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Research Paper

Herbal Drugs-A Promising Approach To Obesity Management

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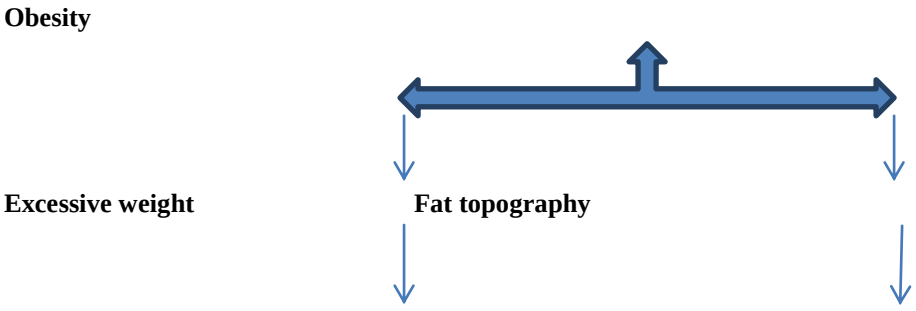
ABSTRACT:-*Obesity has been declared one of the major threats to human health in 21st century. It has become the center of much clinical attention and especially clinical laboratories, whose aim is to reduce this new world syndrome. Dietary fat is associated with well known diseases like diabetes, hypertension and cardio-vascular diseases. Certain long-term medications like use of insulin, sulfonylureas, thiazolidinediones, atypical antipsycotics, antidepressant, steroids, some anticonvulsants (phenytoin and valproate), pizotifen and some forms of hormonal contraception may also cause weight gain or changes in body composition. Weight management means lifestyle modification, behavioral therapy, pharmacotherapy and surgery. Retardation of nutrient absorption and digestion may be used as an approach to manage obesity and related diseases. Drugs have wide ranging side effects and contraindication for its widespread use. So, herbal drugs are a promising route to treat obesity as it is a disease. Many herbal plants like Withaniasomnifera, Zingiberofficinale,Dioscoreanipponica, Maludomestica, Nelumbonucifera, Cassia nomame has constituents that are used to treat obesity*

Keywords:-*Anti-obesity drugs, Fats, Herbal drugs, Lipoprotein lipase, Obesity*

I. INTRODUCTION

Obesity is a condition in which excess body fat is accumulated to an extent that health may be negatively affected. Obesity is commonly defined as a body mass index (BMI) of 30 kg/m^2 or higher. This definition distinguishes obesity from being pre-obese or overweight,which is classified as a BMI of 25 kg/m2 but less than 30 kg/m^2[1].The excessive storage that creates obesity eventually leads to the release of excessive fatty acids from enhanced lipolysis, which is stimulated by the enhanced sympathetic state existing in obesity[2]. The release ofthese excessive free fatty acids then incitelipotoxicity, as lipids and their metabolites create oxidative stress to the endoplasmic reticulum and mitochondria. This affects adipose as well asnonadiposetissue[3] .Obesity increases the risk of type 2 diabetes, cardiovascular disease, cancer, and premature death. More than 1.1 billion people are estimated to be overweight of which around 320 million are calculated to be obese [4].

II. FIGURE



E.g. Diabetes

Hypertension

Coronary Heart DiseaseIncreased Mortality

Fig. 1: Schematic Illustration of consequence of obesity[2]

III. REASONS FOR OBESITY

3.1 Genetic & environmental factors: Studies indicate that from 40% to as much as 80% of the variance of BMI can be attributed to genetic factors. It is estimated that heritability is as high as 30-40% for factors relevant to energy balance such as body fat distribution, resting metabolic rate, energy expenditure after overeating, lipoprotein lipase activity and basal rates of lipolysis [5].

3.2 Endocrine & metabolic Factors: Both metabolic and endocrine factors rarely cause obesityand complex interactions between the endocrine and metabolic systems [5].

3.3 Psychological Factors: Personality characteristics such as e.g., extreme depression, are seen related to obesity[5,6].

3.4 Food intake: Some patients eat more during periods of heavy exercise or during pregnancy are unable to get back to their former eating habits. The increase in obesity can usually be relatedto the type of food consumed [5,6].

3.5 Control of appetite: Appetite is the desire to eat and this usually initiates food intake. Following a meal controlled habbit, cholecystokinin (CCK), bombesin, glucagons-like peptide 1 (GLP1), enterostatin, and somatostatin are released from the small intestine, and glucagons and insulin from the pancreas[5,7].

3.6 Energy expenditure &thermogenesis: Basal metabolic rate (BMR) in obese subjects is higher than in lean subjects, which is not surprising since obesity is associated with an increase in lean body mass[5,6]. Obese patients tend to expend more energy during physical activity as they have a larger mass to move. On the other hand, many obese patients decrease their amount of physicalactivity. The energy expended on walking at 3 miles per hour is only 15.5 kJ/min (3.7 kcal/min) and therefore, increasing exercise plays only a small part in losing weight[7]

IV. SYNTHETIC DRUGS FOR ANTIOBESITY

The Food and Drug Administration has approved several prescription medications for the treatment of obesity. These medications fall into two categories [7]:

(a) Centrally acting drugs, which suppress appetite.
(b) Peripherally acting drugs, which reduce fat absorption.

For example, phentermine and sibutramine act centrally, reducing appetite by promoting the release of nor epinephrine from presynaptic terminals (phentermine) and inhibiting the uptake of both nor epinephrine and serotonin (sibutramine) in central nuclei[5]. Orlistat acts peripherally, inhibiting the action of lipases in the brush border of the intestine and thereby reducing lipid absorption. Such drugs could aim to suppress food intake, increase energy expenditure or increase lipolysis. At present, only two drugs have been shown to reduce the body weight of obese individuals like orlistat (which decreases fat absorption by preventing the breakdown of dietary fat in the gastrointestinal tract) and sibutramine (which is mainly an inhibitor at the CNS sites that stimulate food intake) Under the guidelines of the US Food and Drug Administration, botanical drugs can be developed faster and cheaper than conventional single-entity pharmaceuticals [8].

V. NATURAL MEDICAMENTS

Natural ingredients and medicinal plant preparations may enhance satiety, boost metabolism, and speed up weight loss[8]. Including these foods in the diet may therefore assist slow, individual weight loss. However, doubts about human application remain. Despite the global market for satiety, fat burning, dietary supplements and other weight management remedies, patient awareness of these products is insufficient. Here, a brief review

of natural medicinal agents and their anti-obesity potential is presented which could aid patients in selecting a botanical product to develop a healthy body[9]. These herbal drugs are:

5.1 ***Nelumbonucifera:****Nelumbonucifera* is an aquatic plant with large, showy flowers resembling the water lily, but not closely related to it. It is commonly called as Indianlotus, sacred lotus, bean of India, and belongs to family Nelumbonaceae. *Nelumbonucifera*leave extract was recently used to treat obesity in China. *Nelumbonucifera*shows its anti obesity effect activity by inhibiting the activity of alpha-amylase and lipase and regulate lipid metabolism. *Nelumbonucifera* leave extract prevent the increase in body weight, parametrial adipose tissues weight and liver triacylglycerol level [10].

5.2 ***Garciniacambogia*:**The*Garciniacambogia* is a fruit which belongs to family Guttiferae. Common Names of *Garciniacambogia* are Brindle berry, brindall berry, garcinia, malabar tamarind, gambooge, gorikapuli, uppagi, garcinia kola, mangosteen oil tree. This commonly distributed in India and South East Asia.This plant is a rich source of hydroxycitric acid (HCA), the active agent that aids in weight loss by inhibiting fat production and suppressing appetite. Garcinia contains citrine, an extract that is 50-60% HCA, which inhibits an enzyme that helps the body synthesize fat for storage in adipose tissue. HCA promotes energy, inhibits lipogenesis, lowers the production of cholesterol and fatty acids, increases the production of glycogen in the liver, suppressesappetite [11].

5.3 ***Camellia sinensis:*** The dried leaves of this plant are helpful in the origination of black tea. Black tea contains many different compounds including polyphenols such as thea-flavinsand the red-brown thearubigins that are products of the oxidation of flavan-3-ols during fermentation and are different from the polyphenols found in green tea, theanine, catechins, and caffeine[12]. In diet-induced obese rats, a Keemun black tea extract reduced food intake, body weight and plasma triglyceride levels via oral administration[13]. In addition, the black tea extract inhibited fatty acid synthase, though this effect was reduced when the extract was prepared with boiling water[14] .

5.4 ***Ziziphusmauritiana/ Ziziphus jujube***: are shrubs belong to family *Rhamnaceae,* distributed in warm temperate zone from Western Africa to India. Seeds and leaves of both these plants are used as folkloric medicine for treating hyperlipidemic and hyperglycemic conditions[15].Anti-obesity activity of *Ziziphusmauritiana bark* powderin high fat diet (HFD) induced obese rats. HFD induced obese rats did show characteristic increase in body weights, body fat and insulin resistance. At the end of 90 day schedule of ZMBP administration, obese rats showed significant reduction in body weight gain over standard drug treatment. The anti-obesity activities of several medicinal herbs have been ascribed to increase fecal fat excretion via the inhibition of lipase activity. Thus, reduction in body weight gain, loss of triglyceride content associated with increased fecal lipid excretion in ZMBP fed obese animals suggest an inhibitory mechanism in lipid absorption[16].

5.5 ***Arachishypogaea:***Thisis a legume or "bean" belongs to family Fabaceae.Its common name is peanut. This plant is free from Transfats. So, it decreases body weight gain, liver triglyceride content and liver size in association with increased fecal lipid excretion, suggesting an inhibitory mechanism on lipid absorption [17].

5.6 ***Citrus aurantium:*** Its common name are bitter orange, seville orange, naranjaagria, neroli. It belongs to family Rutaceae. Antiobesity effect of *C. aurantium*contains synephrinewhich is a stimulant with similar properties as caffeine and ephedrine. It claims to have similar effects byincreasing energy expenditure, increasing metabolism, and suppressing appetite [18]. Bitter orange has become a very widely used stimulant in fat burners. *C. aurantium*aided in weight loss and increase thermo genesis, at least to some extent. In contrast, the loss of fat mass in the test groupwas significantly greater compared to the placebo and control groups [19].

5.7 ***Hoodia gordonii:*** Its common name bobbejaanghaap, bergghaap, bitterghaap and it belons to family Apocyanaceae[20]. It grows in parts of the Western Cape, the North and Northwestern regions of the Northern Cape as far as Kimberley, and just into the Southmost parts of the Free State as well as in South-western Namibia.Animal research on hoodia includes that a purified extract of *Hoodia gordonii*, revealed a reduction in food intake, increased water consumption, reduced mean body mass gain, and body mass loss in some of the rat groups[21]

5.8 ***Bauhinia purpurea*:** Bauhinia purpurea is a species of flowering plant in the family Fabaceae, native to South China and Southeast Asia. Its common names are orchid tree, Hong Kong orchid tree. The present study on rats show that a high fat diet resulted in dyslipidemic changes as illustrated by increasing triglycerides, total cholesterol and low density lipoprotein LDL and a decrease in serum level of high density lipoprotein HDL, so, Oral administration of methanolic extract of *Bauhinia purpurea*(200 mg/kg b.w) to obese rats resulted in a decreased total cholesterol triglycerides, LDL, but increase in HDL[22].

5.9 ***Murrayakoenigi:*** The curry tree (*Murrayakoenigii*) is a tropical to sub-tropical tree in the family Rutaceae, which is native to India and Sri Lanka.The results obtained in this study clearly demonstrate that *Murrayakoenigii*leaves treatment was associated with a potent improvement of glucose intolerance. The results demonstrate clearly that repeated oral administration of *Murrayakoenigii* leaves evoked a potent anti-hyperglycemic activity in high fat diet obese rats. In other hand, high fatty diet group increased the both total cholesterol and triglycerides levels as compared to control group[23].

5.10*Dolichosbiflorus and Piper betle:* *Dolichosbiflorus is* a twining herb of Old World tropics cultivated in India for food and fodder; sometimes placed in genus Dolichos belonging to family leguminasae. This plant is commonly known as horse grain, horse gram. *Piper betlei*is the leaf of a vine belonging to the Piperaceae family, which includes pepper and kav. Studies and research shows that the herbal formulation LI10903F made by the combined extract of the above two mentioned plants show significant adipogenesis having the ability to inhibit lipid accumulation in 3T3-L1adipocytes and show lipolysis[24].

VI. CONCLUSION

As discussed earlier that the synthetic allopathic drudg like use of insulin, sulfonylureas, thiazolidinediones, atypical antipsycotics, antidepressant, steroids, some anticonvulsants (phenytoin and valproate), pizotifen and some forms of hormonal contraception may also cause weight gain or changes in body composition. So, switching to herbal drugs is the favourable way to control obesity. The above discussed plants have various constituents which can control obesity and the diseases which would occur due to obesity.

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