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OBESITY - TOXICOLOGICAL & MEDICO-LEGAL PERCEPTIONS

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ABSTRACT

Obesity is a chronic pathological condition resulting from complex interactions between cultural, psychological, environmental and genetic factors. There is intense interest on the role of environmental factors during intrauterine life and early infancy. Obesity has received both national and international attention because of its detrimental impact on health and the enormous economic burden it imposes on the individual. Many obesity problems can be treated successfully by changing lifestyle, diet based on appropriate quality and quantity of foods along with certain exercise. However, some people do not respond to this approach, and treatment every measure may fail to exhibit results. Present article discuss the non conventional Aetiology and certain medico-legal issues associated with obesity along with perspective of Ayurveda in Toxicity induced obesity.

Key words: Obesity, Toxins, Ayurveda, Toxicology, Medico-legal.

INTRODUCTION

Persons having proportionate musculature and compactness of the body, no doubt possess very strong sensory and motor organs and as such they are not overcome by the onslaught of diseases.[1] We are living in a world with rapidly changing elements like environment, food supply, population and scientific knowledge. Within different environments, our bodies, personalities, needs and goals change. In this most advanced modernized era, the humans are gifted with lot of sophistication, luxuries but at the same time left

with sedentary ways of life, stress induced hectic and unhealthy schedules. These along with indiscriminate dietary habits, over eating, consuming processed, high quality, high caloric foods and beverages propping into one's life are adversely influencing the homeostasis leading to the exhibition of number of pathologies. This continuous changing life styles and environment, changed diet habits, man has become the victim of many diseases caused by unwholesome dietary habits and Obesity is one of them. Obesity is blessing of modern age of machines and materialism. It is physiological, psychological and social disorder, which is most disfavored by modern society for social as well as medical reasons. The present day society expects peak physical and mental performance from each of its member and obese person is unable to find himself physically and mentally fit for it. It occurs as a result of lack of physical activities with increased intake of daily diet results into the clinical entity, which can be called as obesity. According to the 'World Health Report – 2002' of W.H.O. obesity is one disease among the top 10 selected risks to the health. Total health care expenditure for obesity patients is 2-8%. According to the report there are more than 1 billion adults worldwide were overweight, and at least 300 million who are clinically obese. 'The World Health Report –2002' represents one of the largest projects ever undertaken by W.H.O. in collaboration with experts' worldwide.[2] Most obesity and overweight problems can be treated successfully by changing lifestyle (regular exercise and stress management) diet based on whole (Nutrient dense foods, Phyto - nutrient rich foods and low- glycemic foods.) However, some people do not respond to this approach. There is new scientific evidence linking internal and external environmental toxins to chronic obesity.[3] Present article focuses on anomalous aetiology and certain medico-legal issues connected with obesity and its management along with perspective of Ayurveda in toxicity induced obesity.

Outdoor Toxins

Toxinology is a branch of toxicology that involves the study of naturally occurring toxins, including those found in microorganisms, plants and animals. Many products used outdoors or in the garage are toxic including insecticides, herbicides and rodenticides. Antifreeze, fertilizers and ice melts are all substances that can find outdoors. DDT (dichlorodiphenyltrichloroethane) and PCB's (Polychlorinated Biphenyls) are also among such outdoor toxins. It may enter the body through the lungs, the gastrointestinal tract, and the skin. Measurable amounts of PCBs have been found in soils, water, fish, milk and human tissue. Industrial waste is also responsible for impairment the humans' day by day.

Indoor Toxins

Indoor Toxins enter our body by breathing and absorption through our skin. The February 1998 issue of Scientific American stated that indoor toxins are 3-5 times more dangerous than those found outdoors.[4]

- Dry cleaning fluid
- Mothballs and moth crystals
- Toilet bowl cleaners or deodorants
- Dry ink toners
- Toxins in showers
- Mosquito repellents
- OTC drugs
- Fruits and vegetables ,which has been sprayed by DDT & other pesticides

Obesogens

Obesogens are the chemicals that inappropriately stimulate adipogenesis and fat storage. E.g. Thia-zoli-dine-dione anti-diabetic drugs

– Increase fat storage and fat cell size at all ages, Bisphenol A - found in canned food and drink containers more likely to cause Obesity.

- Anti-psychotics – Numerous central nervous system (CNS), hormonal and metabolic mechanisms have been proposed to explain the specific mechanisms by which atypical antipsychotics cause weight gain. Effects on serotonergic, dopaminergic, adrenergic, histaminergic, glutaminergic & anticholinergic receptors are all thought to promote weight gain. The balance between oestrogen and testosterone is also concerned.
- Insulin-Insulin sensitivity that can lead to insulin resistance is associated with physiological changes maintaining obesity.[5]
- Pesticides-DDT -Pregnant women normal weight have higher levels of DDE (dichlorodiphenyldichloroethylene - DDT's breakdown product) in their blood, which is oestrogenic endocrine-disrupting chemical, may contribute to the obesity epidemic in women & their babies.[6]
- "Developmental obesogen" suggests that chemicals may act to alter the differentiation of adipocytes or envelopment of neural circuits that regulate feeding behavior to result in a predisposition to obesity and related metabolic disorders.

Obesity and Drug Absorption

Inadequate data is available on the effects of drug absorption and obesity. However changes in absorption would be predicted in obesity due to increased body surface area and increased cardiac output, ultimately leading to increased gut perfusion.[7,8]

Obesity and Drug Distribution

Drug distribution is in some instances significantly altered in obesity.[9] Obesity results in increased adipose tissue mass, which can influence medications with lipophilic properties. [10,11,12,13] Lipophilic substances are generally increasingly affected by obesity. Whereas less lipophilic compounds, are generally have little to no change in volume of distribution with obesity.

Obesity and Drug Clearance

Drug elimination is directly proportional to absorption & Distribution in the body. For certain drugs, tissue affinity & retention may also alter its clearance. These properties may increase the half-life of a drug. [14] Even though for most of the drugs, the disparity between changes in clearance

remains unexplained, but it is important to note that obesity may be associated with changes in blood flow or metabolic activity.[15]

Pharmaco-therapeutic Toxicity in Obesity

Beside hormonal, neurological, and endocrine disruption, environmental toxins can slow down the resting metabolic rate which may be one of the most important reasons for the increase of obesity worldwide. Initially thyroid function and hormones may be altered by toxins. The thyroid receptors may also be damaged. Later, toxins interfere with appetite control mechanisms in the hypothalamus. Simultaneously toxins may promote inflammation, which increases insulin and leptin resistance. Mitochondria are damaged which further slows down metabolism. Finally, oxidative stress and free radicals may worsen the conditions by accumulation in the body. This might be the reason why so many more people are becoming obese and overweight despite interventions such as exercise/dietary restrictions.

Substance Abuse & Obesity

The National Institute on Drug Abuse (NIDA) has found that there is Common Mechanisms of Drug Abuse and Obesity. Nicotine and other drugs of abuse can stimulate hypothalamic feeding circuits and thereby influence weight gain.[17]

Alcohol - According to the American Journal of Clinical Nutrition, alcohol is fat-sparing. when alcohol is consumed in excess of the body's daily energy needs, it is harder for the body to burn fat, and more fat is stored, leading to weight gain. [18] Toxins induce obesity is has been explained by the research conducted at Harvard School of Public Health which states that rates of obesity in infants less than 6 months old have risen 73% since 1980.[18] Such epidemic of obesity in infants is not associated to diet or lack of exercise. There is intense interest on the role of environmental factors during intrauterine life.

Medico-legal Issue & complications

1. **Liposuction** – It is the commonest surgical procedure conducted to remove fat from different sites on the human body. As there is no surgical procedure which is complication free, the liposuction also inherits certain complications viz Thromboembolism, burns, Fluid imbalance, Puncture of an internal organ etc. Studies shows that 66.1% surgical claims in US are related to the procedure of liposuction.[20]

2. **Ultrasound** - Litigation also filed against sinologists for overlooked fetal anomalies.[21] The increased amount of fat may hinder the view in obese pregnant women.

3. **Anesthesia** - The anesthesia may be shadowed with the risk of difficult intubation due to obesity. Calculation of appropriate anesthetic agent dosages may be difficult [22]

4. **Fat- embolism** – It is more frequently seen as a cause of death in survivals of Accidents & Deep injury victims.[23]

5. **Wound infections and pulmonary embolism** are 50% higher in obese patients.[24] which may also lead to higher morbidity and mortality rates in obese.[25,26,27,28] Apart from these clinical negligence claims brought on patients' behalf for injuries due

to handling difficulties, equipment failure, problems with calculation of drug doses and failure of diagnosis are other causes for the litigations.

Obesity surgeries & contra-indicated herbs

After considering the inherited risk surgeries in obese persons, medications including the herbs and spices showing anti-coagulant or anti-platelet activities should be avoided for at least 3 weeks prior to surgery.

Perspective of Ayurveda in Toxicity induced Obesity:

Agadatantra is one among the eight clinical branches in Ayurveda which explains the concepts of acute & chronic poisons of animate and inanimate origin. It also encompasses the effect of environmental pollution, toxic effects due to incompatibilities of food, Aamvisha, Garavisha & Dooshivisha. [29] The Concept of Dooshivisha is unique. It is the residue part of animate, inanimate and artificial poisons in the body and vitiates dhatu during favorable conditions.[29] Low potency poison is a very wide concept where a multitude of diseases can be considered as originated due to Dooshivisha. The environment is full of toxins, the food which we are consuming and drugs to which we are exposed are certainly harmful to humans. Since most of these chemicals are scientifically known as toxic, and remain in human body for longer durations, can be considered as Dooshivisha. Hence when the patients of obesity do not respond to the conventional treatment like altered diet and routine including exercise and medicines, one should think of integrating single herbs and or compound preparations expounded in Ayurveda for its anti-toxic properties. These include *Bilwadi Agad,*[30] *Dooshivishari Agad,*[31] *Murvadi Yoga,*[32] *Patoladi kashaya*[33] *and single herbs like Shirisha,*[34] *Haridra* [35,36] *etc.* Dietary phytonutrients, antioxidants, and nutritional supplements combined with exercise and hypolipidimic therapy may help in detoxification further reducing the body burden of toxins and fat.

CONCLUSION:

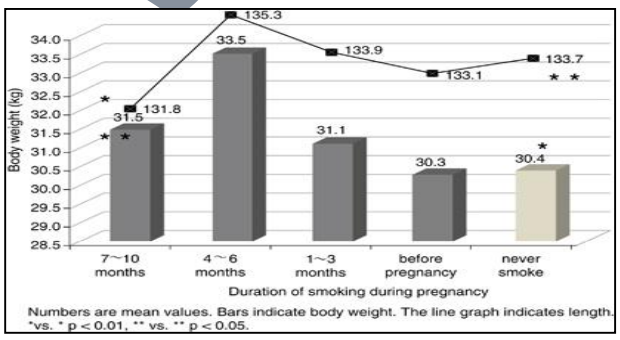
The increasing burden of environmental toxins, including persistent organic pollutants and heavy metals, can no longer be ignored as a key etiologic factor in the epidemic of obesity. Lower resting metabolism and low basal temperature due to toxicity may result in decreased ATP production and which may ultimately land in weight gain. Safe therapeutic protocol for obese individuals should be based upon existing therapeutic information as well as careful monitoring of the patient during intervention. Environmental toxins (Obesogens) ranging from heavy metals to petrochemicals should also be considered during the intervention of obese who are non respondent to conventional treatment.

REFERENCES

1. Charak Samhita- edited by Rajeshwardatta Shastri, Chaukhamba Bharti Acadamy, Sutrasthana, Adhyaya -21, Verse 18, 17th Edn. 1991: 413-414.
2. The WHR-http://www. who.int/whr/2002/en/ whr02 _en.pdf (assessed on 12.04.2013).

3. Mark AH. Environmental Toxins, Obesity and Diabetes: An Emerging Risk Factor- Alternative Therapies, 2010; 16(2): 56-57.
4. Paul Harris ND. Eliminating Toxins: First key to permanent weight loss-www. tulsanaturalclinic. com (Accessed on 12.04. 2013).
5. http://circ.ahajournals.org/content/107/10/1448.long (assessed on 12.04.2013).
6. Karmaus W, Osuch JR, Eneli I, Mudd LM, Zhang J, Mikucki D, Haan P, Davis S. Maternal levels of dichlorodiphenyl-dichloroethylene (DDE) may increase weight and body mass index in adult female offspring. Occup Environ Med. 2009; 66 (3): 143-149.
7. Adams JP, Murphy PG. Obesity in anaesthesia and intensive care. *Br J Anaesth*. 2000; 85: 91-108.
8. Wisen O, Hellstrom PM. Gastrointestinal motility in obesity. *J Intern Med*. 1995; 273:411-418.
9. Abernethy DR, Greenblatt DJ. Pharmacokinetics of drugs in obesity - Clin Pharmacokinet. 1982; 7(2): 108-124.
10. Wurtz, R, Itokazu G, Rodvold K. Antimicrobial dosing in obese patients. Clin Infect Dis. 1997; 25: 112-118.
11. Cheymol G. Effects of obesity on pharmacokinetics implications for drug therapy. Clin Pharmacokinet. 2000; 39: 215-231.
12. Adams JP, Murphy PG. Obesity in anaesthesia and intensive care. Br J Anaesth. 2000; 85: 91-108.
13. Casati A, Putzu M. Anesthesia in the obese the patient: pharmacokinetic considerations. J Clin Anesth. 2005; 17:134-145.
14. Hannah MacKenzieImplications of Obesity on A naesthetics-Scottish Universities Medical Journal, Dundee, 2012; 1(1): 81-88.
15. Robert A. Blouin and Graham W. Warren- Pharmacokinetic Considerations in Obesity - J Pharmaceutical Sciences, 1999 (88): 1-7.
16. http://web4health.info/en/answers/ed-treat- rugs-overweight.htm (assessed on 12.04.2013).
17. Mineur Y S. Nicotine decreases food intake through activation of POMC neurons. Science (2011) 332: 1330–1332.
18. Kim J, Peterson KE, Scanlon KS, et al. Trends in overweight from 1980 through 2001 among preschool-aged children enrolled in a health maintenance organization. Obesity (Silver Spring). 2006; 14(7): 1107-1112.
19. Ino, Shibuya, Saito, Inaba. Relationship between body mass index of offspring and maternal smoking during pregnancy Int J Obesity-2012(36): 554-558 doi:10.1038/ijo.2011.255
20. Dr. Subrahmanyam's Medical jurisprudence & Toxicology, Law Publishers Pvt. Ltd-(2011): 696.
21. Paladini D. Sonography in obese and overweight pregnant women: Clinical, medicolegal and technical issues- Ultrasound Obstet Gynecol. 2009; 33(6): 720-9. doi: 10.1002/uog.6393.
22. Sharmeen Lotia, Mark C. Bellamy - Anaesthesia and morbid obesity - Critical Care & Pain j 2008(8): 151-156.

23. Watson AJ - Genesis of fat emboli - J. clin. Path., 23, Suppl (Roy. Coll. Path.), 4: 132-142.
24. Turtiainen, Saimanen. Surgical wound infectionS after vaScular Surgery: Prospective multicenter observational Study - Scandinavian Journal of Surgery (2010)99: 167–172.
25. Berrington DE, Gonzalez A (December 2010). "Body-Mass Index & Mortality among 1.46 Million White Adults". N Engl J Med. 363 (23): 2211-2219.
26. Mokdad AH, Marks JS, Stroup DF, Gerberding JL "Actual causes of death in the United States, 2000" JAMA -2004-291 (10):pp 1238-45
27. Allison DB, Fontaine KR, Manson JE, Stevens J, VanItallie TB. "Annual deaths attributable to obesity in the US". (1999) JAMA 282 (16): 1530–1538.
28. Whitlock G, Lewington S, Sherliker P. "Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies". (2009) Lancet 373 (9669): 1083–1096.
29. Ananta S, Sushruta S. Hindi Translation, Chaukhambha Subharati Prakashana Varanasi. Kalpasthana Chapter 2, verse 25-26: 522.
30. Vagbhata. Ashtang Hridaya –Collated by Atrideva Gupta Chaukhamba Sanskrit Series Publication, Varanasi, 4th Edition, Uttarasthan, 35th Adhyaya, and Verse 33-34, 1970: 577.
31. Ibid- Verse 39- 1970: 577.
32. Ibid - Verse 57- 1970: 578.
33. Vagbhata, Ashtang H. Collated by Atrideva Gupta Chaukhamba Sanskrit Series Publication, Varanasi, 4th Edition, Sutra Sthana, 15th Adhyaya, Verse 15, 1970: 105.
34. Rupali S, Chhaya S, Sawant S. M. Karmarkar A, Bhagwat M. Anti hyper glycaemic and antidiabetic effect of the leaf extracts of albizzia lebbeck linn.(benth) and Psidium guajavalinn-Onalloxan and Streptozotocin induced Diabetic mice- Asian Journal of Pharmaceutical and Clinical Research, 4 (1), 2011:129-131.
35. Sangram M, Dwivedi RR, Ravishankar B, Ashok B. An Experimental Study on Hypolipidemic effect of some selected Ruksha Guna drugs- AYU journal- 2009,Volume : 30 (2): 205-210.
36. Ashish P. A review on lipid lowering activities of Ayurvedic and other herbs- Natural Product Radiance, 6 (1), 2007:81-89.



Graph -1: Maternal Smoking & BMI of offspring [19]

Table 1: Medicines causing weight gain[16]		
Sr. No.	**Class**	**Drug**
1	Lithium	Used for manic bipolar disorders.
2	Cortisone	Cortisone, Prednisoe used for rheumatism and allergies
3	Anti-seizure medicines	Depakote, Valproate.
4	Mood stabilizers	Elavil, Tofranil, Xeroxat, Cipramil, Sertralin, Zoloft, etc.
5	Antipsychotics	Zyprexa, Paxil, Ergenyl, Absenor, Orfilir, Chlorpromzine.
6	Migraine medicines	Sandomigrin, Ergenyl, Trypizol
7	Oestrogen	Follimin, Follinett, Neovletta.
8	Insulin	Insulatard, Humulin, Actrapid.
9	Breast cancer medicines:	Nolvadex, Tamoxifen.
10	Beta blockers	Inderal, Cardura.
11	Anti-rheumatic	Etanercept, Enbrel

Table 2: Complications & Claims in Liposuction		
Sr No	**Description of Injury**	**% Claims**
1	Minor temporary Injury	36.3
2	Major temporary Injury	15.8
3	Minor permanent Injury	13.7
4	Major permanent Injury	0.3
5	Significant permanent Injury	1.7
6	Insignificant Injury	23.3
7	Emotional Trauma	6.5
8	Fatal Injuries	2.4

Table 3: Prohibited Herbs & Foods & Spices before surgery [20]		
Sr	**Drug**	**Complications**
1	*Medicago sativa*	Anti-coagulant
2	*Arnica montana*	Anti-coagulant
3	*Ferulla assafoetida*	Anti-coagulant
4	*Capsicum frutescen*	Antiplatelet
5	*Syzygium aromaticum*	Antiplatelet
6	*Omega-3-fatty acids*	Antiplatelet, Prolonged bleeding
7	*Allium sativum*	Inhibition of platelet, bleeding
8	*Armoracia rusticana*	Anti-coagulant
9	*Zingiber officinale*	Anti-coagulant
10	*Ginkgo biloba*	Decrease blood viscosity
11	*Panax ginseng*	Anti-coagulant, Antiplatelet
12	*Glycyrrhiza glabra*	Antiplatelet
13	*Allium cepa*	Antiplatelet
14	*Carica papaya*	Antiplatelet, Prolonged bleeding