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Safe and effective management of global health issue: Obesity with scientifically validated herbal medicines

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Abstract
Nutrition and life style related disorders like obesity, diabetes, sleep disorders, hypertension etc. are one of the major causes of deaths and other illnesses in many of the developed countries. The modernization of our diet with high energy, high lipid containing foods is a major cause and less physical work or energy expenditure have encroached in our daily routine. Both the urban as well as rural population of world is facing the similar challenges. The differences is, rural population is not aware of the causes and even do not know the best practices to come out of it and the urban population is not much working on resolving the situation may be due to adaptation of the lifestyle, scarcity of time, work pressure and stress. Indian herbs have scientifically been explored to find out the more effective and economic way to treat obesity. The hypolipidemic activity of many Indian herbal medicines like Pongamia glabra Vent. Commiphora wightii (Arn.), Pterocarpus marsupium Roxb, Celastrus paniculatus Willd, *Aegle marmelos* (Linn) etc. have been evaluated and many herbs like Dioscorea bulbifera Linn. Have shown hunger depression activity. The continuous research on ethnopharmacological evidences on anti-obesity potential of Indian herbal drugs has drag the attraction of many Pharmaceutical Industries. The popularizations of the alternate medicines worldwide have gain tremendous focus since the last decade for the effective management of obesity by the use of Indian herbs both in developed as well as developing country.

Keywords: lifestyle disorder, obesity, Indian herbs, hypolipidemic activity

1. Introduction
Obesity is the major clinical threat in the modern era due to changed dietary habits of people. It is recorded that about 1.9 billion adults above the age of 18 years in the world are overweight and nearly 600 million of them registered as clinically obese [1]. The major reason of obesity is the increase in adipose cell size and it is characterized through the evaluation of total fat accretion in cytoplasm of adiposities [2]. Various enzymes such as fatty acid synthase and lipoprotein lipase influence the change in the metabolic activity [3]. To deal with the problem of obesity regular exercise is the best physical component as reported by National heat lung and blood Institute [4]. In the recent research work on the therapeutic potential, attempts are being made to apply natural product against obesity without any adverse effect [5].
The review of research work indicated treatments of obesity by the application of herbal remedies. The study highlighted a brief description of the modern trends in epidemiology and pathogenesis along with their bioactive compounds responsible for the anti-obesity activity along with the probable mechanism of action. The traditional medicines exhibits the effect on obesity therapy, a critical review is collected on available data on plants with anti-obesity activities reported in journals of Pharmaceutical sciences.

2. Important medicinal Plants with Anti-obesity potential
2.1 *Platycodon grandiflorum*
The plant has many traditional usage like as an expectorant, treatment of bronchitis, dermatitis etc. The plant leaves are also used in the form of pickle especially in china and korea as an anti-obesity remedy. The aqueous extract of plant is reported to decrease rat plasma triacylglycerol level through inhibiting the hydrolysis of triolein. Further examination on inhibition of absorption of dietary fat through the intestine also showed the promising results. The similar study was carried on high fat diet induced anti-obesity model with 5% aqueous extract and significant reduction in tissue weight was observed along with hepatic triacylglycerol [6].

2.2 *Alpinia officinarum*
The ethyl acetate fraction of aqueous extract of *Alpinia officinarum* showed to have high pancreatic lipase inhibitory activity. 3-Methylethergalangin as an active bioactive compound was isolated from the same fraction which may be responsible for the activity. Aqueous as well as ethyl acetate extract have found to possess antihyperlipidemic potential when studied using oral administration of corn oil for generating triglyceridemic mice. The significant reduction in serum triglycerides was reported [7].

2.3 *Salix matsudana*
Study on leaves extract of *Salix matsudana* for anti-obesity activity showed to have promising results when testing by enhancing the level of triglyceride level through oral administration of emulsion of corn oil and also in high fat diet induce obesity model. The dose selected for corn oil emulsion was 570 mg/kg. The significant reduction in body weight was observed in high fat diet fed rat when administered with 5% polyphenol fraction of *Salix matsudana* leaves. The reduction in hepatic total cholesterol was also studied and plant again have shown successful results in he mice given high fact diet only. The palmitic acid uptake was also reduced through membrane vesicles along with increased lipolysis in fat cell using polyphenol

fraction. In phytochemical evaluation study, presence of apigenin-7-O-d-glucoside, luteolin-7-O-d-glucoside and chrysoeriol-7-O-d-glucoside was identified which are responsible for palmitic acid uptake, alpha-amylase inhibition [8].

2.4 *Benincasa hispida*
It is one of the common vegetable source specially in India and topical countries and belongs to the family Cucurbitaceae. The fruits of the plant is an essential ingredient of one of the Ayurvedic formulation used in the conditions of epilepsy and nervous ailments as Kusmanda lehyam. It has been reported that the methanolic extract of plant have property to reduce the percentages of food intake may be due to its anorectic property. The study was carried out over a period of 7 Hours and food intake reduction was observed from 0.2% to 54% in a dose dependant manner. It could be one of the essential anti-obesity member and its further characterization is needed [9].

2.5 *Panax japonicas*
It is one of the traditional medicine, used from ancient time for the successful management of life style disorders including hypertension, hyperlipidaemia and diabetes. So the herb can have an beneficial effect in the treatment of obesity as well, as obesity is also one of the potential life style disorder so again scientific study is needed to explore the plant and its anti-obesity properties [10, 11].

2.6 *Gardenia jasminoides Ellis and Crocus sativus L*
Both the plants have an crocin as an bioactive compound. So its has been reported that the crocin isolate from the plant has potential to lower down lipid parameters like triglycerides, total cholesterol, LDL, VLDL associated with hyperlipidaemia. The dose of 25 to 100mg/kg was given to high fat diet induce obesity model in rats, and was continue for a period of 10 days. The inhibition of fat absorption though inhibition of pancreatic lipase and increased faecal excretion of fat is mainly responsible for the activity. Crocus sativus L. is widely distributed in Iran, India, Greece and belongs to the family Iridaceae. The plant has majority aromatic volatile oil constituents as terepens and their esters. Its synonym is saffron and has many medicinally important advantages including treatment of hypertension, cancer, depression, aphrodisiac. The plant also shown to possess memory enhancing potential. Recently it has been explored for anti-obesity potential and significant reduction in body weight was observed [12].

2.7 *Platycodon grandiflorus*
It belongs to the family Campanulaceae. Saponins, carbohydrates and fibres are the major phytoconstituents of the plant. The study reported to reduce lipid profiles in diet induced obesity model in rats. The fibres of the plant reported to treat atherosclerosis by lowering the level of cholesterol whereas, the saponin inhibit bile acid uptake and also enhances faecal excretion of fat. Thus the plant can be used in the treatment an management of obesity and other life style related disorders including syndrome X, hypercholesterolemia etc [13].

2.8 *Salacia reticulate*
The plant reported to possess lipolysis potential along with it lower down the insulin resistance. The mechanism associated is inhibition of alpha glucosidase enzyme found in intestine and also increased expression of messenger RNA responsible for generating hormone sensitive lipase and adiponectine. The anti-obesity activity was reported and clinical trials result suggest its potential to reduce weight and BMI when administered in combination with vitamin D. Plant improves insulin resistance and glucose metabolism as well [14].

2.9 *Phoseolus vulgaris*
The pulse crop was a major staple food but now its use is reduced due to westernization. The recent scientific exploration for its anti-obesity activity revelled its potential to reduce many obesity associated lipid parameters including total cholesterol, LDL, HDL etc. The study was performed by using cooked dry bean feeding in diet induced obesity model in Sprague dawley rats. The probable mechanism of associated with the activity could be increased cholesterol catabolism and enhanced excretion. The weight loss and improved lipid plasma profile was observed in 12 days. The further bioactive evaluation is needed to generate complete profile responsible for the activity [15].

2.10 *Moringa oleifera*
The plant has reported to show anti-obesity potential of methanolic extract of plant leaves. He study was performed in high fat diet induced anti-obesity model in rats. Various lipid parameters were elevated through high fat diet like total cholesterol, triglycerides, body weight etc. The 49 days study demonstrated significant change in lipid profile level along with liver biomarkers, blood glucose level and organ weight. The atherogenic index was also reduced and have significant thermogenic effect. So it can be used in the treatment of obesity and related disorders [16].

2.11 *Enicostemma littorale*
Plant based medicine have gain much focus in the recent years specially for the management of obesity since the disorder is associated with morbidity and mortality. The ethanolic and aqueous extract of *Enicostemma littorale* belonging to the family Genitanaceae was reported to possess anti-lipase and anti-obesity potential. The study was performed using high fat diet induced anti-obesity model in male Wistar rats. The results shows promising reduction on various morphological and lipid parameters associated with obesity like total cholesterol, triglyceride level, body weight, BMI etc when tested at different dosage from 200 mg/kg to 500 mg/kg [17].

3. Conclusion
In modern life style obesity has becoming a worldwide problem as many people are suffering from the disease. It is proved that increase and decrease in body weight gain in animals and human being with or without change in the body fat reflects anti-obesity effect. It is observed that anti-

obesity effect such as body weight reduction, decrease in the level of triglycerides, total cholesterol level and LDL safely treated with plant based medicines. Usually most of the compounds identified from natural resources included or listed which is a better inhibitor of pancreatic lipase giving hydrolysis effects. The active natural resources have emerged as new dimensions in safe and effective treatment of obesity.

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