

Egyptian Medicinal Plants and Weight Reduction

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Received: September 21, 2026; **Published:** October 29, 2026

Abstract

Medicinal plants are widely used as home remedies and raw materials in the pharmaceutical industry. The past decade has seen a significant increase in the use of herbal medicine. Medicinal plants have rare side effects and are relatively inexpensive. The prevalence of obesity is expanding rapidly worldwide, making the disease a global burden with limited treatment options. Many choosing drug trends suggest reducing weight and reversing metabolic disturbances of obesity by controlling appetite. Herbal medicinal plants played a greatest role to cure and prevent many diseases. The ingredients of these medicinal plants effected for their doing. The cheeping prices of these medicinal plants in comparing with the chemical one. The aim of this review article is clarification of many medicinal plants used to decrease weight. Such as *Allium sativa*, *Anisum pimpinella*, *Artemisia annua* L., *Camellia sinensis*, *Capsicum annum*, Ginseng, *Nigella sativa*, Seaweed, palm oil.

Keywords: Cheeping; Herbal Medicine; Ingredients; Side Effect; Weight

Introduction

Medicinal plants, which used in traditional medicinal science, have relatively minimal or no negative impacts and toxicity, and their applications have increased due to accessibility, affordability, and acceptable efficacy [1]. Obesity is the main and primary reason for various metabolic ailments according to the epidemiological evidence, such as hypertension, diabetes, and cardiovascular complications [2]. Obesity is a serious health issue causing numerous health impairments, such as musculoskeletal disorders, cardiovascular diseases, type 2 diabetes, and different types of cancer [3]. Vulnerability to COVID-19 increases due to obesity, because both diseases share common inflammatory/metabolic pathways [4]. During the pandemic, promotion of physical activity and prevention of obesity are as important as physical isolation of severely obese individuals [5]. Natural sources provide an advantageous basis for the development of novel anti-obesity products [6]. Food supplements and functional foods containing fruit extracts, vegetables, and herbal products also gaining increased attention as an important natural alternative to prevent metabolic syndrome and obesity [7]. This review article aims to introduce and survey the most important medicinal plants based on different traditional medicinal sciences containing chemical constituents with anti-obesity activities for the treatment and prevention of obesity. Plants used medicinally because of ethno botanical and ethno pharmacological research that examines their potential for curing and preventing a wide range of illnesses.

Allium sativa

The most studied species of *Allium* whose medicinal properties have known since ancient times include *Allium sativum* (garlic), *Allium cepa* (onion), *Allium ampeloprasum* var. *porrum* (leek), and *Allium ascalonicum* (shallot) [8]. Garlic known as a prebiotic food that is rich in sulfur-containing compounds such as allicin, allian, ajoenes, vinylthiins, and flavonoids such as quercetin [9]. Allicin (diallyl thiosulfinate) isolated from garlic extract is a lipid-soluble sulfur and natural food compound with numerous biological and medicinal functions. Garlic extract, specifically allicin, known for its weight loss properties, reduction of adipose tissue mass, and improvement of plasma lipid profile via the downregulation of multiple gene expressions involved in adipogenesis, along with the upregulation of mitochondrial inner membrane protein expression [10]. Moreover, *Allium* appears to affect the composition of gut microbiota. The gut microbiota, as a complex and dynamic microbial community plays an important role as a link between genes, environment, and immune system, and is associated with diseases such as obesity. Some studies have evaluated the effect of *Allium* and polyphenolic components on the gut microbiota composition [11]. However, since the effect of garlic extract on intestinal microbial composition varies in different health situations, it also evaluated in healthy obese individuals.

Anisum pimpinella

In Iran, seed extracts of *Pimpinella anisum* habitually used as aromatic, carminative, and disinfectant for hands, while against illnesses, they are used as analgesic in migraine and as a diuretic [12]. Further, the Aniseed plant has a dry and warm nature and used to increase menstruation, sweat, and urine secretion, as well as to make a good complexion. In central areas of Morocco, the *Pimpinella anisum* plant and extracts used for treatments for neurologic, digestive, gynecologic, and respiratory disorders [13]. In Southern areas, *Pimpinella anisum* used in phytotherapy mainly in urinary tract infections, principally against pyelonephritis and cystitis [14]. In Algeria, plant parts including seeds and leaves are habitually used against respiratory disorders, chronic uremic in Algerian inflammatory-malnutrition, and currently against COVID-19 infection [15]. In Turkey, seeds of *Pimpinella anisum* with herbal tea and used for weight loss [16]. In Italy, seeds of *Pimpinella anisum* used as flavoring in bread, sweet and meat dishes for carminative, digestive treatments [17]. Many studies illustrated that it could concluded that drought caused a significant decrease in the weight of thousand seed, germination energy, and total germination and content of essential oil in anise.

Artemisia annua L

Artemisia L. is one of the largest and most important aromatic and medicinal genera of the Asteraceae family and comprises more than 400 species [18]. The annual wormwood, *Artemisia annua* L., native to temperate Asia, has become endemic in a higher number of countries [19]. *Artemisia annua* is widely studied for its bioactive compounds, and its essential oils considered promising candidates for sustainable weed control due to their allelopathic activity. Essential oils known for their several modes of action against pests [20]. The main compounds detected in essential oils of *A. annua* in previous investigations include camphor, 1,8-cineole, and artemisia ketones, but the chemical composition varied in accordance with the geographic area, time of harvest, method of extraction, and part of the plant [21]. Furthermore, the scientific importance of this plant comes from its biologically active substances, such as sesquiterpenes and terpenoids (mainly monoterpenes in Essential oils) [22]. These phytochemical classes recognized for a wide variety of biological activities [23]. Cultivated annual wormwood, not only for Essential oil production, is certainly an interesting and promising product, given the various uses including agricultural ones. Despite their promising bioherbicidal potential, *A. annua* essential oils may pose toxicity risks to mammals if not properly formulated or dosed, which limits their direct use and requires further toxicological assessment [24].

Artemisia annua L. (*A. annua*, Sweet Annie) is traditionally renowned for its antimalarial properties; however, modern research has discovered multiple pharmacological effects, including antibacterial, antiviral, anticancer, anti-inflammatory, and antioxidant effects [25]. Notably, *A. annua* and its extracts have shown to eliminate free radicals and enhance antioxidant enzyme activity in both *in vitro* and *in vivo* studies, thereby improving oxidative balance and enhancing resistance to foreign pathogens [26]. Animal studies have yielded encouraging evidence of the beneficial impacts of *A. annua* extracts on oxidative stress parameters. For instance, dietary addition with *A.*

annua extract shown to enhance the liver antioxidant capacity and physiological parameters in *Micropterus salmonids* [27]. In rat models, the *A. annua* leaf extract further protected against oxidative damage by up-regulating antioxidant enzymes and reducing biomarkers of lipid peroxidation [28]. Moreover, recent findings suggested that the protective actions of *A. annua* involved the modulation of signaling pathways associated with cell survival and antioxidant responses [29].

Camilla sinensis

Green tea is a commonly used fat burner component proposed to enhance thermogenesis, energy expenditure, and fat oxidation [30]. The metabolic and fat burning potential of green tea mainly attributed to its dominant polyphenols, catechins [31]. A number of previous studies suggest that green tea has the potential to aid weight loss and alter components of lipid profile, including total cholesterol and LDL cholesterol. Zhang, *et al.* [32] indicated that habitual intake of green tea reduced body fat mass [32]. Although some studies did not find any association between green tea ingestion and obesity indices [33], weight reduction has been reported in some meta-analyses; for instance, [34] reported that green tea on its own may have a small impact on weight loss by a reduction of about 1 kg. This magnitude of the effect is too small to be clinically significant, as the threshold of minimal clinically important difference in fat loss, which defined as approximately a 2.5 kg loss [35]. Consequently, in a systematic review and meta-analysis [36] proposed that incorporating green tea, as a supplementary measure within weight-loss strategies that include caloric restriction and exercise training may be effective. Nevertheless, the current evidence is inconclusive, and it remains to be seen whether combining exercise training with green tea ingestion would yield greater effects than exercise training alone. Studies show that both EGCG and caffeine in *Camellia sinensis* leaf extract may help increase weight loss.

Capsicum annum

Chili pepper is generally used as a flavoring spice and is prominent in diets of various communities and cultures worldwide since 7000BC, with a long history of flavoring, coloring, preserving food, as well as medication [37]. In chili pepper, more than 200 active constituents have identified, and some of its active constituents play multiple roles in the whole body [38]. In addition to capsaicin as anti-obesity compound, other types of natural products have also shown to consider as anti-obesity compounds. Celastrol from roots of the thunder god vine can reduce appetite and food intake in mice that fed a high-fat diet [39].

Epidemiological data revealed that the consumption of foods containing capsaicin was associated with a lower prevalence of obesity [40]. In one double-blind, randomized, placebo-controlled trial, it indicated that treatment of overweight or obese subjects with 6 mg/day capsinoid for 12 weeks was associated with abdominal fat loss measured by dual energy X-ray absorptiometry. Body weight decreased as 0.9 and 0.5 kg in the capsinoid and placebo groups, respectively. [41] aimed to investigate whether capsaicin assists weight maintenance by limiting weight regain after weight loss of 5% to 10%. The results showed that capsaicin treatment caused sustained fat oxidation during weight maintenance compared with placebo [42], they added that enhanced lipid oxidation and increased energy expenditure are potentially beneficial for weight management.

Capsaicin, a vanillamide alkaloid derived from chili peppers, characterized by a strong irritant odor [43]. Modern pharmacological studies have demonstrated that capsaicin possesses multiple therapeutic effects, including anti-itch and analgesic properties, weight loss and lipid regulation, anticancer activities, antibacterial effects, blood pressure reduction, endocrine system regulation, and the protection of cardiovascular, cerebrovascular, and digestive systems. Consequently, capsaicin has potential applications in treating conditions such as neuropathic pain, arthritis, obesity, diabetes, and cancer [44].

Ginseng

Previous studies demonstrated that the crude saponin had an antiobesity effect [45]. Ginseng crude saponin contain a variety of bioactive saponins. Some pharmacological effects of ginseng verified as being due to different types of ginsenosides. For example, the

protopanaxadiol ginsenosides exhibit antioxidant activity, whereas the protopanaxatriol ginsenosides have efficacy in improving learning and memory [46]. The antiobesity activity of saponins, major active compounds isolated from crude saponin reported [47]. Meanwhile, it is appear that several ginsenosides, reduced induced obesity. Persuasive evidence suggests that gastrointestinal factors, including cholecystokinin and neuropeptide release, provide feedback that slows gastric emptying and regulates energy intake in response to combinations of intradermal fat and/or carbohydrate [48].

Other studies have shown that ginseng root extract significantly decreased body weight and adipose tissue mass in other animal models of obesity, such as Otsuka Long-Evans Tokushima fatty rats [49]. In addition, [50] noticed that fat mass and inhibits obesity in mice. Based on the ability of decreasing body weight and adipocyte size and inhibition obesity by regulating the expression of adipogenesis-associated genes.

Two studies showed that ginseng berry extracts exhibit potent antihyperglycemic and antiobesity effects in obese animal models [51]. Interestingly, a recent study showed that a wild ginseng ethanol extract had preventive effects against diabetes and obesity [52].

Nigella sativa

Nigella sativa is a medicinal herb that belongs to the Ranunculaceae family and has been used for many years for several medical purposes, including fungal infections, rheumatoid arthritis, digestive disorders, diabetes mellitus, and dyslipidemia, particularly in Asia and Africa [53]. Other beneficial effects of *N. sativa* have been reported in previous studies, including hypoglycemic, 11 anti-hyperlipidemic, antihypertensive, antioxidant, and anti-inflammatory effects [54]. In fact, *N. sativa* consists of some bioactive components, including thymoquinone (TQ), thymol, and lipase enzyme that are probably responsible for its anti-obesity effects [55]. Some animal studies reported that *N. sativa* could decrease body weight by lowering appetite and increasing energy expenditure. Some studies reported that *N. sativa* has a weight-reducing effect [56], while other studies failed to show its positive effects on body weight.

Seaweed

Seaweed, especially kelp *Laminaria*, which is a good source of dietary fiber; the soluble fibers consist of alginates, laminarin glucan, and fucoidan, whereas the insoluble fiber is essentially cellulose [57]. Seaweed is an important dietary component for people in Japan: it served in approximately 21% of meals [58]; however, the daily median consumption per person reported to be 1.2 g/d, and the contribution of dietary fiber intake from seaweed to total dietary fiber intake was only 0.4 g/d [59]. These results suggest that the consumption of dietary fiber-rich seaweed could increase in the Japanese diet. The major seaweeds consumed that the consumption of seaweeds has reported to affect both health status and chronic disease: several studies have reported a relationship between seaweed intake and risk reduction in cardiovascular disease [60], metabolic syndrome [61], and type 2 diabetes [62]. In addition, effects of seaweed and seaweed extract intake on digestive tract health [63], bone health [64], as well as antiviral properties [65], have reported; however, there are few reliable human studies. Seaweed also contains bioactive compounds with high antioxidant capacity, such as carotenoids and polyphenols [66]. Reports have shown that fucoxanthin, from different types of seaweed, has anti-inflammatory and anti-obesity effects [67].

Oolong tea

Oolong tea is a kind of partially fermented Chinese tea, and it considered to have a stronger weight loss effect than any other kinds of tea. Previous research has shown that Oolong tea leaves could remarkably decrease rats' body weight [68]. During storage, the fillings of tea polyphenols, soluble sugar, and other ingredients changed [69]. As these ingredients are the material basis of Oolong tea anti-obesity and anti-inflammation effects, it is reasonable to speculate that the physiological effects of it would change with storage as well.

Furthermore, Oolong tea also has variety of health gains, especially the regulation of metabolic disorders [70] and found that the flavins from it decreased serum triglycerides and elevated vassel fat excretion in animal models. Two clinical studies illustrated that Oolong

tea significantly inhibited weight gain and lipid accumulation and promoted antioxidant and hepatoprotective activities [71]. In addition, they added that Oolong tea induced obesity in mice.

Palm oil

Several recent studies have examined the impact of different dietary oils on body weight, including palm oil [72], considering the varying constituents present in these oils that are associated with adiposity. For instance, several studies have reported an inverse association between omega-3 polyunsaturated fatty acids and weight gain due to its effects on fat oxidation [73], and postprandial satiety in the overweight and obese people [74]. However, further to the above postulated positive effect of oil constituents on body weight, certain fatty acid constituents known to have a negative impact. For example, the consumption of saturated fat has consistently linked with the development of obesity [75]. Furthermore, long chain saturated fatty acids like those that myristic, palmitic, and lauric acid found in both palm and coconut oils have linked with weight gain when compared with short-chain saturated fatty acids and unsaturated fatty acids like oleic acid [76]. Therefore, due to the high content of saturated fatty acids, it could postulated that palm oil and coconut oil, when consumed regularly increases the risk of obesity [77].

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Volume 17 Issue 8 October 2026

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