Common herbal plants and their role in control of obesity

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Abstract

Obesity is quite common around the globe and linked with the increased prevalence of various other diseases including: immune dysfunction, diabetes, depression, cancer and cardiovascular disorders. Obesity is induced by the diet is usually due to disproportionate intake of calorie enriched diet, lack of physical activity and reduced energy consumption. Worldwide, it was estimated that an average of 603.7 million adults and 107.7 million children were found to be obese in 2015. It was also observed that the prevalence of obesity is quite greater in females than males. The incidence rate of obesity was 12.0% among adults and 5% among children. In 2015, approximately 4 million deaths were reported around the world due to increased BMI. The current review is aimed to study common herbal plants which have proven anti-obesity effect and could be used in the routine diet to reduce weight and to improve the quality of life. The databases used for this review were included Google Scholar, PubMed, Scopus and Medline. There are many common herbal plants and spices which are used in daily routine that could be helpful in reducing weight. Black Chinese tea, *Nigella Sativa*, Green Tea and *Camellia synensis* has exhibited promising anti-obesity activity. To reduce the prevalence of obesity and to improve the quality of life better strategies should be considered. Physicians and other health care professionals with pharmacological interventions should recommend change in daily routine life to patients for better outcomes

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Introduction
Obesity is quite common around the globe and linked with the increased prevalence of various other diseases including: immune dysfunction, diabetes, depression, cancer and cardiovascular disorders. So, right approach should be taken into account to loss the weight and other resultant abnormalities (Vanamala et al., 2012). Worldwide, it was estimated that an average of 603.7 million adults and 107.7 million children were found to be obese in 2015. It was also observed that the prevalence of obesity is quite greater in females than males. Obesity is also associated with polycystic ovary syndrome which is characterized by ovarian dysfunction, hirsutism and acne (Mahmood et al., 2011). The incidence rate of obesity was 12.0% among adults and 5% among children. In 2015, approximately 4 million deaths were reported around the world due to increased BMI. Further, increased BMI was resulted to 120 million disability-adjusted life-years. As link to the BMI, about 39% of the mortalities and 37% of the disability-adjusted life-years were found in people having BMI <30 (Collaborators, 2017). Overall, global economic burden of the obesity was predicted to be 2 trillion US dollars in 2014 (Tremmel et al., 2017). The major reason behind the increased incidence of obesity is probably surplus ease to access and affordability of energy-dense foods. The marketing of such food products and utilization may the key cause of weight gain (Swinburn et al., 2011). Obesity is quite common in both developed and developing countries. Pakistan is an emerging country and ranked on 9th highest position regarding obesity monetary burden (Ahmad et al., 2015). Pakistan is facing many challenges like lack of health resources, malnutrition, trend shifting towards the fast food, occurrence of non-communicable including obesity and economic burden. Due to lack of the regulatory control, the fast food industry is expanded abruptly in Pakistan which resulted into the weight gain and its comorbidities (Sajjad and Qureshi, 2018). Better strategies should be considered to reduce the prevalence of obesity and improve the quality of life (Kanwal et al., 2015; Tanveer et al., 2019). Physicians and other health care professionals with pharmacological interventions should recommend change in daily routine life to patients for better outcomes (Howard, 1981). Obesity is induced by the diet is usually due to disproportionate intake of calorie enriched diet, lack of physical activity and reduced energy consumption. Due to imbalance between the energy intake and utilization either fat cells are increased in size or number (He et al., 2009). Complementary and alternative medicine (CAM) including change in dietary habits and herbal supplements are proven to be effective in the treatment of weight loss (Barnes et al., 2002). In 2002, World Health Organization (WHO) has recommended the Asian countries to reduce the BMI cut-off values (Aziz and Sohail, 2016). Many therapeutically useful compounds are being isolated from herbs and used in treatment of various ailments (Tanveer et al., 2019). There are many common herbal plants and spices which are used in daily routine that could be helpful in reducing weight. Black Chinese tea, *Nigella sativa*, Green Tea and *Camellia sinensis* has exhibited promising anti-obesity activity. It is recommended that dose of the medicinal herbs should be determined for effective treatment and possible side effects (Hasani-Ranjbar et al., 2013). In an investigation, 53 medicinal plants were studied for their possible anti-obesity effects. Black tea, Glycyrrhizalabra, licorice, *Saturejakhuzeanica*, *Fenugreek*, cherry, garlic powder (Allicor) and rhubarb stalk has demonstrated a significant reduction in total cholesterol and LDL cholesterol levels (Hasani-Ranjbar et al., 2010). A research was conducted on processed tomato vinegar beverage TVB to evaluate anti-obesity and anti-insulin effects and outcomes has showed the reduction in insulin resistance and visceral obesity (Seo et al., 2014). Tomatoes not only helpful in weight drop but also reduce the risk for the chronic inflammatory diseases (Hazewindus et al., 2014). The current review is aimed to study common herbal plants which have proven anti-obesity effect and could be used in the routine diet to reduce weight and to improve the quality of life. The databases used for this review were included Google Scholar, PubMed, Scopus and Medline (Abid et al., 2019).
Role of herbal plant in controlling obesity

Orange peel

Orange peel or bitter orange peel (Citrus aurantium) belongs to family Rutaceae. Many valuable phytochemicals have been isolated, named: synephrine, hordenine, N-methyl tyramine, octopamine, flavonoids, volatile oil and Vitamin C. The isolated compound named Synephrine has significant pharmacological activities such as bronchial muscle relaxation and constrictions of vessels. The fruit extracts of the orange peel is widely used to cure multiple diseases such as infections, obesity and cancer (Suryawanshi, 2011; Arshad et al., 2019). In a research, orange peel has been evaluated for the anti-obesity effects. The extracts of orange peel were given to the female mice in combination with caffeine and black tea. It was observed that the mice which taken such combination of diet have exhibited reduction in abdominal fat and in brown adipose tissue (Huang et al., 2009). Another study has also proven the weight loss effects of orange peel by using in vitro model. The outcomes of the study have confirmed that the citrus polyphenols cause lessening of the cell lipid contents along adipocyte differentiation (Nakajima et al., 2014).

Licorice

Glycyr rhizaglabra is famous as a “licorice”. The herb has remarkable properties to reduce obesity. An investigation has done on the plant to prove its anti-obesity effect and for this herb supercritical fluid extract enriched with glabridin was used. For study fat diet was given to rats and anti-obesity effect was observed for about eight weeks. This chemical reduces the obesity by interfere the process of adipose cells generation (Ahn et al., 2013). In Korea, about eight hundred species of the plant was tested to investigate the anti-obesity effect. A chemical known aslicochalcone was proved to be effective and it is separated from the Glycyrrhizauralensis root extract. This research has also proved thatlicochalconeimpede the formation of oleic acid by pancreatic lipase (Won et al., 2007). A placebo-controlled study were conducted which was double blinded. For this study slightly obese subjects were chosen, included 56 males and 28 females and they were divide into 4 groups. Daily a placebo dose was given to the participants and sample of the bloods were monitored for the BMI for eight weeks. The study has exhibited that total body fat mass declined in three LFO groups (Tominaga et al., 2009). A double blind placebo controlled investigation was conducted to evaluate the dried licorice extract with a calorie restricted diet on anthropometric indices and insulin resistance with nutrigenetic approach. For this study, subjects (n=2) were randomly assigned to placebo or licorice group. It was concluded that in overweight participants, the Pro/Pro polymorphism of the PPAR-γ2 gene seems to encourage promising effects on control of obesity. However, further research is still required to verify that PPAR-γ2 gene polymorphisms or another obesity genes can affect responses to obesity cure and management (Namazi et al., 2017).

Cardamom

Elettariacardamomum is known as cardamom and belongs to familyzingiberaceae. A research was done on Sprague-Dawley rats to check the hypoglycemic and anti-obesity effect which was instigated by alloxan. This study was performed on 45 rats which were equally divided into three groups of the rats. Samples were taken at three intervals daily for about 14 days to monitor the blood glucose and cholesterol. The outcomes of the study have shown a marked reduction in glucose and cholesterol level hence proved effective for obesity and hypoglycemic effects (Winarsi et al., 2014). Another study was conducted on animals also proved herb beneficial effect to reduce obesity (Daneshi-Maskooni et al., 2017). An investigation was carried on albino rats to compare the hyperglycemic and anti-obesity activity of cardamom with pioglitazone and dexamethasone. In this study 24 rats were used and split into 4 groups. One group received dexamethasone and second group received cardamom suspension along with and before consuming dexamethasone for 6 days. The third group received pioglitazone and last group did not receive any medication. Both cardamom and pioglitazone reduced the hepatomegaly and cause weight loss and reduce the blood sugar level (Bhat et
Gurmar
The botanical name of the Gurmar is Gymnemasylvestre and belongs to Asclepiadaceae family. The most significant active constituents of Gurmar is Gymnemic acid and it has hypoglycemic, anti-inflammatory and anti-helmentic activity (Saneja et al., 2010). The usual recommended dose of leaves is 75-150 mg to reduce the obesity (George and Nimmi, 2011). The chief phytochemicals of Gurmar are including gymnemic acids, gymnemasaponins, and a polypeptide, gurmarin. Its herbal extract used to reduce the blood cholesterol and also reduce body weight (Tiwari et al., 2014).

Black cumin
Nigella sativa is a common herb and used widely to treat many disorders. It was used by Unani physicians of customary medicine (Hakims or Tabibs) and ayurvedic practitioners (Vaids) for the cure of many pathologies i.e. dyslipidemia, hypertension and obesity (Qidwai et al., 2009). A study has conducted to provide an explanation of herb extracts effects on adipocytes and PPARγ.

The findings of the study have revealed the plant extract act as an agonist of PPARγ. The outcomes of the research data have suggested that N. sativaseed oil has potential to cure obesity and to reduce increased blood sugar (Benhaddou-Andaloussi et al., 2010). Many studies have indicated that the plant has anti-cancer, cardio-protective, anti-diabetic and immune-modulatory properties. Black cumin also exhibit marked anti-oxidant properties by preventing generation of reactive oxygen species (Tanveer et al., 2014). Herb active phytoconstituent called hymoquinone has revealed bioactivity in a variety of disease models and still the mechanisms of action is not known. Further growing interest in and the use of functional foods and nutraceuticals, as well as the rise in obesity and chronic diseases globally, more investigations are needed to verifyuseful effects of the plant (Vanamala et al., 2012).

Tea
Tea or Camellia sinensis is belongs to family Theaceae. Polyphenols have been isolated from the tea plant and studied for their potential role to treat chronic disorders with special reference to obesity. Various scientific studies have exposed the impendingeffectiveness of both black and green tea to reduce the weight. However, exact mechanism is still unknown and is needed to be explored (Grove and Lambert, 2010). It has been shown that green tea, when consumed on a daily basis, supports health. Many of the beneficial effects of green tea are related to its catechin, particularly (−)-epigallocatechin-3-gallate (EGCG), content. There is conclusive evidence from in vitro and animal studies which provide the concepts for underlying functional mechanisms of green tea catechins and their biological actions (Thielecke and Boschmann, 2009).

Garlic
Till then many studies have conducted on garlic to validate the wisdom behind its use to reduce weight and hyperlipidemia. A research was performed on obese rats to discover the effects of garlic oil and onion oil on serum lipid levels. For study, ninety six male Sprague-Dawley rats were used and divided into 8 random groups on basis of their blood levels of triglycerides, cholesterol and body weight. For about 60 days, they were given extracted volatile from the plant orally and then different obesity measuring parameters were examined. The results of study have implied that garlic oil and onion oil are effective in controlling the obesity (Yang et al., 2018).

Onion
Weight reducing potential of the onion (Allium cepa) extract was evaluated in both obese and diabetic Zucker diabetic fatty rats. The efficacy of the results was determined by assessing the relevant obesity and diabetes markers. The findings of the study have confirmed that the onion is quite effective in minimizing the serum glucose level and lipid profile. Onion contains many useful constituents like cycloalliin, S-propyl-l-cysteine sulfoxide, S-methyl-l-cysteine, dimethyl trisulfide and S-methyl-l-cysteine.
sulfoxide were reported to be effective in inhibiting formation of oil drop in the cells, suggesting that these compounds may be involved in the anti-obesity effect of the onion extract (Yoshinari et al., 2012). Male 8 week old mice were purchased (n=60) and they were kept under standardize conditions and divided into 5 groups and they were fed on HFD and normal saline 2g/kg/day for 10 weeks and control group was fed only normal saline the body weight of mice fed the high fat diet was higher than that of mice fed the normal diet by approximately 32.5%. In the orlistat treated group as positive control the body weight was significantly decreased by approximately 16.5% (Sung et al., 2014). A research has also proved that the administration of onion reduced the size of adipocyte and serum hyperlipidemia in obese rats. Moreover, the antihypertensive effects of onion were also noticed. It is suggested by the study that onion reduces the serum lipid components and improves hypertension in obese rat (Kanf et al., 2010).

Tomato
Tomato or Solanumlycopersicum is widely used across the world and embraced with many valuable chemicals which are effective for the treatment of many ailments. A study was conducted to evaluate the tomato and broccoli extracts for control of obesity and to regulate glucose homeostasis through the modulation of resistin levels. There is an association between the resistin and obesity. For study 48 male albino rats were used and investigated for about 1 month. By using the ELISA and spectroscopic techniques, levels of leptin, resistin, adiponectin, insulin and glucose were determined. The outcomes have shown that tomato and broccoli extract treatment regulates glucose homeostasis via reduction of serum resistin and may be a useful non-pharmacological therapy for obesity (Aborehab et al., 2016). Intake of vegetable is more beneficial against many diseases also including obesity which is a major health problem now a day. Tomato is a beneficial vegetable that could help in weight reduction. A study was performed on zebra fish because we can feed every type of vegetables to zebra fish. After giving tomato’s to the zebra fish a marked reduction in weight was observed (Tainaka et al., 2011). Tomato and vinegar also inhibit the deposition of different types of fats in body and decreased the cholesterol level in liver and plasma (Lee et al., 2013). Now great consideration is given to use of herbs, vegetables and fruits for the control of weight as these dietary approaches are safe and effective. Tomatoes contain caretenoids abundance which play a key role in human to reduce the free radicals and hence act as the anti-oxidant (Pinela et al., 2016). It also contain the vitamin C called ascorbic acid and vitamin E called tocopherol which also play a significant role in reduction of weight (Davey et al., 2000; Baiano and Del Nobile, 2016) as these chemicals also have a function of antioxidant (Lee et al., 2004) and intake of tomato can maintain balance of the such vitamins in body (Abushita et al., 2000; Singh and Jialal, 2004).

Ginger or Zingiberofficinale has both non-volatile and volatile constituents. The extracts of the ginger are commonly used to treat many diseases and by studies many potential roles of the plant has verified (Misawa et al., 2015). The plant contains the many valuable active compounds that lower the blood cholesterol, improve digestion and reduce the weight (Srinivasan, 2017). At a dose of 800mg/dl, the plant volatile components remarkably reduce the body glucose and fat. Hence it can be used to treat obesity and diabetes (Andallu et al., 2003; jewole, 2006).

Conclusion
Obesity is quite common around the globe and linked with the increased prevalence of various other diseases including: immune dysfunction, diabetes, depression, cancer and cardiovascular disorders. The major reason behind the increased incidence of obesity is probably surplus ease to access and affordability of energy-dense foods.

The marketing of such food products and utilization may the key cause of weight gain. There are many common herbal plants and spices which are used in daily routine that could be helpful in reducing weight. Black Chinese tea, Nigella sativa, Green Tea and Camellia synensis has exhibited promising anti-obesity
activity. To reduce the prevalence of obesity and to improve the quality of life better strategies should be considered. Physicians and other health care professionals with pharmacological interventions should recommend change in daily routine life to patients for better outcomes.

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