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Review Article

Natural Agents Used for the Management of Obesity in the Traditional Unani System of Medicine: A Comprehensive Review

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Abstract

Obesity is one of the most challenging chronic diseases threat the world facing today. It is a disease state emerging from an imbalance between energy intake and energy expenditure and is directly responsible for the rapidly increasing morbidity and mortality from insulin resistance, the metabolic syndrome, diabetes, cardiovascular disorders, cancer, respiratory ailments, arthritis, reproductive challenges and psychosocial problems. There is a global health burden due to lack of effective drugs for the management of obesity. The treatment modalities in modern system of medicine such as uses of sibutramine, orlistat, ghrelin and surgical intervention like liposuction having serious complications so it is need of time to find out novel anti-obesity natural agents without any side effects. According to ancient Unani literature obesity is a phlegmatic disease in which su-e-mizaj barid ratab occurs and excessive fat accumulates in the body. Based on *Ilaj-biz-zid* concept mentioned in traditional Unani medicine, the single Unani herbs of hot and dry temperament like Cinnamom (*Darchini*), Garden Rue (*Suddab*) Cumin Seeds (*Zeera Siyah*), Carom seed (*Ajwain Desi*) and Marjoram (*Marzanjoosh*) are in practice for obesity since ancient times. An ideal anti-obesity drug should help in the reduction of weight by 10% and showing the improvements of other biomarkers such as lipid profile and blood sugar level. The purpose of this review is to explore the potential of natural agents and herbs, their chemical constituents and mechanism of action in the treatment of obesity.

Keywords: Anti-obesity; Natural Agents; Unani Medicine; Recent Advancements; Ilaj-biz-zid

Introduction

Obesity is a complex trait with a multifactorial aetiology, including behavioural, environmental, and genetic factors (Hill, J.O 1998) [1]. Now a days, obesity has taken on the shape of an epidemic, with the consequences of increased morbidity and mortality from insulin resistance and metabolic challenges, arthritis, and psychosocial problems. Obesity is a disease state emerging from an imbalance between energy intake and energy expenditure. Obesity can also

be defined arbitrarily as an increase in body fat stores compared to lean body mass. The causes of obesity are endocrinal disorder (hypothyroidism, Cushing's syndrome, hypothalamic obesity, and polycystic ovarian syndrome), some medications (antipsychotic drugs, antidepressants, and epileptic drugs), socioeconomic status, physical inactivity, sedentary life style, and dietary habits. In clinical practice, obesity is best assessed by calculating BMI, waist circumference, anthropometry, waist-to-hip ratio, skin fold thickness, and measurement of visceral fat (WHO Consultation on Obesity 2000) [2]. To prevent gradual weight gain over time, the 2005 Dietary Guidelines for Americans recommended a small decrease in energy from foods and beverages and an increase in physical activity. Individual strategies typically used to reduce energy intake include limiting portion sizes, food groups, or certain macronutrients. Although the drugs currently available for the treatment of obesity are few in number and limited in efficacy, such as sibutramine and orlistat. Bariatric surgery has been endorsed as an acceptable weight loss option for patients with severe obesity or obesity with comorbid conditions (Apefelbaum, M) [3].

In traditional system of Unani medicine Siman-e-Mufrat (obesity) is a phlegmatic disease in which the body's temperament becomes abnormally barid and ratab causing excessive fat accumulation (Sheham wa Sameen), leading to obesity. Jalinoos a renowned Unani physician stated that "An obese person has less life expectancy than a lean and thin person and sudden death is more common in those who are obese from birth comparing lean and thin individuals (Jalinoos 1903) [4]. According to the traditional Unani system of medicine, it is of two types. Siman-e-mufrat umoomi and siman-e-mufrat muqami. Umoomi is the state of generalized obesity whereas local siman-e-mufrat belongs to specific organs, not the entire body (Razi, A 1999) [5]. Unani system of medicine is a treasure trove for effective and innocuous drugs, and a large number of single Unani drugs have been recommended for the treatment of siman-e-mufrat by various renowned Unani physicians in their respective manuscripts. Unani physician advocated therapeutic procedures viz. venesection, induced vomiting, purgation, diuresis, diaphoresis, hot bath as well as oral herbal drugs having hypolipidaemic properties. The herbs used were mudir, mushil, muhazzil, musakhkhin, mujaffif, muharrik, mufatteh-e-sudad in action (Kantoori A 1903) [6]. These agents are recognized as very safe and exhibit good therapeutic effects. The safety profile of medicinal plants has always been a boon to the world of pharmacology. Therefore, researchers have shown an interest in investigating drugs that can prove better efficacy and safety than currently available in conventional system of medicine. Following are detailed descriptions of ten single Unani drugs that are used as natural agents in the management of obesity.

Description of Luk Maghsool *(Laccifer lacca/Coccus lacca)*

Lac (*Kerria lacca* Kerr) is an animal-derived product that is sold as seedlac or shellac. This drug is well-known among Unani practitioners for its anti-obesity properties. *Kerria lacca* is a species of insect in the family Kerridae, the lac insect. These are in the superfamily Coccoidea, the scale insects. This species is perhaps the most commercially important lac insect, being a main source of lac, a resin which can be refined into shellac and other products (Raman A. 2014) [7].

Anti-Obesity effect

The effect of lac on rats fed a high-fat diet (HFD) was studied by measuring changes in body weight and serum leptin levels. Lac's effect on total cholesterol, triglyceride (TG), low-density lipoprotein-cholesterol (LDL-C), and high-density lipoprotein-cholesterol (HDL-C) was also investigated. For 12 weeks, male Wistar rats (170-220 g) were divided into eight groups: a control group with a normal diet, an HFD group, and experimental groups with an HFD containing 0.1, 0.2, and 0.4% (w/w) of seedlac or 0.1, 0.2, and 0.4% (w/w) of shellac. Each rat's body weight was measured once a week. Animals were sacrificed at the end of the experiment, and serum concentrations of cholesterol, TG, LDL, HDL and leptin were measured. The study demonstrated that seedlac and shellac significantly reduced body weight and serum leptin levels in treated groups as compared to HFD groups. Also, Shellac reduced TG levels, and both shellac and seedlac increased HDL concentrations significantly (Poorassar., *et al*. 2020) [8].

Description of Darchini *(Cinnamomum zeylanicum)*

Darchini is a tree of 30 feet height. The shape of the leaves is oval, veined and green in colour. It mainly grows in Sri Lanka. This herb also cultivated in west India, java, Sumatra, Mauritius, Borneco and in South America. The bark of tree is brownish, rough and brittle. When tree becomes six- or seven-year-old then the bark is peeled off. The inner bark is collected and used as spice (Iqbal 1993) [9].

Anti-hyperglycaemic and anti-obesity activity

The flavour of cinnamon is imparted by cinnamon aldehyde (CIN), which is also known to be the primary agonist of transient receptor potential-ankyrin receptor 1 (TRPA1). TRPA1 expression in stomach epithelial cells from mice was studied. Mice significantly reduce their overall food intake and gastric emptying rates following a single dose of CIN. TRPA1 and ghrelin are co-localized in enteroendocrine cells of the duodenum, both *in vivo* and in the ghrelin-secreting cell model MGN3-1, wherein incubation with CIN up-regulates expression of TRPA1 and Insulin receptor genes. Following CIN stimulation, the amount of ghrelin secreted in the culture medium was measured, and was found that both Octanoyl and total Ghrelin were significantly lower than control. Furthermore, obese mice fed a diet containing CIN for five weeks significantly reduced their overall body weight and improved glucose tolerance without any discernible changes in insulin secretion. It was concluded that genes involved in fatty acid oxidation were upregulated in adipose tissues thereby establishing CIN's anti-obesity and anti-hyperglycemic properties (Camacho., *et al*. 2015) [10].

Description of Marzanjoosh *(Origanum majorana L.)*

Marzanjoosh (Origanum majorana) is a perennial herb or undershrub with sweet pine and citrus flavour. Although *Marzanjoosh* is sometimes confused with oregano in several Middle Eastern countries, it is known by the names knotted marjoram and sweet marjoram there to differentiate it from other members of the Origanum genus.

Anti-diabetic and anti-hyperlipidaemic activity

Tripathi *et al*. investigated the effects of *Origanum majorana* ethanol leaf extract (100, 200, and 400 mg/kg body weight) on diabetic and hyperlipidaemic rats induced with streptozotocin (50 mg/kg b.w). At predetermined intervals following oral administration of such an extract, blood glucose levels were monitored. As a result, it was found that the extract significantly reduced blood glucose levels. The extract significantly reduced elevated levels of total cholesterol, triglycerides, low density lipoproteins and very low-density lipoproteins, while also raising levels of high-density lipoprotein concluding hypolipidemic as well as hypoglycaemic activities (Tripathi., *et al*. 2018) [11].

Description of Suddab *(Ruta graveolens Linn)*

Ruta graveolens, commonly known as Rue, common Rue or Herb of grace, is a species of Ruta grown as ornamental plant and herb. It is native to the Balkan Peninsula. Currently, it is grown in gardens all over the world, mostly for its bluish foliage, though it is also occasionally grown for its ability to withstand hot, dry soil. To a lesser extent, it is grown as an insect repellent, a condiment, and a medicinal herb.

Anti-oxidant and antilipidemic activity

Osama *et al*. investigated effects of Rutin, a pharmacologically active constituent of *Ruta graveolens*, on oxidative stress, lipid profile, and impaired glucose tolerance in albino rats with type 2 diabetes that were induced by nicotinamide-streptozotocin. For 30 days, diabetic rats were given rutin and R. graveolens infusion orally at doses of 125 and 50 mg/kg body weight/day, respectively. The findings showed that rutin and R. graveolens infusion significantly reduced hyperglycaemia, hyperlipidaemia, serum insulin and C-Peptide levels, liver glycogen content, hexokinase, glucose-6-phosphatase, and glycogen phosphorylase activities, as well as oxidative stress in diabetic rats. R. graveolens infusion and rutin, on the other hand, significantly increased insulin release from isolated islets of Langerhans, insulin binding to its receptors in the rat diaphragm, and the rat diaphragm's peripheral glucose uptake, while the absorption of cholesterol and glucose from the gut was markedly reduced. Additionally, while rutin alone was found to be effective in boosting adipose tissue PPAR (peroxisome proliferator-activated receptor) expression, both treatment agents reduced resistin expression in adipose tissue. Based on these findings, the study concluded that R. graveolens and rutin both possess antihyperglycemic and antihyperlipidemic properties (Osama., *et al*. 2010) [12].

Description of zeera siyah *(Carum carvi Linn)*

The herbaceous plant caraway is edible and can occasionally be considered perennial. It grows in pairs. In salads, teas, soups, and stews, its cooked leaves, seeds, and roots are among its edible elements that are commonly utilized. It is a hardy plant that can be found in a variety of USDA climate zones and is frequently found in wet meadows, arable land, and waste areas at both sea level and higher altitudes. It is sown as an annual in warm climates in the winter. It is sown as a summer annual or biennial in temperate climates. Since ancient times, people have grown the well-known

herb caraway for both culinary and medicinal purposes. Obesity is traditionally being treated using the potent medicinal plant i.e. *Carum carvi* L.

Anti-obesity effect

The weight-lowering efficacy of caraway extract (CE) on physically active, overweight, and obese women were investigated in a randomised, triple-blind, placebo-controlled clinical experiment. Adult females who were overweight or obese, healthy, and aerobically fit were split into two groups at random (n = 35 per group). Participants did not alter their diet or level of physical activity but instead received 30 mL/day of CE or a placebo. Anthropometric indices, clinical and paraclinical variables, as well as changes in body composition were all examined in subjects at baseline and 90 days later. The treatment group demonstrated a significant decrease in weight, body mass index, body fat percentage, and waist to hip ratio when compared to the placebo group. The subjects' lipid profiles, urine-specific gravities, or blood pressure did not change. Also, there were no reported clinical side effects. The findings of the study suggested that caraway extract may be used as a phytotherapeutic strategy in the treatment of obesity (Kazemipoor., *et al*. 2013) [13].

Description of Ajwain Desi *(Trachyspermum ammi Linn)*

Ajwain, ajowan or *Trachyspermum ammi* also known as ajowan caraway, bishop's weed or carom is an annual herb in the family Apiaceae. Both the leaves and seed-like fruit of the plant are consumed by humans. The name "bishop's weed" also is a common name for other plants. The seed is often confused with lovage "seed" (Aliza 2006) [14].

Anti-obesity and anti-hyperlipidemic Activity

Obesity is defined as the accumulation of a high fat ratio in muscle fat tissues along with hyperlipidaemia, which can have a detrimental effect on one's health. Herbs have been used as a treatment for some infections and problems since ancient times. This study set out to investigate the potential protective effects of carom seeds (*Trachyspermum ammi*) against obesity and hyperlipidaemia.

Carom seed was purchased from Faisalabad and washed to remove the dirt, dust, and other substances that adhered to the test surface. An air forced draught oven was used to dry the unprocessed material. It was prepared, packed in water- and airtight plastic containers, and stored at 5 °C until further examination. Additionally, the blood samples were obtained on days 0, 15, 30, and 60 by taking 15 ml of venous blood after a 12-hour fast the previous night. Centrifugation was used to separate the serum samples, which were then kept at -70°C pending analysis. Enzymatic measurements of cholesterol in low-density lipoprotein and high-density lipoprotein were made. Peridochrom Triglyceride Kits were used to measure the concentrations of triglycerides and total cholesterol. Four groups of sixteen participants—G0 (Control), G1 (500 mg), G2 (1 mg), and G3 (1.5 mg)—were given different amounts of carom seeds in the form of tea. All the parameters, including Body Mass Index, High-Density Lipid, Low-Density Lipid, Tri-Glycerides, and Total Cholesterol, were assessed at 0, 15, 30, and 60 days, respectively, in this eight-week trial. Using SPSS, a paired t-test was performed on the carom seed tea yield data for anti-obesity and anti-hyperlipidemic effects obtained for each treatment. With regard to the treatments administered, a significant difference between the groups has been seen. Among all the groups, G0 shown no significant changes, while G2 and G3 reported significant changes due to the carom seed tea dosage concentrations of 1g and 1.5g, respectively ($p < 0.05$) (Zubdah., *et al*. 2022) [15].

Description of badiyan *(Foeniculum vulgare Mill.)*

Foeniculum vulgare has been used to treat obesity in traditional medicine since ancient times. It is a flowering plant species in the carrot family and is hardy, perennial herb with yellow flowers and feathery leaves. It is indigenous to the shores of Mediterranean but has become widely naturalized in many parts of the world, especially on dry soils near the sea-coast and on riverbanks**.**

Anti-obesity and anti-hyperlipidemic effects

Dina *et al*. investigated anti-obesity and anti-hyperlipidemic effects of ethanolic extract of *Foeniculum vulgare* seeds *in-vivo* and determined mechanism of action using molecular docking to target the leptin receptor. Four groups of 16 albino rats were taken; group 1 received 0.2 ml of normal saline daily; group 2 received a modified high-fat hypercaloric diet; group 3 received extract (200 mg/kg) daily; and group 4 received orlistat (2 mg/kg) orally. Body weight and lipid profile of rats were measured. The ligands for molecular docking were obtained from prior studies, and only the best conformers ligands with the highest and best scores were

chosen. Screening was done using structure-based drug design against a phytochemical component of *Foeniculum vulgare*. It was found that Orlistat produced 6.4% less weight loss in rats than the ethanolic seed extract of *Foeniculum vulgare* (12%). Treatment with plant extract and orlistat had no effect on triglyceride levels. When analysed with AutoDock Vina, molecular docking reveals that Stigmast5-en-3-ol has stronger binding at the leptin receptor's binding site (-6.1 kcal/mol). The study's final finding was that the ethanolic seed extract of *Foeniculum vulgare* shows promise as an anti-obesity treatment as it significantly reduces rat body weight. According to molecular docking, stigmast-5-en-3-ol is a strong candidate to be a leading compound for treating obesity disorders (Dina., *et al*. 2019) [16].

Description of zanjbeel *(Zingiber officinale Rosc.)*

Zingiberaceae family's herbaceous perennial plant, which is likely native to Southeast Asia, or its aromatic rhizome, or underground stem, is used as a spice, flavouring, food, and medicine. Ginger has leafy stems that reach a height of about one metre (three feet). The elongated, two-row, alternate leaves are 15 to 30 cm (6 to 12 inches) long and come from sheaths that cover the stem. The flowers are in dense spikes that resemble cones and are made up of overlapping green bracts that may have yellow edges. These spikes are about 2.5 cm (1 inch) thick and 5 to 8 cm (2 to 3 inches) long. A single tiny yellow-green and purple flower is enclosed by each bract (Britannica, 2023) [17].

Anti-obesity effect

Wang *et al*. carried out a preclinical study to determine whether energy metabolism is related to ginger's ability to reduce obesity. Mice were kept on one of two diets: a standard control diet or a high-fat diet (HFD) with or without supplemental 500 mg/kg (w/w) ginger. The effects of the HFD-induced increases in body weight, fat storage, and levels of serum glucose, triglyceride, and cholesterol were reduced after 16 weeks of ginger supplementation. The administration of ginger significantly increased the respiratory exchange ratio (RER) and heat production in both diet models, according to indirect calorimetry Additionally, the HFD-induced changes in the concentrations of glycolysis and TCA cycle intermediates were reversed by ginger administration. Ginger also changed the gene expression and protein levels of some brown and beige adipocyte-selective markers, which improved brown adipose tissue function and triggered white adipose tissue (WAT) browning. Additionally, the sirtuin-1 (SIRT1)/AMP-activated protein kinase (AMPK)/peroxisome proliferator-activated receptor coactivator 1 (PGC-1) pathway may play a role in some of the regulation of ginger's stimulation of the browning programme. Results suggest that dietary ginger prevents weight gain by altering the body's overall energy metabolism and causing white adipose tissue to turn brown. (Wang., *et al*. 2019) [18].

Description of filfil siyah *(Piper nigrum L.)*

One of the most popular spices, pepper (Piper nigrum), can be found in almost all foods. According to current knowledge, pepper controls physiological activity in obesity. Fruits of the tropical vine known as black pepper (Piper nigrum) are frequently used as spices in food and traditional medicine. This plant can be spread by seed, stem cuttings, or runners and thrives in bright, indirect sunlight with moderate watering. Typically, leaves are ovate (egg-shaped) to ovate-oblong (elongated egg shape). Drupes are the botanical term for round fruits (3-4 mm wide). Unripe fruits that are dried turn black, while ripe fruits are red.

Anti-obesity effect

Nurun., *et al*. determined the potential of piperine and piperidine, two major compounds in pepper, as GHSR Ghrelin inhibitors. To simulate the binding mode of piperine and piperidine as GHSR-Ghrelin antagonists, molecular docking was used. Based on calculations of binding energies and interactions between amino acids, the results indicated that piperidine has a lower potential than piperine as a GHSR-Ghrelin antagonist. Additionally, piperine binding to GHSR may change the location of the GHSR's Ghrelin binding site. The study concluded that, piperine may inhibit the GHSR-Ghrelin interaction, preventing appetite behaviour that causes bodyweight loss in obese people (Nurun., *et al*. 2021) [19].

Description of hulba (Trigonella foenum-graecum)

Trigonella foenum-graecum L., also known as fenugreek, is an annual herbaceous legume that grows well in dryland areas where there is insufficient moisture for other plants. The upright, smooth, herbaceous plant can reach a height of 40–80 cm. (Ecocrop, 2017). Taproot is present. It has stems that are upright, up to 50 cm tall, and sporadically branched. The trifoliolate, compound, alternate, and 7–12 cm long leaves have three lobes. The lower faces of the oval,

up to 5 cm long leaflets are covered in hairs. The papillonaceous flowers are borne in the leaf axils and are white, lemon-yellow, or purplish blue in colour. (Ecocrop, 2017). The fruit is a straight or sickle-shaped pod that is 2-10 cm long, thin, and pointed with 10–20 seeds inside. The seeds are oblong or square, 6-8 mm long, greenish-olive or brownish in colour, and have a pungent, spicy odour. (Ecocrop, 2017; Alaoui, 2005) [20].

Anti-diabetic and anti-hyperlipidaemic activity

Parveen., *et al*. demonstrated how the aqueous extract of Trigonella foenum-graecum seeds (AqE-TFG) affected fat accumulation and dyslipidemia in rats that had been made obese by a high-fat diet (HFD). Female Wistar rats were fed HFD ad libitum, and from days 8 to 28, the rats on HFD received oral treatments of either orlistat (10 mg/kg) or AqE-TFG (0.5 and 1.0 g/kg), respectively). Treatment with AqE-TFG significantly reduced body weight gain, BMI, white adipose tissue (WAT) weights, blood glucose, serum insulin, lipids, leptin, lipase, and apolipoprotein-B levels while increasing adiponectin levels. Lactate dehydrogenase (LDH), aspartate amino transferase (AST), and alanine amino transferase (ALT) serum levels were all improved by AqE-TFG. Treatment with AqE-TFG decreased the levels of thiobarbituric acid reactive substances (TBARS) in the liver and heart while increasing the levels of the antioxidant enzymes glutathione (GSH), superoxide dismutase (SOD), and catalase (CAT). Fatty acid synthetase (FAS) and glucose-6-phosphate dehydrogenase (G6PD) activities in the liver and uterine WAT were also returned to normal levels. These results showed that AqE-TFG has a preventive effect on fat accumulation and dyslipidemia by inhibiting impaired lipid digestion and absorption, improving glucose and lipid metabolism, improving insulin sensitivity, increasing antioxidant defence, and downregulating lipogenic enzymes (Parveen., *et al*. 2014) [21].

S. NO	Unani Name	Botanical/Scientific name	Traditional uses mentioned in unani pharmacoepia	Temperament	References
1	LUK MAGHSOOL	*Cocos lacca*	*Mujaffif-i-rutubat-e-badan* (Dessicative), *Mufattiḥ -i-Sudad*(Deobstruent),*Muhallil-i-Awram*(Antiinflammatory),	Hot2^{0}Dry3^0	Ghani, 2011; [22] Hakeem, 2002; [23]
2	Darchini	*Cinnamomum zeylanicum*	*Qabid* (Astringent), *Hāḍim*(Digestive) *Musakhkhin*(Calorific), *Jādhib*(Absorbent), *Jālī*(Detergent), *Tiryāq*(Antidote) *Mudirr-i-Bawl*(Diuretic), *Muḥarrik*(Stimulant), Hypolipidemic and Hypoglycemic.	Hot2^{0}Dry2^0	Kabeeruddin, 2007; [24] Rafeequddin, 1985; [25]
3	Marzanjoosh	*Origanum majorana L.*	*Mudirr-i-Bawl wa Hayd* (Diuretic and Emenogogue),*Mujaffif-i-rutubat-e- Mi'da*(Dessicative), *Muhallil-i-Awram*(Antiinflammatory), *Musakhkhin*(Calorific),*Qati-e-Balgham*(Antiphlegmatic), *Mufattiḥ -i-Sudad*(Deobstruent)	Hot2^{0}Dry1^0	Naseer. [26] Rafeequddin, 1985; [25]
4	Suddab	*Ruta graveolens Linn.*	*Mufattiḥ -i-Sudad*(Deobstruent), *Mufattit-i-Ḥaṣāt-i-Kulya wa Mathāna*(Renal and Vesicular lithotriptic), *Kāsir-i-Riyāḥ*(Carminative), *Mudirr-i-Bawl wa Hayd* (Diuretic and Emenogogue)	Hot2^{0}Dry2^0	Rushd, 1987; [27] Baitar,1999; [28]

5	Zeera Siyah	*Carum carvi Linn.*	*Hāḍim*(Digestive), *Kāsir-i-Riyāḥ*(Carminative), *Muhallil-i-Awram*(Antiinflammatory), *Qabid*(Astringent), *Muqawwī-i-Mi'da*(Stomachic),*Mulattif*(Demulcent), *Muqawwī-i- Ri'a*(Lungs Tonic)	$Hot2^0Dry2^0$	Naseer, [26] Chopra,1996; [29]
6	Ajwain Desi	*Trachyspermum ammi Linn.*	*Mulayyin*(Laxative), *Mujaffif*(Dessicative), *Mudirr-i-Bawl wa Hayd* (Diuretic and Emenogogue), *Mu'arriq*(diaphoretic), *Mufattit-i-Ḥaṣāt*(Lithotriptic)	$Hot3^0Dry3^0$	Naseer, [26] Azeez,1948; [30]
7	Badiyan	*Foeniculum vulgare Mill.*	*Muqawwī-i-Mi'da*(Stomachic), Mufattiḥ -i-Sudad(Deobstruent), *Munḍij-i-Balgham* wa Sauda(concoctive of phlegm and black bile), *Mulattif*(Demulcent), *Kāsir-i-Riyāḥ*(Carminative), *Muwallid-i-Laban*(Lactogogue),	$Hot2^0Dry2^0$	Ansari,1930; [31] Rushd, 1987; [27]
8	Zanjbeel	*Zingiber officinale Rosc.*	*Hāḍim*(Digestive), *Munaffith-i-Balgham*(Expectorant), *Mulayyin*(Laxative), *Muḥarrik*(Stimulant), *Muqawwī-i-Jigar*(hepatotonic)	$Hot3^0$ $Dry2^0$	Hakeem,2002; [23] Rushd,1987; [27]
9	Filfil Siyah	*Piper nigrum L.*	*Kāsir-i-Riyāḥ*(Carminative), *Jādhib*(Absorbent), *Hāḍim*(Digestive), *Munaffith-i-Balgham*(Expectorant), *Muḥammir*(Rubefacient), *Jālī*(Detergent), *Muqawwī-i-Mi'da*(Stomachic), *Muhallil*(Antiinflammatory),	$Hot3^0$ $Dry3^0$	Ahmad, 2004; [32]
10	Hulba	*Trigonella foenum-graecum*	*Mulayyin*(Laxative), *Muhallil-i-Awram*(Antiinflammatory), *Mudirr-i-Bawl*(Diuretic), *Mulattif*(Demulcent),*Muhallil-i-Riyah*(Flatus dissolving)	$Hot3^0Dry3^0$	Khan, 2013; [33]

Table 1

S. No	Botanical/scientific name	Pharmacological action	Chemical constituents	Mechanism of action
1	*Cocos lacca*	Anti-hiccup, Antipruritic, Anti-arthritic, Anti-inflammatory, Antiulcerogenic, Anti-obesity.	Resin (70-80%), sugars, proteins, soluble salts – 2-4; woody matter, insect bodies, other extraneous matter– 8-12; Laccaic acid (Reshma., *et al*. 2018;) [34]	Laccaic acid that is major constituents of shellac possessing inflammatory cytokines-TNFα, IL-1β and IL-6. Concomitantly, laccaic acid increased AMPK/AKT-mediated phosphorylation of FOXO1, preventing its nuclear translocation and transcriptional activation of gluconeogenic genes (*G6PC* and *PCK1*) Notably, laccaic acid treatment also stopped changes in histone methylation (H3K27me3 and H3K36me2) brought on by a high-fat diet. (Poorassar., *et al*. 2020;) [8].
2	*Cinnamomum zeylanicum*	Antioxidant, Anti-inflammatory, Antidiabetic, Antimicrobial, Anticancer, lipid-lowering, and Cardiovascular-disease-lowering	Cinnamaldehyde, Cinnamon (71.50%), linalool (7.00%), *β*-caryophyllene (6.40%), eucalyptol (5.40%), and eugenol (4.60%) (Behrooz., *et al*. 2020;) [35]	In a study by Kawn and Team cinnamon is also described to promote the browning of white adipose tissue. Following treatment with cinnamon extract, they saw that subcutaneous adipocytes obtained from models of obese mice underwent browning. Increased expression of UCP1 and other brown adipocyte markers in 3T3-L1 adipocytes and subcutaneous adipocytes was indicative of the WAT browning mechanism. Additionally, the cinnamon extract treatment resulted in increased mitochondrial protein biogenesis (Kwan., *et al*. 2017) [36].
3	*Origanum majorana L.*	Anti-allergic, Antihypertensive, Anti-diabetic, Anti-Obesity and Lipid lowering.	5,6,3′ -Trihydroxy-7,8,4′ -trimethoxyflavone, hesperetin, hydroquinone, arbutin and rosmarinic acid, Thymol, Carvone, Terpenoid (Ramazan., *et al*. 2015;) [37]	The finding of this study indicates that using Origanum vulgare has a greater impact on cholesterol-LDL, with the majority of these effects occurring at dosages of 100 and 200 mg/kg Bw. As a result, significant statistical differences were found between the mean cholesterol-LDL rates in groups 3 and 4 compared to the control group ($P<0.05$). Additionally, this is may be due to presence of constituents like terpenoid, thymol, carvon that having antioxidant property. (Ranjbary., *et a*l. 2014) [38].

4	*Ruta graveolens Linn.*	Anti-oxidant, Anti-microbial, Anti-inflammatory, Anti-cancer, Anti-diabetic, Anti-allergy and Anti-Obesity.	Rutin, acridone alkaloids, coumarins, volatile substances, terpenoids, flavonoids and furoquinolines, Xantotoxin, Chalepensin, Skimmianine. (AJinous and Roghaieh., 2012;) [39]	This study demonstrated a significant reduction in body weight, BMI, and body fat mass when four traditional medicinal plants—Origanum vulgare, *Carum carvi*, Trachyspermum cropticum, and Ruta graveolens—were combined. Numerous components of these plants, such as fiber, polyphenols, unsaturated fatty acids, flavonoids, saponins, and terpenoids, have been shown to have anti-obesity properties. This has shown that the phytochemicals included in herbs prevent the absorption of fat by suppressing lipase. Other potential anti-obesity effects of herbal drug include mechanisms like regulating serotonin and decreasing appetite. (Valizadeh., *et al*. 2017) [40].
5	*Carum carvi Linn.*	Antimicrobial, Anticancer, Hypolipidemic, Antidiabetic, Bronchodilator, Diuretic, Hepatoprotective, Analgesic, Antioxidant, Carminative and Anti-Obesity	α-Pinene 0.3, Camphene 0.2, β-Pinene 0.1, β-Myrcene 0.1, Limonene 5.1, γTerpinene 12.6, β-Ocimene 0.1, p-Cymene 0.1, Terpinolene 0.1, Camphor 0.2, Linalool 0.7, Terpinene-4-ol 0.1, βCaryophyllene, Dihydrocarvone 0.2, α-Terpineol 0.1, Germacrene-D 0.1, Carvone 70.1, β- Selinene 0.2, δ-Cadinene 0.3, γ-Cadinene 0.5, Cuminaldhyde 0.1, Eugenol 0.2, (Ali., 2015;) [41].	Another study found that taking 30 ml of caraway extract daily for 90 days significantly reduced hunger and anthropometric markers. Carvone, limonene, carveol, thymol, and carvacrol are examples of bioactive metabolites in caraway that exhibit antioxidant activity and may be significant contributors to weight loss. Leptin and cholecystokinin (CCK), two hormones that influence feelings of fullness, are secreted more when caraway is consumed. This causes in delayed stomach emptying, a decrease in appetite, and thus result in the reduction of body fat. Additionally, it promotes lipolysis in fat droplets and apoptosis in preadipocytes (Sherafatmanesh., *et al*. 2017;) [42].
6	*Trachyspermum ammi Linn.*	Antifungal, Anti-oxidant, Antimicrobial, Antinociceptive, Cytotoxic, Hypolipidemic, Antihypertensive, Antispasmodic, Broncho-dilating actions, Antilithiatic, Diuretic, Abortifacient and Anti-Obesity	Thymol, para-cymene, γ-terpenine, α- and β-pinenes, dipentene, α-terpinene, carvacrol, limonene and dillapiole. (Ranjan., *et al*. 2012;) [3].	In the browning of white adipocytes (3T3-L1 white adipocytes), which are important for glucose homeostasis and lipid metabolism, thymol (20 μm) that is major constituents of Ajwoin has been shown to promote the biogenesis of mitochondria and increase the expression of markers specific to brown fat. It has also been shown to improve the expressions of phospho AMP-activated protein kinase (pAMPK), pampk; phospho acyl-CoA carboxylase (pACC), hormone-sensitive lipase (HSL), perilipin (PLIN), carnitine palmitoyltransferase-1 (CPT1), acyl-coenzyme A oxidase-1 (ACO), peroxisome proliferator activated receptor gamma co-activator 1-alpha (PGC-1α), and uncoupling protein 1 (UCP1). (Choi., *et al*. 2016) [43].

7	*Foeniculum vulgare Mill.*	Anti-diabetic, Anti-inflammatory, Antibacterial, Anti-oxidant, Hepatoprotective, Anti-stress	Neochlorogenic acid, chlorogenic acid, gallic acid, p-coumaric acid, ferulic acid-7-o-glucoside, quercetin-7-oglucoside ferulic acid 1,5 dicaffeoylquinic acid hesperidin, cinnamic acid, rosmarinic acid, quercetin and apigenin. (Ali., 2018;) [44].	Fennel could suppress appetite and weight gain by stimulating cholecystokinin release, as its seeds contain trypsin inhibitors. Phytoestrogens like isoflavones in fennel also inhibit serotonin re-uptake to increase satiety signalling. Enhanced fat metabolism by activating PPARγ receptors and raised thermogenesis by trans-anethole may also add to the anti-obesity effect of fennel. (Raslan., *et al*. 2024) [45].
8	*Zingiber officinale Rosc.*	Antioxidant, Anticancer, Anti-inflammatory, Anti-apoptotic, Anti-hyperglycemic, Anti-hyperlipidemic and Anti-emetic actions	Gingerols, quercetin, zingerone, gingerenone-A, 6-dehydrogingerdione, β-bisabolene, α-curcumene, zingiberene, α-farnesene, and β-sesquiphellandrene, (Qian., *et al*. 2019;) [46]	While HFD decreased the production of Foxa2, the consumption of ginger nanoparticles increased the expression of Foxa2 protein and shielded it from Akt-1-mediated phosphorylation and Foxa2's subsequent deactivation. Additionally, gingerenone A had a greater inhibitory effect on adipogenesis and lipid accumulation in 3T3-L1 preadipocyte cells than did gingerols and 6-shogaol. Furthermore, by activating AMPK, gingerenone A may modify fatty acid metabolism in vivo and reduce diet-induced obesity. 6-Shogaol and 6-gingerol raised the expression of genes that are dependent on the peroxisome proliferator-activated receptor δ (PPAR-δ) in cultured skeletal muscle myotubes, thereby improving cellular fatty acid catabolism. A randomized, double-blind, placebo-controlled study showed a reduction in BMI among females who took 2 g of ginger powder daily. (Mao., *et al*. 2019) [47].
9	*Piper nigrum L.*	Antioxidant, Antiinflammatory, Anticancer, Antidiabetic, Antimicrobial, Antidepressant, enhance the bioavailability, and help to aid digestion.	Piperine, Brachyamide B, Dihydro-pipericide, (2E,4E)-N-Eicosadienoyl-pereridine, N-trans-Feruloyltryamine, N-Formylpiperidine, Guineensine, pentadienoyl as piperidine, (2E,4E)-Nisobuty- ldecadienamid, isobutyl-eicosadienamide, Tricholein, Trichostachine, isobutyl-eicosatrienamide, Isobutyl-octadienamide, Piperamide and Piperamine, (Zoheir and Aftab.,2014;) [48]	This study shows that piperonal supplementation changed the expression of PPARγ, FAS, Fab-4, SREBP-1c, TNF-α, and UCP-2 to levels close to normal in a dose-dependent manner. Piperonal's antiobesogenic activity via master regulator PPARγ regulation is indicated by the reversal effects it has on the expressions of FAS, SREBP-1c, Fab-4, and TNF-α. The thermogenic properties of piperonal, which cause energy to be dissipated as heat, are demonstrated by the increased expression of UCP-2 following treatment with 40 mg/kg b.wt. Thus, by addressing several targets, this research suggests that treating with piperonal can lessen the effects of HFD-induced changes. (Meriga., *et al*.2017;) [49].

10	*Trigonella foenum-graecum.*	Antilipidemia, Antioxidant, Hepatoprotective, Anti-inflammatory, Antibacterial, Antifungal, Antiulcer, Anti-Obesity.	Fenugrin B, Trigofenoside A-G, Diosgenin, Yamogenin,Gitogenin, Tigogenin, Apigenin, Luteolin, Vitexin, Quercetin, Kaemferol-Dirhamnoside, Diadzein, Trigonelline and Choline. (Dilkash., *et al*. 2016;) [50].	In a clinical study 46 patients with type II diabetes witnessed an improvement in clinical symptoms as compared to 23 controls. Furthermore, because trigonelline contributes to the browning of 3T3-L1 white adipocytes, thus contributed a significant role in reducing the obesity. In 3T3-L1 white adipocytes, trigonelline administration led to a significant elevation of the expression of BAT hallmark proteins, such as PGC-1α, PRDM16, and UCP1, as well as the genes that encode these proteins (Ppargc1α, Prdm16, and Ucp1). (Choi., *et al*. 2021) [51].

Table 2

Discussion

Single Unani drugs that are investigated for its anti-obesity effect are included in this paper. There are ten single unani drugs with their action, chemical constituents and mechanism of action are reviewed and given in Table 1 and Table 2.

In classical Unani literature these drugs are described as having anti-obesity effects including the reductions in body weight, body mass index, waist and hip circumferences, waist-hip ratio, skin fold thickness, and mid-upper arm circumferences. The metabolism-stimulating, desiccative, deobstruent, absorbent, anti-inflammatory, calorific, diuretic, antiphelegmatic, diaphoretic, demulcent, laxative, hypoglycaemic, hypolipidemic, antioxidant, and impending the digestion of fat properties of these medications are responsible for their anti-obesity effects.

In unani treatise it has been mentioned that the effect of these drugs is due to its Har yabis Mizaj (Hot and Dry Temperament). Because the obesity is due to excessive accumulation of Shahm (Fat) wa sameen that results in transformation of abnormal Barid ratab Mizaj (Cold and Wet Temperament) So as Ilaj Bi'l Didd these drugs act against the preponderance of fat and dissolves them.

According to Unani system of medicine obesity is a phlegmatic disease and the drugs that are mentioned above having the properties like Mudirr (Diuretic), Muhallil (Resolvent), Qata-e-Balgham (Concoctive of phlegm) can evacuate the Mawad-e-balghamiyah fasidah from the body thus resulting in the reduction of obesity.

These drugs are also studied on modern scientific parameter in various studies that are mentioned earlier. It is clearly evident that these drugs are very effective due to properties like lipase inhibitor, adipogenesis down regulator, producing thermogenesis, neuropeptide signalling modulator and also lipolytic effect that results in diminished fat absorption and lipogenesis.

Conclusion

The prevalence of obesity is becoming a major health issue on a global scale, but there is no effective treatment at this time. While the Unani system of medicine has a vast array of single and compound medications as well as regimens for the treatment of obesity. There are several plants that are mentioned in Unani system of medicine for the management of obesity. This paper attempts to identify numerous potent Unani weight loss single drugs through a systematic and well-designed review. An enhanced comprehension of the current evidence-based science on Single Unani medications will further direct a qualitative study project on obesity management that would entice end users with its efficacious benefits.

Thus, it is the need of the hour to re-evaluate the work done by Unani physicians in managing obesity. The claims made by Unani Scholars have recently received scientific validation in a few scientific studies. Thus, adopting this system to control the prevalence of obesity may be a better option.

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