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A Review on Global Health Complication Obesity and its treatment with Natural Products

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ABSTRACT—Obesity is a complex disorder involving excessive deposition of Adipose tissue in the body. The increased prevalence of obesity significantly affects human health worldwide. It isone of the most common disorder worldwide which leads to many complications like diabetes, strokes, and other cardiovascular disorders. The above complications cause one-third of mortality worldwide. This problem arises due to the considerable dissimilarity of calorie consumption and energy expenditure and the treatment of obesity is mostly based upon equalizing the above-mentioned reason. The use of natural products as medicine has been in use for hundreds of years in various traditional systems of medicine throughout the world. To promote safe, efficient, and long-term effective methods to diagnose obesity, multiple natural products for the inhibition of adipogenesis had revealed. This review provides information regarding the treatment of obesity with natural products.

Keywords—Obesity, Accumulation of fat, Calorie consumption, Energy expenditure, Body mass index.

I. INTRODUCTION

The excess of adipose tissue is called obesity, and it is associated with a state of chronic subclinical inflammation. According to the World Health Organization (WHO), in 2016, at least 1.9 billion adults showed obesity or overweight, thus being equivalent to more than 25 percent of the world's population.Obesity has been confessed as an important considering factor in the development of various diseases1. Obesity is defined as abnormal or excessive fat accumulation in adipose tissue, that presents a risk to the health of human body. The accumulation of excess fat and dispensation of fat in the body - either around the waist and trunk (abdominal, central or android obesity) or peripherally around the body (gynoid obesity) - have main health complications2. The underlying cause of overweight/obesity associated with a number of chronic diseases such as coronary heart disease, hypertension, diabetes mellitus, gallbladder disease, osteoarthritis and some types of cancer3.People leading sedentary life style instead of active life. More calorie diet together with an inactive lifestyle has been noticed as a prospective risk factor for cardio vascular diseases, cancer, diabetes mellitus4. The rise in obesity in the past several decades has been dramatic worldwide, particularly in the Western world5.Obesity is prevalent in the U.S. population and contributes significantly to morbidity and mortality6. The frequency of obesity in the developed world is raising approximately 23% of adult, Canadians 5. 5 million people are obese and an additional 36% are overweight7. A foresight scientific report used to guide UK government policy, has predicted by 2025, nearly half of men and over a third of women will be obese. Obesity associated risk is also expand in individual with normal weight and BMI (Body mass index) who have more growth of waist circumference of more than 102cm (40 inches) in men and more than 88cm (35 inches) in women poses a significant risk8. The rise in obesity is multi factorial. Specific habitat factors are also involved including excess portion size, dietary macronutrient composition and sedentary lifestyle9. Obesity is associated with increased risks for type 2 diabetes mellitus (T2DM), hypertension (HTN), dyslipidemia, metabolic syndrome, coronary heart disease, other atherosclerotic diseases, and non-alcoholic fatty liver disease10.

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II. CAUSES OF OBESITY

There are many factors that leads to obesity. Those are

1) Genetic factors: Genes plays an important role in the process of metabolism. If the gene has less ability to metabolise, as a result the process slows down which leads to the accumulation of fat.
2) Life style: Intake of unhealthy high calorie diet, living sedentary life are considered as high-risk factors of obesity.
3) Emotional factors: Some people over eat in states of depression, hopelessness and anger.
4) Socioeconomic factors: Presence of food stores around influences the person to eat.
5) Gender: Women are more likely to gain weight when compared to men.
6) Age: Metabolism slows down as the age increases.
7)Pregnancy: Women generally increases their weight during pregnancy time.

III. EFFECTS OF OBESITY

Obesity leads to many complications that endanger life. The complications are listed below

- Cardiovascular diseases
- Increased sugar levels
- High blood pressure
- Osteoarthritis
- Gout
- Fatty liver syndrome
- Depression
- Dementia
- Fungal rashes in skin folds.

There are other mass related issues that may affect standards of life includes shame, guilt, social isolation and lower work achievement.

IV. PATHOGENESIS OF OBESITY

Adipose tissue is one of most complex organs in human body, formation of adipose tissue is called Adipogenesis which is the main reason behind the obesity. It is a process of cell differentiation by which pre-adipocytes becomes adipocytes. Adipocyte distinction is regulated by several transcription factors. It includes the beta-3-adrenergic receptor gene, peroxisome-proliferator-activated receptor gamma 2 gene, chromosome 10p, melanocortin-4 receptor gene and other genetic polymorphisms. (10) CCAAT/enhancer binding protein α (C/EBP-α) and adipocyte-specific genes are activated by peroxisome proliferator-activated receptor γ (PPAR-γ).

They are intricated in the seizing of growth that is required for adipocyte differentiation. Lipoprotein lipase (LPL) catalyses' the hydrolysis of Triglyceride molecules. It is abundant in adipose tissue. The expression of LPL mRNA has often been considered as an early sign of adipocyte differentiation there by it play a key role in controlling lipid accumulation. A protein hormone which is called as Adiponectin produced by adipose tissue regulates blood glucose levels and promote fatty acid break down.

Obesity pathogenesis demands two related distinct processes i.e., sustained positive energy balance (energy intake >energy expenditure) and resetting of body weight11

Now a days Calories consumption will be in more amounts than that are required by the body. The calorie remained in the body accumulates as a fat. This results in the increased size of fat cells which further leads to increase in the number of fat cells. After the increase in number of fat cells of a person, even if they controlled their food intake the size of the adipose cells might decrease but the number of fat cells remains constant. Consumption of high calorie diet or large amount of food may be due to lack of self-controlling ability or lack of will power. By making simple lifestyle changes, one can easily get rid of this disorder.

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The main problem associated with obesity is eating habits, in recent decades these habits changed enormously, like irregularity of meals, improper timings, incorrect proportions between specific groups of products or excessive consumption of certain products, especially fats and mono saccharides. In 1961, the daily amount of calories consumed per person was 2,300. In 1998, it increased to 2,800, and in 2015 exceeded 3,000. In addition, the total amount of available food increases, due to its low price. At the same time, consumption of number of vegetables and fruits is also reduced.

According to the WHO European Office, only 30% of boys and 37% of girls (age from 13 to 15) eat fruit every day.

V. TREATMENT

Reduction of calorie intake and practicing healthier eating habits are vital to overcome the obesity. ("EAT LESS WORK MORE"). Workout may cause lipolysis resulting in free fatty acid release from triglycerides stored in fat for future use as an energy source by muscle, increasing expenditure12. Although you may lose weight quickly at first, slow and steady weight loss over the long term is considered as the safest way to lose weight and the best way to keep it off permanently. The subjects who had participated in daily workouts achieved a victorious long-term weight loss observed in several studies13.

There is no best weight-loss diet. For short term weight loss of human low carbohydrate diets are more beneficial but the result may not retard for long term weight maintenance14.

VI. NATURAL PRODUCTS FOR TREATMENT OF OBESITY

Due to presence of plant derived secondary metabolites plants have been used in the management of a broad spectrum of metabolic dysfunction including obesity.

Plant-derived secondary metabolites contain large amount of natural active components like flavonoids, polyphenols and anthocyanins (15). Different plant sources such as fruits, vegetables, cereals, legumes and spices contains active agents in various quantities. These plant sources provided a convenient and easy way for the management of obesity.

1) SS. NO	2) PPLANT SOURCES	3) AACTIVE COMPONENT	MECHANISM OF ACTION	4) RREFERENCES
1	Mulberry leaf	Polyphenol, caffeic acid, hydroxyl flavin	Reduce the expression of sterol regulatory element binding proteins -1c, PPAR-γ proteins, target genes adipocyte-specific fatty acid binding protein and fatty acid synthase..	Y. C. Chang, M. Y. Yang, S. C. Chen, C. J. (2016) (16)
2	Pepper seed	Capsicoside G	By the activation of AMP activated proteins Adipogenesis is suppressed	Sung and Lee (2016) (17)
3	Cocoa seed	Polyphenols	It lowers lipid in the liver and it up-regulate genes in lipid catabolism and down regulates genes in lipid synthesis pathways.	Ali et al. (2015) (18)
4.	Citrus limon	Phenols, flavonoids	R CFegulation of peroxisomal β-oxidation through the increase m-RNA level of acyl-co A oxidase in the liver and white adipose tissues. it has effects on metabolic alterations caused by obesity.	Benavente-García et al. , 1997 (19)
5.	Barley seed	Coumaric acid, ferulic acid	It inhibits adipocyte metamorphism. There by it prevents bodyweight gain and it dys regulated lipid profiles.	Seo et al. (2015b) (20)
6.	Black soybeans	Anthocyanin	Remarkably decreases fat deposition and the expression of lipogenesis genes (ppar G). and increases the levels of lipolysis proteins such as lipoprotein lipase AMP activated protein kinase in mesenteric fat.	Kim et al. (2015) (21)

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7. Red chilli Capsinoids Through uncoupling protein-1 dependent mechanism reduces the diet induced obesity. Okamatsu-Ogura et al. (2015) (22)

8. Garlic s-allyl cysteine, methiin It decreases relative masses of liver and fat tissues, hepatic oxidative stress and serum tri acyl glyceride levels. It increases faecal lipid content in high fat diet rats. Chen et al. (2014a)23

9 Saffron

Crocin It significantly reduces plasma levels of tri acyl glycerol and total cholesterol Mashmoul et al. (2014)24

10 Strawberry/raspberry Tiliroside It inhibits the inflammation, obesity induced hepatic and muscular tri glyceride accumulation. Goto et al. (2012)25

11 Coffee Polyphenols It suppresses post prandial hyper glycaemia and hyper lipidaemia. it inhibits lipo genesis by down regulating acetyl –coA carboxylase 1&2, pyruvate dehydrogenase kinase-4 in the liver. Murase et al. (2012) 26

12 Bil berry Anthocyanidins It inhibits adipocyte differentiation by influencing the gene expression of insulin pathway. Suzuki et al. (2011)27

13. camellia seed oil Polyphenols It suppresses increase in body weight, fat storage and serum level of total cholesterol. it suppresses adipogenesis in adipocytes. Chen et al. (2014b) 28

1.Mulberry Leaf [Morus alba]

- MLPE was extracted from mulberry leaves using ethanol, and those polyphenolic compounds that can be analysed by HPLC {High-performance liquid chromatography}.
- Mulberry (Morus alba) leaf has been used in Chinese medicine as the remedy for hyperlipidaemia .
- MLE significantly reduces body weight gain and lipid accumulation in the liver and serum/hepatic triglyceride and total cholesterol levels compared with those in the HFD group. Therefore, the mulberry leaf may be used as a dietary supplement in patients with certain diseases with obesity involvement.
- Mulberry leaf extract may protect liver cells from damage and reduce liver inflammation13 weight loss. Rodent studies note that these leaves may increase fat burning and promote weight loss
- Mulberry leaves could alleviate obesity by enhancing brown adipose tissue (BAT) activity partly indicated by elevated thermogenesis and overexpression of uncoupling protein 1 in BAT.

2. Pepper seed

- A preliminary new study suggests that the pungent component in black pepper known as piperine, fights fat by blocking the formation of new fat cells.
- Piperonal a compound in black pepper reduced the harmful effects of a high fat diet.
- Capsicoside G inhibited the early stage of adipogenesis.
- Capsicoside G from pepper seeds may have potential in the treatment of obesity.

3. Cocoa

- Cocoa helps to regulate energy use and metabolism while also increasing feelings of fullness. In other words, although chocolate is commonly associated with weight gain, cocoa powder may actually help to reduce weight while providing important nutrients.
- CP has anti-obesity potential by inhibiting PL, thus helping to prevent the development of non-communicable diseases. pancreatic lipase (PL)

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4. Citrus limon

- Lemon plant (Citrus limon L.) belongs to the Rutaceae family, and is the third most important Citrus species after orange and mandarin.
- Citrus limon contains many important phytochemicals, including phenolic compounds (mainly flavonoids)
- Reported that dietary lemon polyphenols extracted from lemon peel (0.5 % w/w) on high-fat diet-induced obesity in C57BL/6J mice for 12 weeks suppressed body weight gain (44 %) and body fat accumulation (36 %).
- One anti-obesity mechanism reported for lemon is by up-regulation of peroxisomal β-oxidation through the increase mRNA level of acyl-CoA oxidase in the liver and white adipose tissues, which was likely mediated via up-regulation of the mRNA levels of peroxisome proliferator activated receptor-α (PPARα).

5. Barley seed-Hordeum vulgare (L.)

- Barley is high in fibre, especially beta-glucan, which may reduce cholesterol and blood sugar levels. It may also aid weight loss and improve digestion
- An aqueous extract from hulled barley (AHB) was effective in anti-adipogenesis.
- Other bioactive compounds in barley include phenolic acids such as ferulic acid, coumaric acid, and benzoic acid .These compounds exert their effects in many cell types including adipocytes, osteoblasts, and immune cells.
- It inhibits adipocyte metamorphism. There by it prevents bodyweight gain and it does regulate lipid profiles.

6. Black Soybeans-Glycine max L

- Black soybeans (Glycine max L. Merr) are merely a black variety of soybean containing a variety of phytochemicals. These phytochemicals in black soybean (BSB) are potentially effective in human health
- black soybeans—reduce appetite, increase a sense of fullness, and lower overall calorie intake.
- Black soybean seed coat extract (BE) is a polyphenol-rich food material consisting of 9.2% cyanidin 3-glucoside, 6.2% catechins, 39.8% procyanidins
- The black soybean anthocyanins were also effective in improving the lipid profile. They significantly reduce the levels of serum triglyceride and cholesterol
- Black soybean seed coats have an anti-obesity effect, which can reverse the effects of HFD on body weight, adipose tissue weight, and serum lipid content.

7. Red Chilli-Capsicum annum L.

- Through uncoupling protein-1 dependent mechanism reduces the diet induced obesity
- capsaicin, the major pungent component of chili peppers, which happens to be a potent activator of TRPV1. Capsaicin is the most consumed spice in the world, and its health beneficial effects,
- including thermogenic and anti-obesity activities, have been known for centuries
- capsaicin increased satiety and fullness and tended to inhibit overeating when food intake was ad libitum and also prevented the effect of the negative energy balance on desire to eat

.

8. Garlic

- Garlic is responsible for boosting energy levels that burn all the calories, keeping you fitter. It is known to boost your metabolism, further helping you lose weight efficiently. Garlic is a known appetite suppressant.

By incorporating novel drug delivery technology instead of conventional drug delivery in herbal medicine one can reduce the side effects, increase the efficacy. This is the main criteria behind using novel method of drug delivery in herbal medicine.

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VII. CONCLUSION

In the present scenario, Obesity is the most commonly arising disorder that causes cardiovascular diseases and various harmful disorders that lead to an overall increase in mortality rate. To promote awareness among people about obesity present review has been done. As per our review what we want to sum up is, using natural products for obesity treatment is better and it is clinically proven by many researchers that obesity can be cured with help of natural products. Though these all-natural products or remedies may not cure the disease completely in all cases of Obesity, they can help us in curing to some extent. The patient remains more healthy when followed by treatment of natural products rather than those synthetics and chemical products.

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