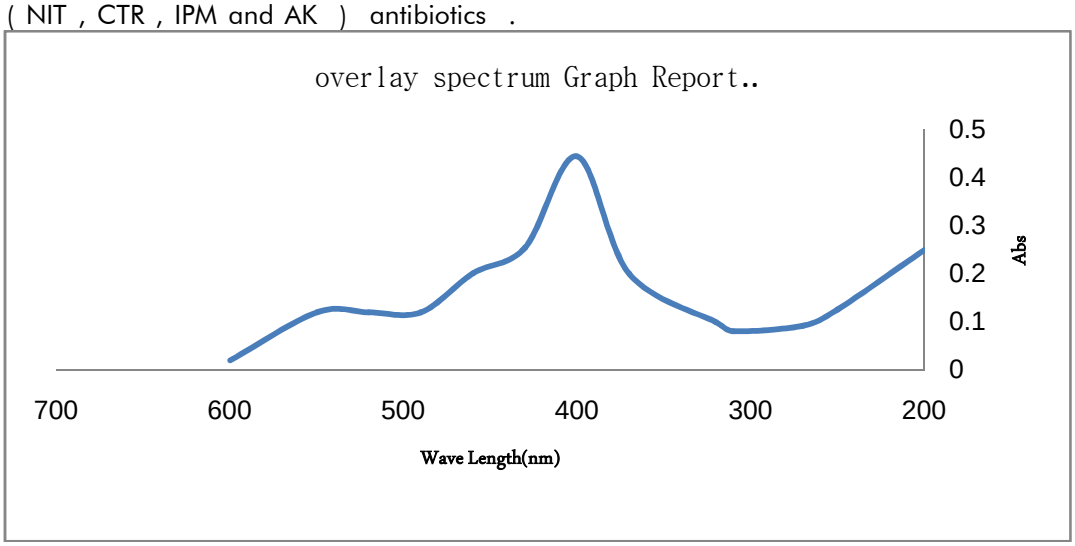


Figure 2 UV-Vis spectra of absorbance ofbiosynthesized silver nanoparticlesby alga*P.oedogonia*after 72 hours of incubation.

The result of FTIR analyses exhibit that there are different stretches bond appeared in different peaks **3450.65**assigned with HN and Other peak 1635.64 related to C = C, as well as the peak near 667.37 appointed as the shades of the FTIR for nanosilver biosyntheticshowed strong and sharp absorption band at 1635.64 assigned to the streching vibration of C = O (NH) group as shown in Figure 3.

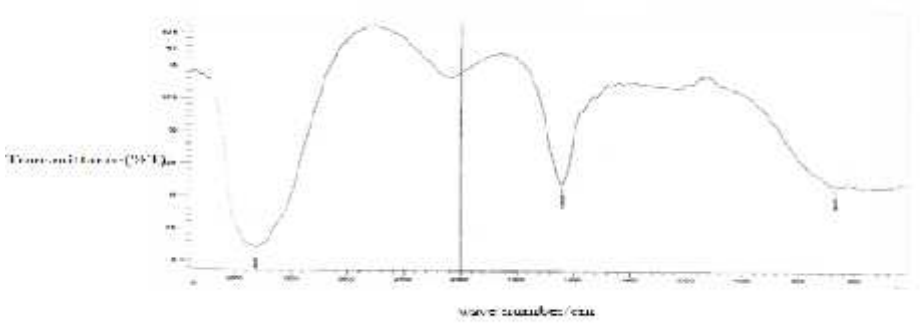


Figure (3): FTI Ranalysis for nano silver biosynthesized byalga*P.oedogonia*after 72 hours of incubation

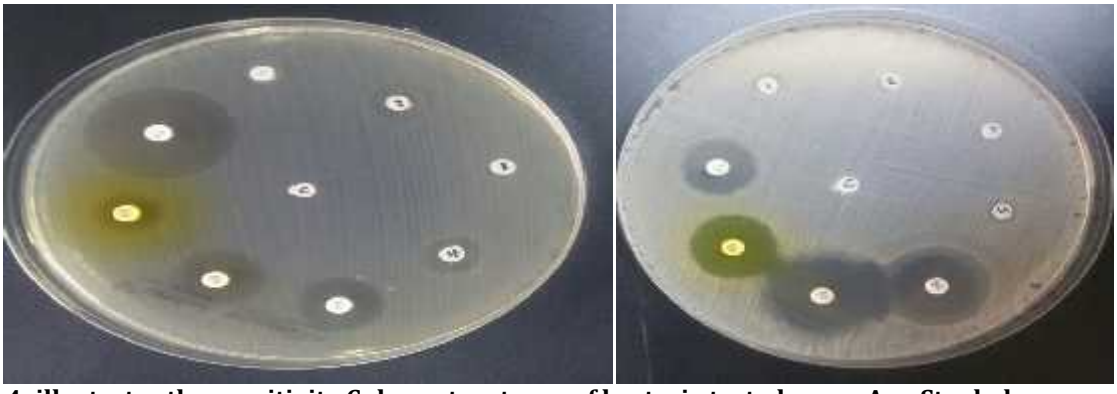


Figure 4: illustrates the sensitivity Cubs on two types of bacteria tested were: A - - Staphylococcus aureus - B-. proteus mirabilisIndicates where No. (4) of the effect of nano silver and an antidote to both types of bacteria.

On the other hand sensitivity test results showed that AgNPs synthesized by *P.Oedogonia* had an antibacterial activity against tested micro organisms *P. mirabilis* and*S.aureus*,this inhibitory activity represented by inhibition zone which was 9mm and 4mm respectively in compare with NIT ,CTR and AK antibiotics.SotheAgNPs was more efficient than NIT antibiotic against *Proteus mirabilis* fig(4).The mechanism of inhibitory effects of silver ion(Ag+) on microbes is partially known ,the positive charge on Ag+ is decisive for it antibacterial activity by electrostatic attraction between negative charge of cell membrane of microorganism and positive one of AgNPs[ref.].For gram negative bacteria the explanation is differ and it may depends on the conc. of AgNPs and it was closely related with the formation of "pit" in the bacterial membrane,[20, 21, 22] to be assumed that changes in the bacterial cell wall structure as a result of interactions with Ag NPs as an integral part of the activity of any bactericidal, thereby increasing the permeability of the membrane and the one that lead to death Ag NPs reacted with biomaterials sulfur and phosphorus, as well as include components within cells, for example, proteins or DNA, and cell components such as membrane these components proteins affect breathing, and dividing and ultimately survival surviving cells bacterial cell wall, can be part of the silver ions Ag NPs enter in cells to accumulate damaged DNA and influence on protein synthesis. (23) .In other words, Ag NPs that are filled with polyphenolic components cell walls of bacteria crashes where makes Gram-negative bacteria are sensitive specifically Polyphenolic generate free radicals and other species as a response based on the oxygen reaction, which can make a big damage and toxicity may lead to further damage when they become membranes off including a loss on a wide range of ions + K leading to shortages in the membrane resulting in disruption in the leakage visceral, which includes the discharge of proteins and molecules lipopolysaccharide where the bacterial outer membrane of many fatty sugars and asymmetrical mainly composed while the inner membrane consists from a tight chains of phospholipids, which are semi-permeable (24). Is not

understood fully the precise mechanism of interaction that occurs between Ag NPs and bacteria have Ag NPs attached to the wall of the cell and thus permeable membrane disruption and breathe cells eventually can also be for Ag NPs that cells directly penetrate because they may bind the cell wall containing sulfur with biomolecules proteins containing phosphorus, for example, nuclear acid and therefore it can be easily linked to the constituents of the bacterial cell and destabilize the normal cell function 25)). As may be due to other possible mechanism, a release Alcaitonat Ag, which is antibacterial of Ag NPs (26).

Conclusion

This investigation showed that the green alga *P.oedogonia*effectively synthesized AgNPs by interacting with aqueous silver nitrate (AgNO3) ,this may may be typical candidates for more studies in the future exploring their role in pharmacological and biomedical applications .the biosynthetic of nano particles by algae and cyanobacteria can reduce costs ,times,pollution and it may play major role in the shift towards green chemistry and away from the side effects of manufactured drugs.

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