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Obesity, Herbal Supplements, and Weight Loss: A Narrative Review of Efficacy and Safety

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ABSTRACT

Obesity and its associated comorbidities have become a major global public health concern, imposing a substantial burden on healthcare systems and socioeconomic structures. Although lifestyle modifications, including healthy dietary patterns, regular physical activity, and behavioral approaches, constitute the cornerstone of weight management, poor long-term adherence often leads individuals to seek alternative strategies. In this context, herbal supplements are widely used for their purported anti-obesity properties.This narrative review examines the mechanisms of action, efficacy, and safety profiles of several commonly used herbal supplements. Ginger has been associated with thermogenesis and appetite regulation; however, current findings remain inconsistent. Dandelion exhibits antioxidant and anti-adipogenic properties, yet human studies confirming these effects are limited. Garcinia cambogia may provide modest short-term weight loss, while concerns regarding hepatotoxicity persist. Guar gum and partially hydrolyzed guar gum may enhance satiety and improve lipid profiles; however, their roles in long-term weight control remain unclear. Guarana and yerba mate may offer metabolic and cardiovascular benefits due to their caffeine and polyphenol content, but further clinical evidence is required to substantiate these effects. Opuntia ficus-indica fiber extracts may promote modest weight reduction by increasing fecal fat excretion, although gastrointestinal adverse effects have been reported. Green tea, particularly its catechin epigallocatechin-3-gallate (EGCG), exerts multiple mechanisms affecting adipogenesis and energy metabolism, with hepatotoxicity mainly associated with concentrated extracts. Overall, while these supplements demonstrate various biological activities, evidence supporting their long-term effectiveness in weight management is limited. Sustainable lifestyle modifications remain the most reliable and effective strategy for obesity prevention and treatment.

Obezite, Bitkisel Takviyeler ve Vücut Ağırlığı Kaybı: Etkinlik ve Güvenliğe İlişkin Anlatımsal Bir Derleme

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ÖZET

Obezite ve buna eşlik eden komorbiditeler, günümüzde küresel ölçekte önemli bir halk sağlığı sorunu haline gelmiş ve sağlık sistemleri ile sosyoekonomik yapılar üzerinde ciddi bir yük oluşturmuştur. Sağlıklı beslenme düzeni, düzenli fiziksel aktivite ve davranışsal yaklaşımları içeren yaşam tarzı değişiklikleri vücut ağırlığı yönetiminin temelini oluştursa da, uzun dönemli uyumun yetersiz olması bireyleri sıklıkla alternatif stratejilere yöneltmektedir. Bu bağlamda, bitkisel takviyeler, iddia edilen anti-obezite özellikleri nedeniyle yaygın olarak kullanılmaktadır.Bu anlatımsal derleme, yaygın olarak kullanılan bazı bitkisel takviyelerin etki mekanizmalarını, etkinliklerini ve güvenlik profillerini incelemektedir. Zencefil, termojenez ve iştah düzenlenmesi ile ilişkilendirilmiş olsa da mevcut bulgular tutarsızdır. Karahindiba antioksidan ve anti-adipojenik özellikler göstermekte, ancak bu etkileri doğrulayan insan çalışmaları sınırlıdır. Garcinia cambogia kısa vadede mütevazı bir vücut ağırlığı kaybı sağlayabilmekte, buna karşın hepatotoksisiteye ilişkin endişeler devam etmektedir. Guar gam ve kısmen hidrolize guar gam tokluk hissini artırabilir ve lipid profillerini iyileştirebilir; ancak uzun dönem vücut ağırlığı kontrolündeki rolleri net değildir. Guarana ve yerba mate, kafein ve polifenol içerikleri sayesinde metabolik ve kardiyovasküler faydalar sunabilir, ancak bu etkilerin doğrulanması için ek klinik kanıtlara ihtiyaç vardır. Opuntia ficus-indica lif özleri, dışkı yoluyla yağ atımını artırarak mütevazı kilo kaybına katkıda bulunabilirken, gastrointestinal yan etkiler bildirilmiştir. Yeşil çay ve özellikle epigallokateşin-3-gallat (EGCG), adipogenez ve enerji metabolizmasını etkileyen çoklu mekanizmalar sergilemekte olup, hepatotoksisite esas olarak yoğunlaştırılmış ekstrelerle ilişkilendirilmektedir. Genel olarak, bu takviyeler çeşitli biyolojik aktiviteler gösterse de, vücut ağırlığı yönetiminde uzun vadeli etkinliklerini destekleyen kanıtlar sınırlıdır. Obezitenin önlenmesi ve tedavisinde sürdürülebilir yaşam tarzı değişiklikleri en güvenilir ve etkili strateji olmaya devam etmektedir.

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INTRODUCTION

In recent decades, obesity has emerged as a growing global health concern, affecting people around the world. Projections indicate that by the year 2030, 38% of the global population will be overweight, and an additional 20% will be obese (Safaei et al., 2021). The treatment of obesity typically divided into five categories: dietary therapy, physical activity, behavior therapy, pharmacotherapy and weight loss surgery (Wiechert & Holzapfel, 2021). Herbal supplements have emerged as an appealing alternative to conventional therapies due to consumers' desire for quick and accessible weight loss options (Bonetti et al., 2022; Dastjerdi et al., 2018). These supplements are not considered drugs, enabling their sale without clinical evidence. Consequently, it is estimated that approximately half to two-thirds of adults use these products, resulting in an annual expenditure of about 37 billion dollars on supplements in the USA (Apong, 2016; Shanahan & de Lorimier, 2016). Given the current situation, the aim of this article is to review the proposed mechanism of action, evidence of efficacy and safety of some of the commonly consumed herbal supplements.

METHODS

This research is a narrative review of the literature. Peer-reviewed articles were determined using Web of Science, PubMed, and Science Direct databases. This review included in vitro and in vivo research with fully published manuscripts in English, covering years between 2015 and 2025. The following keywords were used: "*ginger*" OR *"zingiber officinale"* OR *"dandelion"* OR *"taraxacum officinale"* OR *"malabar tamarind"* OR *"garcina cambogia" OR "cyamopsis tetragonoloba"* OR *"guar gum"* OR *"paullinia cupana"* OR *"guarana"* OR *"ilex paraguariensis"* OR *"yerba mate"* OR *"opunthia ficus indica"* OR *"camellia sinensis"* OR *"green tea"* OR *"epigallocatechin-3 gallate*" AND "obesity" AND "weight loss" AND "obesity treatment" AND "anti-obesity". The authors analyzed titles, abstracts, and finally the full texts of the articles, separately. For each supplement as a result of this process, numerous in vitro and in vivo studies were identified. This research does not require Institutional Review Board (IRB) approval as it did not involve primary data collection from human subjects. Additionally, since it was compiled as a narrative review, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol was not followed.

RESULTS AND DISCUSSION

In this section, we outline the key findings from studies on herbal supplements and consider their potential role in obesity management. For each herbs, we provide a summary of the available evidence on mechanisms of action, efficacy, and safety, together with a critical discussion of the main strengths and limitations reported in the literature (Table 1).

Table 1
Summary of herbal supplements

Herbal supplements	Bioactive Ingredients	Proposed Mechanism of Action	Evidence of Efficacy	Research findings	Evidence of Safety	Reported adverse effects	Ref
Ginger *(Zingiber officinale)*	Gingerol, paradol, and shogoal	Increases thermogenesis, reduces appetite and insulin levels	Varied clinical trials of different methodological quality on animals.Very few research in humans	Possible effect on resting metabolic rate and body fat	Some safety concerns reported	Heartburn, gastric irritation, and could cause allergic reactions	(Foshati et al., 2023; Ozkur et al., 2022; Zhang et al., 2021)
Dandelion (*Taraxacum officinale)*	Terpenes, phenols and flavonoids	Suppresses adipocyte differentiation and lipid accumulation, inhibits pancreatic lipase	Small clinical trials, mostly in vitro.	No consequence on body weight	No safety trouble reported. 2–8 g/day of dried root or 2–5 mL of tincture	None known	(Kania-Dobrowolska & Baraniak, 2022; Li et al., 2022; Mou et al., 2025)
Garcinia cambogia	Hidroksisitrik asitin (HCA)	Restrains lipogenesis, limits food intake	Many short-term clinical trials of different methodological quality	No result on body weight	Safety concerns commonly not reported at doses less than 2800 mg/day.	Toxic effects of HCA at high dose (2000–3000 mg/day)	(M et al., 2022; Noreen et al., 2023; R. B. Semwal et al., 2015)
Guar gum *(Cyamopsis tetragonolobus)*	Polysaccharides of galactomannans	Acts as bulking agent in gut, prolong feelings of satiety and fullness, delays gastric emptying	Many clinical trials of efficient methodological quality	No result on body weight	Few safety concerns reported. Daily doses ranging from 7.5 g to 21 g	Nausea, flatulence, cramps, and diarrhea	(Mudgil et al., 2014; Hussain et al., 2023; Setayesh et al., 2023)
Guarana (*Paullina cupana)*	Methylxanthin, guaranin, and caffeine	Stimulates central nervous system, raise thermogenesis	Different clinical trials of combination products	Possible small result on body weight	Significant safety concerns accused at high doses (more than 400 mg/day)	Nervousness, irritability, vomiting, anxiety, and tachycardia	(Hack et al., 2023; Torres et al., 2022)
Yerba-mate *(Ilex paraguariensis)*	Chlorogenic acid, caffeine, and obromine	Hypolipidaemic action, inhibits pancreatic lipase, anti-inflammatory effect, and decrease insulin level	Numerous clinical trials of different methodological quality on animals.	Little to no result on body weight	No safety concerns reported. 1–2 g per cup, or 500–1000 mg extract daily)	None known	(de Vasconcellos et al., 2022; Gerber et al., 2023; Sirotkin, 2024)
Opunthia ficus indica	Betalains (phenolic compound)	Anti-diabetic effects. Decrease body fat, blood pressure and total cholesterol	Limited and small sampled clinical trials.	No consequence on body weight	Some safety concerns reported 500–1,200 mg/day extract or 100–300 g fresh plant	Diarrhea, nausea, increased stool volume and increased stool volume	(Giraldo-Silva et al., 2023)
Green tea (*Camellia sinensis*)	Polysaccharides, caffeine and catechins	Enhance fat oxidation and energy expenditure, decrease lipogenesis and fat absorption	Many clinical trials of efficient methodological quality on green tea (in different forms)	Possible small effect on body weight	Significant safety concerns accused for green tea extract (not as beverage (2–3 cups/day or 250–800 mg extract)	Nausea, constipation, raised blood pressure, hepatotoxic	(James et al., 2023; Kciuk et al., 2023)

Ginger

Ginger is the underground part (also known as rhizome) of the *Zingiber officinale* plant and originates from South China (Kiyama, 2020). Ginger rhizomes are used as a therapeutic agent to treat a variety of health problems worldwide for over a thousand year (Munda et al., 2018). Ginger has thermogenic, anti-hypertensive, glucose-sensitizing, antidiabetic, anti-hyperglycemic, antioxidant, anti-inflammatory and stimulatory effects (Mohamed, 2014; Munda et al., 2018; Srinivasan, 2017). Recently ginger has gained popularity due to anti-obesity claims (Ebrahimzadeh Attari et al., 2018). Ginger's anti-obesity effects could be due to two different mechanisms. Firstly, it might be decreasing appetite and overall energy intake by altering gastric emptying and motility (Preciado-Ortiz et al., 2025). A systematic review study showed increased antral contraction rates and decreased half emptying time (Nikkhah Bodagh et al., 2019). Some studies showed faster gastric emptying, leading to increased satiety through fast delivery of nutrients to the intestine, which in turn stimulates the release of satiety hormones (Aregawi et al., 2023; Nikkhah Bodagh et al., 2019). Secondly, it might be increasing overall energy expenditure due to its thermogenic action (Macit et al., 2019). Active constituents of ginger like gingerol and shogaol increase basal metabolic rate, enhance the oxidation of fats, and decrease fat absorption in intestines (Ebrahimzadeh Attari et al., 2018; Preciado-Ortiz et al., 2025).

A study showed both dry and fresh ginger intake resulted in increased oxygen consumption due to gingerol homologs' (zingerone, 6-gingerol, 8-gingerol) thermogenic effects. In that experiment, administration of ginger extract at 100–400 mg/kg doses significantly enhanced mitochondrial biogenesis and AMPK-PGC1α pathway activation. However, high doses (≥400 mg/kg) were reported to cause disruption of mitochondrial function (Deng et al., 2019). In a study, 3T3-L1 preadipocyte cell differentiation is inhibited by 6-gingerol through decreasing the Akt/GSK3β pathway. Therefore adipogenesis and accumulation of cytoplasmic lipid droplets are suppressed (Tzeng & Liu, 2013). A ginger supplementation study showed suppression of high fat diet induced obesity and suggested that ginger may be a promising complementary treatment against obesity (Hong et al., 2023). However, a considerable reduction in metabolic rate was shown rapidly after an intraperitoneal injection of 6-gingerol (25 mg/kg) in rats. In addition, rats given ginger-added meal (%2) for 5 days did not change body temperature or physical activity (Ozkur et al., 2022).

Ginger is used for the treatment of metabolic syndrome and diabetes (Zhu et al., 2018). Dietary ginger significantly improved HbA1c over time in patients with type 2 diabetes mellitus (T2DM), suggesting potential benefits for long-term glucose control (Huang et al., 2019). A recent study investigated the effects of 6-gingerol on weight gain and insulin resistance in rats with Metabolic Syndrome (MetS). It showed promise in reducing weight gain and insulin resistance through the modulation of adipocytokines (Gunawan et al., 2023). A recent systematic review and meta-analysis observed notable reductions in fasting blood sugar, HbA1C, systolic blood pressure, and diastolic blood pressure among patients with T2DM who received ginger supplementation compared to those in the control group (Ebrahimzadeh et al., 2022). Although there is some data showing the efficacy of ginger, safety should be evaluated closely (Singletary, 2023). Ginger can inhibit thromboxane synthetase and increase time of bleeding which can be dangerous if used with anticlotting drugs(Talasaz et al., 2025). However, there is some contradictory data. A systematic review aimed to assess the potential effect of ginger on platelet aggregation in adults compared to either placebo or baseline data. Ten studies were included, comprising eight clinical trials and two observational studies. Four clinical trials reported a reduction in platelet aggregation with ginger, while four others found no effect. The two observational studies also had mixed findings. Methodological variations and moderate risks of bias were observed in the studies. Overall, the evidence on the impact of ginger on platelet aggregation and coagulation remains inconclusive, warranting further research (Marx et al., 2015). In most studies, ginger was administered at daily doses of 2–6 g of dried ginger powder or 160–500 mg of standardized extract, and while generally well tolerated, higher intakes may increase bleeding risk in individuals taking anticoagulant drugs. Further studies in humans are required to evaluate the safety and efficacy of ginger.

Dandelion

Dandelion (*Taraxacum Officinale*), also known as lion's tooth, telltime and blow ball, is a plant from the Asteraceae (Compositae) family (Rodriguez-Casado, 2014). Although its origin is in Europe, it can also be seen in the temperate region of the Northern Hemisphere (Grauso et al., 2019; Rodriguez-Casado, 2014). All parts of the plant can be used in various food products and beverages such as salad (leaves), coffee (roasted roots) or soft drinks (dried flowers) (Rodriguez-Casado, 2014). Furthermore, the traditional consumption of dandelion as an herbal remedy is widespread throughout the world due to its beneficial effects on human health (Lis & Olas, 2019; Olas, 2022). Experimental trials and traditional knowledge suggest that dandelion may also have an anti-obesity effect (Kania-Dobrowolska & Baraniak, 2022; Lis & Olas, 2019). A recent study investigated the anti-obesity properties of dandelion extracts. The 60% ethanolic extract showed significant antioxidant and anti-obesity effects in vitro. Valuable secondary metabolites were identified, and in vivo tests on obese mice confirmed positive impacts on lipid profile and obesity biomarkers. Dandelion could be a promising natural approach for obesity management (Kania-Dobrowolska & Baraniak, 2022). Similarly, another in vitro study also demonstrated that dandelion suppressed preadipocyte alteration, reduced lipid accumulation and regulated several gene and non-coding RNA expressions that are important in the control of adipogenesis. Additionally, it was suggested that dandelion participates in adipogenesis and lipid metabolism, making it another option for the treatment of obesity due to its therapeutic properties (Tanasa et al., 2025). However, there are also some opposing findings to those mentioned above. A recently published in vitro study showed that dandelion given as a part of a combined dietary supplement did not have a notable effect on pancreatic lipase, a major enzyme related to metabolic syndrome. Both *Cynarascolymus* and *Taraxacum officinale*, two of the components of this supplement, inhibited pancreatic lipase only by 17-20% at the highest concentration (100 μg/mL) (Villiger et al., 2015). Dandelion also has other biological properties such as choleretic, diuretic, anti-rheumatic, and anti-inflammatory effects, and it has been historically used in alternative medicine against diseases like cancer, hepatic disorders, and inflammation (Gonzalez-Castejon et al., 2012; Lis & Olas, 2019). A molecular study investigating the TRAIL (TNF-related apoptosis inducing ligand)-based anti-cancer therapies suggested that dandelion plays an important part in TRAIL-induced apoptosis and could be a novel TRAIL sensitizer in cancer treatment (Mou et al., 2025).

Different studies also suggested that dandelion root components have a selective impact on cancer cell without any toxic effects to other cells (Rehman et al., 2017; Wang et al., 2019). In these studies, dandelion root extract was used at concentrations ranging from 2 to 10 mg/mL in vitro, which effectively induced apoptosis in cancer cells while showing minimal toxicity to normal cells. Dandelion may have some significant benefits on human health, however, further controlled human studies supporting the potential effect of dandelion are needed.

Garcinia Cambogia

Garcinia Cambogia (*Malabar tamarind*) is an important source of hydroxycitric acid (HCA) and originates in Southeast Asia (R. B. Semwal et al., 2015). Garcinia cambogia fruits have been used for therapeutic purposes for centuries particularly in East India (Noreen et al., 2023). The dried fruit rind is commonly used as a traditional medicine in many Asian countries for treating piles, constipation, rheumatism, edema, intestinal parasites and irregular menstruation (Ruchi Badoni Semwal et al., 2015). The fruit contains high amounts of HCA (approximately 10 to 30% citric acid)(H. Baky et al., 2022). Several studies have reported its anti-obesity effect (Golzarand et al., 2020; Haber et al., 2018; Jamila et al., 2019; Y.-J. Kim et al., 2013; Li et al., 2015). A study has reported that HCA administration appeared safe for weight-loss purposes, because it does not stimulate the central nervous system (Haber et al., 2018). HCA inhibits ATP citrate lyase, which is the primary enzyme for the formation of cytosolic acetyl-CoA in many tissues that represents an essential step in fatty acid biosynthesis (Vasques et al., 2014).

A meta-analysis that included twelve studies reported a small but clinically significant difference in weight loss due to short-term Garcinia extract administration, with dosages ranging from 1 g to 2.8 g daily for an average of 8 weeks (Onakpoya et al., 2011). Despite promising literature, there are some inconclusive data on the obesity management effects of Garcinia cambogia (Maunder et al., 2020). A clinical trial studying the short term administration of Garcinia cambogia extract, did not show any significant change on the blood lipid profile (except for triglycerides) or on the anthropometric and calorimetric characteristics (Vasques et al., 2014). Many studies have suggested the need to determinate the mechanism of the anti-obesity effects of Garcinia/HCA (Chong, Beah, et al., 2014; Kauser et al., 2014; Y. J. Kim et al., 2013). Clinical trials seem to have inconclusive data on anti-obesity effects of Garcinia cambogia/HCA. Furthermore, its safety and toxicity should be considered in clinical studies. Data from animal and human studies suggests that up to 2800 mg/day of HCA can be safe for human consumption, but some studies indicated toxic effects of HCA, especially hepatotoxicity effects observed in doses exceeding 2000–3000 mg/day in certain reports (Andueza et al., 2021; H. Baky et al., 2022). However, further studies are necessary to investigate its efficacy and safety.

Guar Gum

Guar gum (GG) is a soluble dietary fiber derived from the seeds of guar or Cyamopsis tetragonoloba, an annual legume (Hu et al., 2011). Approximately 90% of the world's guar is cultivated in India and Pakistan, where the guar bean is consumed as a legume, fed to cattle, or used as manure (5Mudgil et al., 2014). GG is composed of a main chain containing 1,4-linked β-D-mannopyranosyl units with side chains of single 1,6-linked α-D-galactopyranosyl groups attached to it (5Mudgil et al., 2014; Hu et al., 2011). GG appears as a white to yellowish-white, almost odorless powder (Hu et al., 2011). It can be dissolved in water without heating and forms a highly viscous solution. Consequently, GG is utilized as a natural food ingredient in various food products for stabilization purposes (Garg & Gupta, 2023). Additionally, it is commonly taken in supplement form and can be easily incorporated into liquid-based products, such as juices, yogurt, soups, and enteral formulas (Noack et al., 2013). However, its high viscosity can limit its applications in certain foods, especially liquid-based ones (George et al., 2019). Partially hydrolyzed guar gum (PHGG) was developed to facilitate the incorporation of GG into the diet while providing a dietary fiber source that would be acceptable to consumers (Cantón Blanco et al., 2017). PHGG was obtained by enzymatic hydrolysis of GG, has the same chemical structure and similar biological function with intact GG. However, the molecular weight of PHGG is 10 times lower than that of GG (Kapoor et al., 2017). PHGG is almost colorless, tasteless, and odorless, and it is highly soluble in water (Hu et al., 2011). The Institute of Medicine proposed a new definition for fiber known as functional fiber (Hussain et al., 2023). According to this definition, functional fibers are isolated, non-digestible carbohydrates that promote physiological benefits in humans. They are commonly added to foods or provided as supplements. Isolated fiber supplements may play an adjuvant role in supporting the health benefits of high-fiber foods. The caloric value of PHGG ranges between 1.6 and 1.9 kcal/g (6.7 and 7.9 kJ/g) (Finley et al., 2013). GG and PHGG are resistant to the digestion in the small intestine but are easily fermented by anaerobic bacteria in the large intestine. The physiological beneficial effects of GG and PHGG are commonly attributed to their gel forming properties (Santas et al., 2012). Amelioration of glycemic response, decline in serum cholesterol levels, increment of satiation, maintenance of intestinal microflora balance, improvement of atrophy of terminal ileum villi, reduction of the incidence of the diarrhea, treatment of constipation are one of the main physiological functions of GG and PHGG (Fiszman & Varela, 2013; H. Baky et al., 2022; Kapoor et al., 2017). Dietary fiber, particularly GG have a part in the weight management and counteracting obesity. Mechanism behind weight management by GG is due to increment of satiation, a decrease in food consumption/energy intake and an increase in fecal fat and energy excretion (5Mudgil et al., 2014; Fiszman & Varela, 2013; Santas et al., 2012). It is further concluded that more viscous fiber may be more successful in promoting satiety. Satiety and satiation are basic notions in the comprehension of appetite control and regulation of eating behavior in the short and long term. Satiation occurs throughout the eating occasion and prompts the termination of eating. Satiety describes the fullness that persists after eating and prevents further eating before getting hungry (Bellisle et al., 2012). The various sensory-cognitive influences induce short-term satiety while post-ingestive and post-absorptive factors provoke mid and long-term satiety. However, they team up to create synergy (Van Kleef et al., 2012). Soluble viscous fiber, such as GG, may slow down enzyme activity and stomach emptying resulting in delayed glucose absorption and an enhancement of satiety. An augmentation of satiety and a decline in energy intake could be effective for short-term weight loss and long-term weight maintenance (Fiszman & Varela, 2013; Garcia-Alvarez et al., 2016). Equivocal findings demonstrated regarding to the effects of GG or PHGG on food intake, satiety and/or weight loss in human studies. In a five-week prospective, randomized, double-blind study which was conducted among obese healthy females, a hydrolyzed GG fiber supplement (20 g/day) produced a increased postprandial cholecystokinin response, but did not modify other satiety hormones or increase satiety ratings, in either the fasting or the postprandial state (Gembe-Olivarez et al., 2023). Supplementation of a semisolid meal with GG mitigated the increment on hunger, appetite and desire to eat; whereas measurements of appetite were increased in the other treatments (some of them were statistically significant). Addition of the GG (2%) to glucose (30%) drink contributed to a significant improvement on satiation and satiety in healthy men (Karkkainen et al., 2015). In other study in non-obese male volunteers, adding of 3% GG to a high-fat soup was more effective on satiety than adding to a low-fat soup. Furthermore, the satiating effect of GG supplementation to a high-fat meal was not linked with slowing down the gastric emptying rate, whereas addition of it to a low-fat counterpart was related (Rather et al., 2017). The meta-analysis of eleven trials (treatment periods ranging between 3-24 weeks) indicated a non-significant difference associated with amount of weight loss in patients taking GG (daily dose ranging from 9.0 g to 30.0 g) compared with patients taking placebo (Ahmed & Abass, 2021). GG appears to have a positive metabolic effect on glucose and lipid abnormalities (Dall'Alba et al., 2013). In a meta-analysis of clinical trials, one gram of GG decreased the total cholesterol by 1.13 mg/dLand the low density lipoprotein (LDL) cholesterol by 1.20 mg/dL(Marshall et al., 2012). Also, PHGG down regulated the expression of some genes which is involved in cholesterol esterification and absorption in small intestine (Santas et al., 2012). Several studies exploring the acute effects of GG intake on postprandial glucose levels and/or insulin levels were conducted (Derosa et al., 2022; Lewis-Smith et al., 2016). In the scientific report of European Food Safety Authority (EFSA), related to health claims of GG, the panel stated that it isn’t possible to come to a decisive conclusion with reference to studies assessing the long-term maintenance or attainment of blood glucose target. The safety assessment of GG was performed by internationally recognized committees and GG is considered generally recognized as safe (GRAS) regarding to a food substance since 1974 (Mortensen et al., 2017).

GG consumption can cause intolerable gastrointestinal complaints, notably flatulence, diarrhea and abdominal pain in some patients (Garg & Gupta, 2023). The pharmacokinetics of certain drugs (e.g. some oral antidiabetics, penicillin V and oral contraceptives) may be impressed by a clinically significant degree. Furthermore, the safety of GG when used as an appetite suppressant has been questioned. It is claimed that premature swelling of GG tablets may occur and cause obstruction of or damage to the esophagus. Concordantly, appetite suppressants containing GG in tablet form are some of the banned or restricted products in the European Union. However, appetite suppressants containing microgranules of GG are claimed to be safe. In food applications, an acceptable daily intake of GG has not been specified by the WHO. In conclusion, the use of guar gum for weight loss should be discouraged because of its lack of efficaciousness. Particularly the use of GG only as an anti-obesity agent. GG and other fiber agents may have a role, nevertheless, in obese patients for the treatment of comorbidities such as glucose intolerance, diabetes, and hyperlipidemia.

Guarana

Guarana (Species: *Paullinia cupana*), also known as Brazilian Cocoa or Zoom, is native to Amazon region. Widely used as a stimulant, guarana is also used therapeutically for headache, fever, and cramps (Schimpl et al., 2013). Guarana seeds are primarily composed of methylxanthines, including caffeine, theobromine, and theophylline. In addition, they contain a high proportion of polyphenols and catechins (Hamerski et al., 2013; Kleber Silveira et al., 2018). Notably, guarana seeds contain a very high dose of caffeine (2 to 8%), which is 3 to 5 times higher than that found in a Coffea Arabica bean (Hamerski et al., 2013). Guarana has multiple pharmacological activities, including promoting weight loss (Bortolin et al., 2019), improving cognitive performance (Scholey et al., 2013), protecting against DNA damage, acting as an antidepressan, and possessing antioxidant, antibacterial, and antifungal properties (Basile et al., 2013; Dalonso & Petkowicz, 2012; Lima et al., 2019; Portella Rde et al., 2013). Due to claims of weight loss, the use of caffeine-containing beans like guarana has significantly increased in recent years (Pendleton et al., 2012). Guarana extracts are used for weight loss in the forms of tablets, powder, or pure (Hamerski et al., 2013). The first epidemiological study investigating the prevalence of metabolic disease and habitual guarana consumption in an elderly Amazonian population showed a lower disease rate, but there were methodological limitations (Krewer Cda et al., 2011). Guarana provides similar efficacy to caffeine and is used as an ergogenic aid for enhancing athletic performance (Pomportes et al., 2019). However, consumption of 10 g pure caffeine/guaranine as a single dose may be fatal (Burke et al., 2011). Adverse effects attributed to guarana due to the high caffeine content (400 mg or more) may include nervousness, irritability, insomnia, restlessness, tachycardia, tremors, anxiety, chest pain, increased urination, arrhythmia, decreased bone mass, and stomach problems (Rath, 2012). Guarana is considered for its weight loss effect due to its high proportion of caffeine; however, there is no evidence supporting the positive effect apart from that. Moreover, excessive intake of guarana has similar effects to caffeine overdose, thus attention should be paid to its use.

Yerba Mate

Yerba mate, also known as *Ilex paraguariensis*, originates from South American countries like Paraguay, Uruguay, Argentina, and Southern Brazil. The leaves of this tree are globally consumed as a beverage and used as an ingredient in formulated foods and supplements (Burris et al., 2012; Riachi & De Maria, 2017). Yerba mate is composed of xanthines (caffeine and theobromine), polyphenols (chlorogenic acid), flavonoids (kaempferol, quercetin, and rutin), purine alkaloids (caffeic acid, 3,5-dicaffeoylquinic acid, 3,4-dicaffeoylquinic acid), amino acids, minerals (calcium, phosphorus, and iron), and vitamins (B_1, B_2, C) (Burris et al., 2012)**.** Highly popular for its stimulant and medicinal properties, yerba mate has been reported to provide cardiovascular benefits through its hypocholesterolemic properties, decrease liver damage, stimulate the central nervous system, and act as a diuretic and antioxidant (Godfrey et al., 2013; Riachi & De Maria, 2017)**.** Furthermore, yerba mate, either on its own or in combination with other ingredients such as green tea and guarana, has been associated with weight loss (Godfrey et al., 2013). In a cell culture study, treating 3T3-L1 adipocytes with a polyphenol extract of dried yerba mate leaves was reported to inhibit triglyceride accumulation (Gosmann et al., 2012). In animal studies, supplementation with yerba mate extract in highfat dietfed rats has shown significantly decreased visceral fat, body weight, blood and hepatic lipid, insulin, glucose, and leptin levels (Gambero & Ribeiro, 2015). Another study showed a greater decrease in body fat percentage and fat mass in the group using the yerba mate extract for 6 weeks compared to the placebo group (Kim et al., 2012). Furthermore, in vitro studies have determined that yerba mate regulates the expression of genes involved in adipogenesis and suppresses pancreatic lipase activity (Hussain et al., 2023; Sirotkin, 2024). In rats, the anti-obesity effects of 1 g/kg/day yerba mate extract have been demonstrated (de Meneses Fujii et al., 2014). The cardiovascular benefits of yerba mate have been shown in many studies (Bravo et al., 2014; Gao et al., 2013; Pimentel et al., 2013). After a high-cholesterol diet, yerba mate consumption has been shown to have a hypolipidemic action, decreasing triglyceride, total, and LDL cholesterol levels in hypercholesterolemic rats (Bravo et al., 2014). Furthermore, aqueous yerba mate tea extract has been reported to reduce endothelin and thromboxane B2 levels and to reduce vascular endothelial cell damage (Gao et al., 2013). In a study, yerba mate tea (5 g/day) was administered for 6 weeks to volunteers who have high blood viscosity. Parameters of blood viscosity and microcirculation enhanced in yerba mate tea group (Yu et al., 2015). Yerba mate tea treatment on dyslipidemic patients increased plasma and blood antioxidant protection (Boaventura et al., 2012). Long-term consumption of yerba mate tea has been shown to decrease serum lipid peroxidation, glycaemia, and HbA1c in T2DM and pre-diabetic subjects (Boaventura et al., 2013). Another study found that consumption of roasted yerba mate tea three times a day significantly reduced blood fasting glucose, HbA1c, and low-density lipoprotein cholesterol levels in subjects with T2DM (Choi et al., 2017). Yerba mate extract treatment has been reported to be well tolerated and safe (Kim et al., 2012). According to these findings, yerba mate and its bioactive compounds have beneficial effects on health, but its effect on obesity is still ambiguous (Dunlop, 2016).

Opuntia Ficus Indica

Opuntia ficus-indica (OFI) is a species of cacti originated from Mexico and cultivated in tropical and subtropical areas with a Mediterranean climate (Ventura-Aguilar et al., 2017). Various parts of this plant, such as cladodes, leaves, flowers, and fruits, are used as herbal medicine by Native Americans for wound healing, diabetes, hyperlipidemia, ulcers, gastroenteritis, and liver protection (El-Mostafa et al., 2014; Ozcan & Matthaus, 2017). OFI is rich in mono and polyunsaturated fatty acids, dietary fiber, vitamins like vitamin C and vitamin E, and minerals like calcium, phosphorus, potassium, and magnesium. It also contains phenolic compounds such as betalains and indicaxanthins (El-Mostafa et al., 2014). Due to its high fiber content, OFI's fiber extracts are generally used as weight loss supplements in clinical trials (Chong, Lau, et al., 2014; Grube et al., 2013; Uebelhack et al., 2014). Several studies have shown increased fecal fat excretion and weight loss after using an OFI-based fiber product (Aragona et al., 2018; Chong, Lau, et al., 2014; Grube et al., 2013; Uebelhack et al., 2014). In one study, OFI fiber intake with a standard meal (35% of energy coming from fats) increased fecal fat excretion (Uebelhack et al., 2014). A meta-analysis reviewing 7 randomized clinical trials suggested a significant weight loss effect of OFI (Onakpoya et al., 2015). However, a study demonstrated no significant weight loss and waist circumference reduction after OFI supplementation. Nonetheless, it may lead to decreased body fat percentage, blood pressure, glucose, and lipid profile (Onakpoya et al., 2015). In a diet-induced obesity mouse model study, OFI isohamnetin glycoside extract reduced weight gain, increased insulin secretion, and promoted fatty acid oxidation (Rodriguez-Rodriguez et al., 2015). In addition to its anti-obesity effects, OFI is believed to have antidiabetic effects (Ventura-Aguilar et al., 2017). A study reported that OFI supplementation acutely decreased plasma glucose levels after an oral glucose tolerance test (OGTT). However, after 16 weeks of intervention, there was no significant difference in blood parameters in prediabetic males and females. Post-exercise Opuntia supplementation (an OFI extract) combined with leucine increased insulin secretion and decreased blood glucose levels after OGTT (Deldicque et al., 2013). In a study using raw material (nopal) from OFI consumed with two test meals (high carbohydrate and high soy protein diet), the effect on postprandial blood glucose was tested. With nopal added to the high carbohydrate meal, postprandial glucose peaks decreased significantly. However, in the high soy protein meal, there was no significant difference in postprandial glucose between groups (Lopez-Romero et al., 2014). Moreover, a study made with cladodes' at three different maturity states, streptozocin induced diabetic rats fed with its flours and after OGTT more tender types lowered glucose more than old ones because of their fiber content (Nunez-Lopez et al., 2013). Apart from diabetes, OFI's fruit consumption can decrease plasma cholesterol levels and inhibit lipid oxidation (Benattia et al., 2019). Its possible blood lipid-lowering effect can depend on glycoproteins in OFI extracts. OFI's effect on cardiovascular health can also depend on its antioxidant content, especially its pigments like betalains (Benattia et al., 2019). Betalain is a polyphenolic plant pigment that prevents plants from the hazardous effects of reactive oxygen species (ROS) (Gandia-Herrero & Garcia-Carmona, 2013). Betalain extracted from OFI lowered LDL cholesterol and inhibited the inflammatory red blood marker intracellular cell adhesion molecule-1 (ICAM-1). Also, indacaxanthin isolated from OFI protected endothelial cells from 7-ketocholesterol-induced monocyte/macrophage apoptosis, causing the formation of atheromatous plaques (Tesoriere et al., 2013). Animal studies also demonstrated OFI's positive effect on total cholesterol, HDL, and LDL cholesterols. In obese Zucker rats, an OFI-supplemented diet increased fatty acid oxidation and liver insulin excretion, lowered liver function enzymes, and decreased oxidative stress (Moran-Ramos et al., 2012). Reported side effects of OFI include nausea, diarrhea, abdominal fullness, increased stool volume, and headache (Onakpoya et al., 2015), but no interactions with drugs were found. However, clinical trials about OFI are limited in sample size, and studies with its dietary supplements are also limited. It is indicated that, an effective weight loss supplement should make progress at blood pressure, lipid and glucose levels in accordance with weight loss (Mukherjee et al., 2015). In an animal study, OFI fruit extract decreased body weight and showed diuretic effect (Grube et al., 2013). Despite its mild and moderate effect on blood glucose, this plant is not recommended to pregnant and lactating women, and people with kidney diseases. However, usage of this plant's supplement for conditions like hyperglycemia, hyperlipidemia can prefer alternatively in medical nutrition therapy of obesity.

Green Tea

Green tea (GT) is produced by preventing oxidation through direct drying of *Camellia sinensis* without being fermented and is widely used in Asian countries such as India, China, Japan, and Thailand for treatment purposes (Prasanth et al., 2019). It has become the subject of research in weight control and loss due to the phytochemicals it contains, especially since obesity has been identified as a global public health problem (Ohishi et al., 2021). The phytochemical composition of GT varies according to the age, harvesting time, and processing conditions of the plant (Kumar et al., 2023). Meta-analyses studies suggest that the anti-obesity effect of GT is primarily attributed to the high amount of catechin, particularly Epigallocatechin-3 gallate (EGCG), and its caffeine content. EGCG is believed to be effective in treating obesity by inhibiting adipocyte differentiation and proliferation, blocking fat and carbohydrate absorption in the intestines, and having a synergistic effect with caffeine, which leads to the repression of catechol-O-methyltransferase (COMT) (Xing et al., 2019). This results in the constant activation of norepinephrine in the central nervous system, influencing the UCP gene expression and thermogenesis by inhibiting the phosphodiesterase enzyme of caffeine, which belongs to the methylxanthine group (Huang et al., 2014). EGCG belongs to the flavonoid group and constitutes over 40% of the total phenolic content in GT (Alam et al., 2022). Molecular studies have demonstrated that EGCG inhibits the expression of transcription factors responsible for the enzymes triggering adipogenesis, such as fatty acid synthase. Additionally, it prevents the formation of adipositis and inhibits the formation of free radicals (Lee et al., 2013). The antioxidant characteristic of EGCG is also suggested to contribute to its anti-obesity effect (Yan et al., 2013). Some studies have further suggested that EGCG, in combination with exercise, may be more effective in increasing lipolysis and thermogenesis, thanks to the caffeine present in GT (Sae-Tan et al., 2015). Considering the importance of the microbiota in obesity management, certain bacteria types in fecal flora have become a research topic in obese individuals. Animal and human studies have shown that the amount of firmicutes increases and bacteroidetes decreases in the fecal flora of obese individuals, and this condition can be reversed after weight loss. GT polyphenols are suggested to serve as a nutritional source for bacteroidetes after being digested in intestinal flora, indicating that high consumption of polyphenols may be effective in weight (Bond & Derbyshire, 2019). The potential impact of GT on obesity has also led to investigations into its effects on diabetes mellitus, hyperlipidemia, and metabolic syndrome (Massounga Bora et al., 2018). Molecular and animal studies have demonstrated several mechanisms through which GT catechins can influence these diseases. For example, GT catechins inhibit the activation of 11β-Hydroxysteroid dehydrogenase type 1 which is related to cortisol synthesis and the etiology of metabolic disorders associated with visceral obesity (Pan et al., 2016). They also decrease the absorption of glucose in the intestines and regulate glycemic control by inhibiting pancreatic α-amylase and glycosidase enzymes, which affect GLUT and SGLT activation (Goh et al., 2015; Hintzpeter et al., 2014; Miao et al., 2015). Furthermore, GT has been found to reduce endothelial dysfunction and vascular damage through its antioxidant activity, thus potentially preventing cardiovascular disease (Pang et al., 2015; Snoussi et al., 2014). In a study, individuals with MetS and similar anthropometric measurements were divided into three groups, with one group given 4 cups of GT, the second group given 4 cups of water, and the third group given GT extract, daily. After 8 weeks, a significant increase in serum glutathione and antioxidant capacity was observed in the first and third groups compared to the beginning of the study (Basu et al., 2010). As noted above, the effect of GT on obesity and related diseases relies on the phytochemicals it contains. However, it should be kept in mind that in most studies conducted to reveal the mechanisms, GT or GT catechin were administered in the form of extracts. A study about the reliability of consuming GT extracts suggested that these extracts fall under the 2nd class, as their consumption may lead to hepatotoxicity, and their intake during fasting increases the risk of adverse effects. Instead, consuming brewed GT after meals can reduce the negative health risks (Basu et al., 2013). In rodent models, taking high amounts of GT polyphenols (0.5-1% of dietary content) is thought to have negative effects on intestinal, renal, and hepatic functions (Bedrood et al., 2018; Zhou et al., 2019). However, it should be noted that GT consumption, especially in the form of extract, reduces folic acid bioavailability, although its safety has been demonstrated in a recent review (Hu et al., 2018). Moreover, numerous studies have indicated that green tea consumption may have a possible anti-cancer effect (Farhan, 2022; Miyata et al., 2019; Shirakami & Shimizu, 2018) and may prevent age-related cognitive decline (Farzaei et al., 2019). Further studies are necessary to better understand the effects and mechanisms of GT.

CONCLUSION

This review emphasizes the potential benefits of natural products like ginger, dandelion, garcinia cambogia, guar gum, guarana, yerba mate, opuntia ficus-indica, and green tea in weight control and obesity management. Ginger shows anti-obesity properties, but high doses may be problematic. Dandelion inhibits pancreatic lipase and affects adipogenesis. Garcinia cambogia's HCA has mixed results, necessitating further investigation. Guar gum and PHGG induce satiety, but their long-term impact is uncertain. Guarana and yerba mate show promise, but further research is needed to ensure their long-term efficacy and safety. The weight-loss potential of OFI should be interpreted with caution, considering possible adverse effects. GT's high catechin content, especially EGCG, makes it a compelling candidate for obesity management. Based on the current evidence, including these natural products into weight management approaches should consider individual differences and potential side effects. In conclusion, sustainable lifestyle changes, such as a healthy diet and regular exercise, remain the most effective approach to achieve healthy weight loss and improve overall health.

RECOMMENDATIONS

Herbal supplements continue to attract interest as potential aids for weight management, yet the evidence for their long-term effectiveness remains limited. Clinicians should guide patients by stressing that lifestyle changes are the foundation of obesity treatment, while supplements may serve only as complementary options. Clear communication about product quality, safety concerns, and possible drug interactions is essential. At the same time, well-designed clinical trials using standardized preparations are needed to clarify which supplements, if any, provide meaningful benefits without unacceptable risks.

Ethical Statement

This article is a narrative review based solely on previously published studies. It was not derived from a thesis and has not been presented at a symposium.

Ethical Approval

This article is a review and does not include studies with human participants or animals conducted by the authors. Therefore, ethical approval was not applicable.

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Conflict of Interest

There are no conflicts of interest to declare.

Sustainable Development Goals (SDGs)

Sustainable Development Goals: 3 Good Health and Well-Being.

REFERENCES

Ahmed, F., & Abass, K. S. (2021). The Role of Dietary Supplements in Promoting Human Health against Diseases: A Review. 889-896.

Alam, M., Ali, S., Ashraf, G. M., Bilgrami, A. L., Yadav, D. K., & Hassan, M. I. (2022). Epigallocatechin 3-gallate: From green tea to cancer therapeutics. *Food Chem*, *379*, 132135. https://doi.org/10.1016/j.foodchem.2022.132135

Andueza, N., Giner, R. M., & Portillo, M. P. (2021). Risks Associated with the Use of Garcinia as a Nutritional Complement to Lose Weight. *Nutrients*, *13*(2). https://doi.org/10.3390/nu13020450

Apong, P. E. (2016). Market and marketing of functional foods and dietary supplements in America. In *Innovation in Healthy and Functional Foods* (pp. 103-112). https://www.scopus.com/inward/record.uri?eid=2-s2.0-85052923472&partnerID=40&md5=5a9e86b7d5af309efba26239e6318a64

Aragona, M., Lauriano, E. R., Pergolizzi, S., & Faggio, C. (2018). Opuntia ficus-indica (L.) Miller as a source of bioactivity compounds for health and nutrition [Review]. *Natural Product Research*, *32*(17), 2037-2049. https://doi.org/10.1080/14786419.2017.1365073

Aregawi, L. G., Shokrolahi, M., Gebremeskel, T. G., & Zoltan, C. (2023). The Effect of Ginger Supplementation on the Improvement of Dyspeptic Symptoms in Patients With Functional Dyspepsia. *Cureus*, *15*(9), e46061. https://doi.org/10.7759/cureus.46061

Basile, A., Rigano, D., Conte, B., Bruno, M., Rosselli, S., & Sorbo, S. (2013). Antibacterial and antifungal activities of acetonic extract from Paullinia cupana Mart. seeds. *Nat Prod Res*, *27*(22), 2084-2090. https://doi.org/10.1080/14786419.2013.784868

Basu, A., Betts, N. M., Mulugeta, A., Tong, C., Newman, E., & Lyons, T. J. (2013). Green tea supplementation increases glutathione and plasma antioxidant capacity in adults with the metabolic syndrome. *Nutr Res*, *33*(3), 180-187. https://doi.org/10.1016/j.nutres.2012.12.010

Basu, A., Sanchez, K., Leyva, M. J., Wu, M., Betts, N. M., Aston, C. E., & Lyons, T. J. (2010). Green tea supplementation affects body weight, lipids, and lipid peroxidation in obese subjects with metabolic syndrome. *J Am Coll Nutr*, *29*(1), 31-40. https://doi.org/10.1080/07315724.2010.10719814

Bedrood, Z., Rameshrad, M., & Hosseinzadeh, H. (2018). Toxicological effects of Camellia sinensis (green tea): A review [Review]. *Phytotherapy Research*, *32*(7), 1163-1180. https://doi.org/10.1002/ptr.6063

Bellisle, F., Drewnowski, A., Anderson, G. H., Westerterp-Plantenga, M., & Martin, C. K. (2012). Sweetness, satiation, and satiety. *J Nutr*, *142*(6), 1149S-1154S. https://doi.org/10.3945/jn.111.149583

Benattia, F. K., Arrar, Z., Dergal, F., & Khabbal, Y. (2019). Pharmaco-analytical study and phytochemical profile of hydroethanolic extract of algerian prickly pear (Opuntia ficus-indica.L) [Review]. *Current Pharmaceutical Biotechnology*, *20*(9), 696-706. https://doi.org/10.2174/1389201020666190620113129

Boaventura, B. C., di Pietro, P. F., Klein, G. A., Stefanuto, A., de Morais, E. C., de Andrade, F., . . . da Silva, E. L. (2013). Antioxidant potential of mate tea (Ilex paraguariensis) in type 2 diabetic mellitus and pre-diabetic individuals. *Journal of Functional Foods*, *5*(3), 1057-1064.

Boaventura, B. C., Di Pietro, P. F., Stefanuto, A., Klein, G. A., de Morais, E. C., de Andrade, F., . . . da Silva, E. L. (2012). Association of mate tea (Ilex paraguariensis) intake and dietary intervention and effects on oxidative stress biomarkers of dyslipidemic subjects. *Nutrition*, *28*(6), 657-664. https://doi.org/10.1016/j.nut.2011.10.017

Bond, T., & Derbyshire, E. (2019). Tea Compounds and the Gut Microbiome: Findings from Trials and Mechanistic Studies. *Nutrients*, *11*(10). https://doi.org/10.3390/nu11102364

Bonetti, G., Herbst, K. L., Donato, K., Dhuli, K., Kiani, A. K., Aquilanti, B., . . . Bertelli, M. (2022). Dietary supplements for obesity. *J Prev Med Hyg*, *63*(2 Suppl 3), E160-e168. https://doi.org/10.15167/2421-4248/jpmh2022.63.2S3.2757

Bortolin, R. C., Vargas, A. R., de Miranda Ramos, V., Gasparotto, J., Chaves, P. R., Schnorr, C. E., . . . Moreira, J. C. F. (2019). Guarana supplementation attenuated obesity, insulin resistance, and adipokines dysregulation induced by a standardized human Western diet via brown adipose tissue activation [Article]. *Phytotherapy Research*, *33*(5), 1394-1403. https://doi.org/10.1002/ptr.6330

Bravo, L., Mateos, R., Sarria, B., Baeza, G., Lecumberri, E., Ramos, S., & Goya, L. (2014). Hypocholesterolaemic and antioxidant effects of yerba mate (Ilex paraguariensis) in high-cholesterol fed rats. *Fitoterapia*, *92*, 219-229. https://doi.org/10.1016/j.fitote.2013.11.007

Burke, L. M., Stear, S. J., Lobb, A., Ellison, M., & Castell, L. M. (2011). A-Z of nutritional supplements: dietary supplements, sports nutrition foods and ergogenic aids for health and performance--Part 19. *Br J Sports Med*, *45*(5), 456-458. https://doi.org/10.1136/bjsm.2011.084988

Burris, K. P., Harte, F. M., Davidson, P. M., Stewart, C. N., Jr., & Zivanovic, S. (2012). Composition and Bioactive Properties of Yerba Mate (llex paraguariensis A. St.-Hil.): A Review *Chilean Journal of Agricultural Research*, *72*(2), 268-274.

Cantón Blanco, A., Fernández López, M., Lugo Rodríguez, G., Martínez Olmos, M., Palmeiro

Carballeira, R., Pita Gutiérrez, F., & Tejera Pérez, C. (2017). [Clinical utility of partially hydrolyzed guar gum: review of evidence and experience]. *Nutr Hosp*, *34*(1), 216-223. https://doi.org/10.20960/nh.998 (Utilidad en la clínica de la goma guar parcialmente hidrolizada: revisión de la evidencia y experiencia.)

Choi, M. S., Park, H. J., Kim, S. R., Kim, D. Y., & Jung, U. J. (2017). Long-Term Dietary Supplementation with Yerba Mate Ameliorates Diet-Induced Obesity and Metabolic Disorders in Mice by Regulating Energy Expenditure and Lipid Metabolism [Article]. *Journal of Medicinal Food*, *20*(12), 1168-1175. https://doi.org/10.1089/jmf.2017.3995

Chong, P. W., Beah, Z. M., Grube, B., & Riede, L. (2014). IQP-GC-101 reduces body weight and body fat mass: a randomized, double-blind, placebo-controlled study. *Phytother Res*, *28*(10), 1520-1526. https://doi.org/10.1002/ptr.5158

Chong, P. W., Lau, K. Z., Gruenwald, J., & Uebelhack, R. (2014). A Review of the Efficacy and Safety of Litramine IQP-G-002AS, an Opuntia ficus-indica Derived Fiber for Weight Management. *Evid Based Complement Alternat Med*, *2014*, 943713. https://doi.org/10.1155/2014/943713

Dall'Alba, V., Silva, F. M., Antonio, J. P., Steemburgo, T., Royer, C. P., Almeida, J. C., . . . Azevedo, M. J. (2013). Improvement of the metabolic syndrome profile by soluble fibre - guar gum - in patients with type 2 diabetes: a randomised clinical trial. *Br J Nutr*, *110*(9), 1601-1610. https://doi.org/10.1017/S0007114513001025

Dalonso, N., & Petkowicz, C. L. (2012). Guarana powder polysaccharides: characterisation and evaluation of the antioxidant activity of a pectic fraction. *Food Chem*, *134*(4), 1804-1812. https://doi.org/10.1016/j.foodchem.2012.03.088

Dastjerdi, A. G., Akhgari, M., Kamali, A., & Mousavi, Z. (2018). Principal component analysis of synthetic adulterants in herbal supplements advertised as weight loss drugs [Article]. *Complementary Therapies in Clinical Practice*, *31*, 236-241. https://doi.org/10.1016/j.ctcp.2018.03.007

de Meneses Fujii, T. M., Jacob, P. S., Yamada, M., Borges, M. C., Norde, M. M., Pantaleao, L. C., . . . Rogero, M. M. (2014). Yerba Mate (Ilex paraguariensis) modulates NF-kappaB pathway and AKT expression in the liver of rats fed on a high-fat diet. *Int J Food Sci Nutr*, *65*(8), 967-976. https://doi.org/10.3109/09637486.2014.945153

de Vasconcellos, A. C., Frazzon, J., & Zapata Noreña, C. P. (2022). Phenolic Compounds Present in Yerba Mate Potentially Increase Human Health: A Critical Review. *Plant Foods Hum Nutr*, *77*(4), 495-503. https://doi.org/10.1007/s11130-022-01008-8

Deldicque, L., Van Proeyen, K., Ramaekers, M., Pischel, I., Sievers, H., & Hespel, P. (2013). Additive insulinogenic action of Opuntia ficus-indica cladode and fruit skin extract and leucine after exercise in healthy males. *J Int Soc Sports Nutr*, *10*(1), 45. https://doi.org/10.1186/1550-2783-10-45

Deng, X., Zhang, S., Wu, J., Sun, X., Shen, Z., Dong, J., & Huang, J. (2019). Promotion of Mitochondrial Biogenesis via Activation of AMPK-PGC1α Signaling Pathway by Ginger (Zingiber officinale Roscoe) Extract, and Its Major Active Component 6-Gingerol [Article]. *Journal of Food Science*, *84*(8), 2101-2111. https://doi.org/10.1111/1750-3841.14723

Derosa, G., D'Angelo, A., & Maffioli, P. (2022). The role of selected nutraceuticals in management of prediabetes and diabetes: An updated review of the literature. *Phytother Res*, *36*(10), 3709-3765. https://doi.org/10.1002/ptr.7564

Dunlop, R. A. (2016). Claims of Yerba Mate as a potent anti-obesity agent are not supported by the data [Note]. *Focus on Alternative and Complementary Therapies*, *21*(2), 124-125. https://doi.org/10.1111/fct.12262

Ebrahimzadeh, A., Ebrahimzadeh, A., Mirghazanfari, S. M., Hazrati, E., Hadi, S., & Milajerdi, A.

(2022). The effect of ginger supplementation on metabolic profiles in patients with type 2 diabetes mellitus: A systematic review and meta-analysis of randomized controlled trials. *Complement Ther Med*, *65*, 102802. https://doi.org/10.1016/j.ctim.2022.102802

Ebrahimzadeh Attari, V., Malek Mahdavi, A., Javadivala, Z., Mahluji, S., Zununi Vahed, S., & Ostadrahimi, A. (2018). A systematic review of the anti-obesity and weight lowering effect of ginger (Zingiber officinale Roscoe) and its mechanisms of action [Review]. *Phytotherapy Research*, *32*(4), 577-585. https://doi.org/10.1002/ptr.5986

El-Mostafa, K., El Kharrassi, Y., Badreddine, A., Andreoletti, P., Vamecq, J., El Kebbaj, M. S., . . . Cherkaoui-Malki, M. (2014). Nopal cactus (Opuntia ficus-indica) as a source of bioactive compounds for nutrition, health and disease. *Molecules*, *19*(9), 14879-14901. https://doi.org/10.3390/molecules190914879

Farhan, M. (2022). Green Tea Catechins: Nature's Way of Preventing and Treating Cancer. *Int J Mol Sci*, *23*(18). https://doi.org/10.3390/ijms231810713

Farzaei, M. H., Bahramsoltani, R., Abbasabadi, Z., Braidy, N., & Nabavi, S. M. (2019). Role of green tea catechins in prevention of age-related cognitive decline: Pharmacological targets and clinical perspective [Review]. *Journal of Cellular Physiology*, *234*(3), 2447-2459. https://doi.org/10.1002/jcp.27289

Finley, J. W., Soto-Vaca, A., Heimbach, J., Rao, T. P., Juneja, L. R., Slavin, J., & Fahey, G. C. (2013). Safety assessment and caloric value of partially hydrolyzed guar gum. *J Agric Food Chem*, *61*(8), 1756-1771. https://doi.org/10.1021/jf304910k

Fiszman, S., & Varela, P. (2013). The role of gums in satiety/satiation. A review. *Food Hydrocolloids*, *32*(1), 147-154. https://doi.org/10.1016/j.foodhyd.2012.12.010

Foshati, S., Poursadeghfard, M., Heidari, Z., & Amani, R. (2023). The effects of ginger supplementation on common gastrointestinal symptoms in patients with relapsing-remitting multiple sclerosis: a double-blind randomized placebo-controlled trial. *BMC Complement Med Ther*, *23*(1), 383. https://doi.org/10.1186/s12906-023-04227-x

Gambero, A., & Ribeiro, M. L. (2015). The positive effects of yerba maté (Ilex paraguariensis) in obesity [Review]. *Nutrients*, *7*(2), 730-750. https://doi.org/10.3390/nu7020730

Gandia-Herrero, F., & Garcia-Carmona, F. (2013). Biosynthesis of betalains: yellow and violet plant pigments. *Trends Plant Sci*, *18*(6), 334-343. https://doi.org/10.1016/j.tplants.2013.01.003

Gao, H., Liu, Z., Qu, X., & Zhao, Y. (2013). Effects of Yerba Mate tea (Ilex paraguariensis) on vascular endothelial function and liver lipoprotein receptor gene expression in hyperlipidemic rats. *Fitoterapia*, *84*, 264-272. https://doi.org/10.1016/j.fitote.2012.12.024

Garcia-Alvarez, A., Mila-Villarroel, R., Ribas-Barba, L., Egan, B., Badea, M., Maggi, F. M., . . . Serra-Majem, L. (2016). Usage of Plant Food Supplements (PFS) for weight control in six European countries: results from the PlantLIBRA PFS Consumer Survey 2011-2012. *BMC Complement Altern Med*, *16*, 254. https://doi.org/10.1186/s12906-016-1227-5

Garg, S. S., & Gupta, J. (2023). Guar gum-based nanoformulations: Implications for improving drug delivery. *Int J Biol Macromol*, *229*, 476-485. https://doi.org/10.1016/j.ijbiomac.2022.12.271

Gembe-Olivarez, G., Preciado-Ortiz, M. E., Campos-Perez, W., Rodríguez-Reyes, S. C., Martínez-López, E., & Rivera-Valdés, J. J. (2023). A mix of ginger phenols exhibits anti-adipogenic and lipolytic effects in mature adipocytes derived from 3T3-L1 cells. *Exp Ther Med*, *26*(1), 336. https://doi.org/10.3892/etm.2023.12035

George, A., Shah, P. A., & Shrivastav, P. S. (2019). Guar gum: Versatile natural polymer for drug delivery applications [Review]. *European Polymer Journal*, *112*, 722-735. https://doi.org/10.1016/j.eurpolymj.2018.10.042

Gerber, T., Nunes, A., Moreira, B. R., & Maraschin, M. (2023). Yerba mate (Ilex paraguariensis A. St.-Hil.) for new therapeutic and nutraceutical interventions: A review of patents issued in the last 20 years (2000-2020). *Phytother Res*, *37*(2), 527-548. https://doi.org/10.1002/ptr.7632

Giraldo-Silva, L., Ferreira, B., Rosa, E., & Dias, A. C. P. (2023). Opuntia ficus-indica Fruit: A Systematic Review of Its Phytochemicals and Pharmacological Activities. *Plants (Basel)*, *12*(3). https://doi.org/10.3390/plants12030543

Godfrey, R. J., Laupheimer, M. W., Stear, S. J., Burke, L. M., & Castell, L. M. (2013). A–Z of nutritional supplements: dietary supplements, sports nutrition foods and ergogenic aids for health and performance: Part 45. *Br J Sports Med*, *47*(10), 659-660.

Goh, R., Gao, J., Ananingsih, V. K., Ranawana, V., Henry, C. J., & Zhou, W. (2015). Green tea catechins reduced the glycaemic potential of bread: an in vitro digestibility study. *Food Chem*, *180*, 203-210. https://doi.org/10.1016/j.foodchem.2015.02.054

Golzarand, M., Omidian, M., & Toolabi, K. (2020). Effect of Garcinia cambogia supplement on obesity indices: A systematic review and dose-response meta-analysis. *Complement Ther Med*, *52*, 102451. https://doi.org/10.1016/j.ctim.2020.102451

Gonzalez-Castejon, M., Visioli, F., & Rodriguez-Casado, A. (2012). Diverse biological activities of dandelion. *Nutr Rev*, *70*(9), 534-547. https://doi.org/10.1111/j.1753-4887.2012.00509.x

Gosmann, G., Barlette, A. G., Dhamer, T., Arcari, D. P., Santos, J. C., de Camargo, E. R., . . . Ribeiro, M. L. (2012). Phenolic compounds from mate (Ilex paraguariensis) inhibit adipogenesis in 3T3-L1 preadipocytes. *Plant Foods Hum Nutr*, *67*(2), 156-161. https://doi.org/10.1007/s11130-012-0289-x

Grauso, L., Emrick, S., de Falco, B., Lanzotti, V., & Bonanomi, G. (2019). Common dandelion: a review of its botanical, phytochemical and pharmacological profiles [Review]. *Phytochemistry Reviews*, *18*(4), 1115-1132. https://doi.org/10.1007/s11101-019-09622-2

Grube, B., Chong, P. W., Lau, K. Z., & Orzechowski, H. D. (2013). A natural fiber complex reduces body weight in the overweight and obese: a double-blind, randomized, placebo-controlled study. *Obesity (Silver Spring)*, *21*(1), 58-64. https://doi.org/10.1002/oby.20244

Gunawan, S., Munika, E., Wulandari, E. T., Ferdinal, F., Purwaningsih, E. H., Wuyung, P. E., . . . Soetikno, V. (2023). 6-gingerol ameliorates weight gain and insulin resistance in metabolic syndrome rats by regulating adipocytokines. *Saudi Pharmaceutical Journal*, *31*(3), 351-358. https://doi.org/https://doi.org/10.1016/j.jsps.2023.01.003

H. Baky, M., Fahmy, H., & Farag, M. A. (2022). Recent Advances in Garcinia cambogia Nutraceuticals in Relation to Its Hydroxy Citric Acid Level. A Comprehensive Review of Its Bioactive Production, Formulation, and Analysis with Future Perspectives. *ACS Omega*, *7*(30), 25948-25957. https://doi.org/10.1021/acsomega.2c02838

Haber, S. L., Awwad, O., Phillips, A., Park, A. E., & Pham, T. M. (2018). Garcinia cambogia for weight loss [Article]. *American Journal of Health-System Pharmacy*, *75*(2), 17-22. https://doi.org/10.2146/ajhp160915

Hack, B., Penna, E. M., Talik, T., Chandrashekhar, R., & Millard-Stafford, M. (2023). Effect of Guarana (Paullinia cupana) on Cognitive Performance: A Systematic Review and Meta-Analysis. *Nutrients*, *15*(2). https://doi.org/10.3390/nu15020434

Hamerski, L., Somner, G. V., & Tamaio, N. (2013). Paullinia cupana Kunth (Sapindaceae): a review of its ethnopharmacology, phytochemistry and pharmacology. *J Med Plants Res*, *7*, 2221-2229.

Hintzpeter, J., Stapelfeld, C., Loerz, C., Martin, H. J., & Maser, E. (2014). Green tea and one of its constituents, Epigallocatechine-3-gallate, are potent inhibitors of human 11beta-hydroxysteroid dehydrogenase type 1. *PLoS One*, *9*(1), e84468. https://doi.org/10.1371/journal.pone.0084468

Hong, K. H., Um, M. Y., Ahn, J., & Ha, T. Y. (2023). 6-Gingerol Ameliorates Adiposity and Inflammation in Adipose Tissue in High Fat Diet-Induced Obese Mice: Association with

Regulating of Adipokines. *Nutrients*, *15*(15), 3457. https://www.mdpi.com/2072-6643/15/15/3457

Hu, J., Webster, D., Cao, J., & Shao, A. (2018). The safety of green tea and green tea extract consumption in adults – Results of a systematic review [Review]. *Regulatory Toxicology and Pharmacology*, *95*, 412-433. https://doi.org/10.1016/j.yrtph.2018.03.019

Hu, M.-L., Rayner, C., Wu, K.-L., Chuah, S.-K., Tai, W.-C., Chou, Y.-P., . . . Hu, T.-H. (2011). Effect of ginger on gastric motility and symptoms of functional dyspepsia. *World journal of gastroenterology : WJG*, *17*, 105-110. https://doi.org/10.3748/wjg.v17.i1.105

Huang, F. Y., Deng, T., Meng, L. X., & Ma, X. L. (2019). Dietary ginger as a traditional therapy for blood sugar control in patients with type 2 diabetes mellitus: A systematic review and meta-analysis. *Medicine (Baltimore)*, *98*(13), e15054. https://doi.org/10.1097/md.0000000000015054

Huang, J., Wang, Y., Xie, Z., Zhou, Y., Zhang, Y., & Wan, X. (2014). The anti-obesity effects of green tea in human intervention and basic molecular studies. *Eur J Clin Nutr*, *68*(10), 1075-1087. https://doi.org/10.1038/ejcn.2014.143

Hussain, M., Akhtar, S., Khalid, N., Azam, M., Iqbal, M. W., Ismail, T., . . . Korma, S. A. (2023). Hydrolysis, Microstructural Profiling and Utilization of Cyamopsis tetragonoloba in Yoghurt. *Fermentation*, *9*(1), 45. https://www.mdpi.com/2311-5637/9/1/45

James, A., Wang, K., & Wang, Y. (2023). Therapeutic Activity of Green Tea Epigallocatechin-3-Gallate on Metabolic Diseases and Non-Alcoholic Fatty Liver Diseases: The Current Updates. *Nutrients*, *15*(13). https://doi.org/10.3390/nu15133022

Jamila, N., Khan, N., Hwang, I. M., Choi, J. Y., Nho, E. Y., Khan, S. N., . . . Kim, K. S. (2019). Determination of macro, micro, trace essential, and toxic elements in Garcinia cambogia fruit and its anti-obesity commercial products [Article]. *Journal of the Science of Food and Agriculture*, *99*(5), 2455-2462. https://doi.org/10.1002/jsfa.9454

Kania-Dobrowolska, M., & Baraniak, J. (2022). Dandelion (Taraxacum officinale L.) as a Source of Biologically Active Compounds Supporting the Therapy of Co-Existing Diseases in Metabolic Syndrome. *Foods*, *11*(18). https://doi.org/10.3390/foods11182858

Kapoor, M. P., Sugita, M., Fukuzawa, Y., & Okubo, T. (2017). Impact of partially hydrolyzed guar gum (PHGG) on constipation prevention: A systematic review and meta-analysis [Review]. *Journal of Functional Foods*, *33*, 52-66. https://doi.org/10.1016/j.jff.2017.03.028

Karkkainen, U., Dadi, Y., & Keski-Rahkonen, A. (2015). [Ideal body weight of a young woman--sociocultural and health aspects]. *Duodecim*, *131*(1), 55-61. (Nuoren naisen ihannepaino--sosiokulttuurisia ja terveydellisia nakokohtia.)

Kauser, I., Naqvi, S. Z., Mathur, R., Amir, N., Sharma, G., Gullaiya, S., & Agarwal, S. S. (2014). Effects of camellia sinensis and garcinia cambogia on obesity & its comorbidities -safer alternative then synthetic drugs [Review]. *International Journal of Pharmaceutical Sciences Review and Research*, *27*(2), 319-327, Article 54. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84940236460&partnerID=40&md5=964ff6e6132251173469d59e9ae7737c

Kciuk, M., Alam, M., Ali, N., Rashid, S., Głowacka, P., Sundaraj, R., . . . Kontek, R. (2023). Epigallocatechin-3-Gallate Therapeutic Potential in Cancer: Mechanism of Action and Clinical Implications. *Molecules*, *28*(13). https://doi.org/10.3390/molecules28135246

Kim, J. H., Ko, J., Storni, C., Song, J. H., & Cho, Y. G. (2012). Effect of green mate in overweight volunteers: A randomized
placebo-controlled human study. *Journal of Functional Foods*, *4*.

Kim, Y.-J., Choi, M.-S., Park, Y. B., Kim, S. R., Lee, M.-K., & Jung, U. J. (2013). Garcinia Cambogia attenuates diet-induced adiposity but exacerbates hepatic collagen accumulation and inflammation. *World Journal of Gastroenterology : WJG*, *19*(29), 4689-4701. https://doi.org/10.3748/wjg.v19.i29.4689

Kim, Y. J., Choi, M. S., Park, Y. B., Kim, S. R., Lee, M. K., & Jung, U. J. (2013). Garcinia Cambogia attenuates diet-induced adiposity but exacerbates hepatic collagen accumulation and inflammation. *World J Gastroenterol*, *19*(29), 4689-4701. https://doi.org/10.3748/wjg.v19.i29.4689

Kiyama, R. (2020). Nutritional implications of ginger: chemistry, biological activities and signaling pathways. *J Nutr Biochem*, *86*, 108486. https://doi.org/10.1016/j.jnutbio.2020.108486

Kleber Silveira, A., Moresco, K. S., Mautone Gomes, H., da Silva Morrone, M., Kich Grun, L., Pens Gelain, D., . . . Fonseca Moreira, J. C. (2018). Guarana (Paullinia cupana Mart.) alters gut microbiota and modulates redox status, partially via caffeine in Wistar rats [Article]. *Phytotherapy Research*, *32*(12), 2466-2474. https://doi.org/10.1002/ptr.6185

Krewer Cda, C., Ribeiro, E. E., Ribeiro, E. A., Moresco, R. N., da Rocha, M. I., Montagner, G. F., . . . da Cruz, I. B. (2011). Habitual intake of guarana and metabolic morbidities: an epidemiological study of an elderly Amazonian population. *Phytother Res*, *25*(9), 1367-1374. https://doi.org/10.1002/ptr.3437

Kumar, M., Selvasekaran, P., Chidambaram, R., Zhang, B., Hasan, M., Prakash Gupta, O., . . . Amarowicz, R. (2023). Tea (Camellia sinensis (L.) Kuntze) as an emerging source of protein and bioactive peptides: A narrative review. *Food Chem*, *428*, 136783. https://doi.org/10.1016/j.foodchem.2023.136783

Lee, H., Bae, S., & Yoon, Y. (2013). The anti-adipogenic effects of (-)epigallocatechin gallate are dependent on the WNT/beta-catenin pathway. *J Nutr Biochem*, *24*(7), 1232-1240. https://doi.org/10.1016/j.jnutbio.2012.09.007

Lewis-Smith, H., Diedrichs, P. C., Rumsey, N., & Harcourt, D. (2016). A systematic review of interventions on body image and disordered eating outcomes among women in midlife. *Int J Eat Disord*, *49*(1), 5-18. https://doi.org/10.1002/eat.22480

Li, H., Kang, J. H., Han, J. M., Cho, M. H., Chung, Y. J., Park, K. H., . . . Jeong, T. S. (2015). Anti-Obesity Effects of Soy Leaf via Regulation of Adipogenic Transcription Factors and Fat Oxidation in Diet-Induced Obese Mice and 3T3-L1 Adipocytes. *J Med Food*. https://doi.org/10.1089/jmf.2014.3388

Li, Y., Chen, Y., & Sun-Waterhouse, D. (2022). The potential of dandelion in the fight against gastrointestinal diseases: A review. *J Ethnopharmacol*, *293*, 115272. https://doi.org/10.1016/j.jep.2022.115272

Lima, N. S., Caria, C. R. P., Gambero, A., & Ribeiro, M. L. (2019). The effect of Guarana (Paullinia cupana) on metabolic and inflammatory parameters in adult male mice programmed by maternal obesity [Article]. *European Journal of Nutrition*, *58*(2), 765-774. https://doi.org/10.1007/s00394-018-1686-1

Lis, B., & Olas, B. (2019). Pro-health activity of dandelion (Taraxacum officinale L.) and its food products – history and present [Review]. *Journal of Functional Foods*, *59*, 40-48. https://doi.org/10.1016/j.jff.2019.05.012

Lopez-Romero, P., Pichardo-Ontiveros, E., Avila-Nava, A., Vazquez-Manjarrez, N., Tovar, A. R., Pedraza-Chaverri, J., & Torres, N. (2014). The effect of nopal (Opuntia ficus indica) on postprandial blood glucose, incretins, and antioxidant activity in Mexican patients with type 2 diabetes after consumption of two different composition breakfasts. *J Acad Nutr Diet*, *114*(11), 1811-1818. https://doi.org/10.1016/j.jand.2014.06.352

M, H. B., Fahmy, H., & Farag, M. A. (2022). Recent Advances in Garcinia cambogia Nutraceuticals in Relation to Its Hydroxy Citric Acid Level. A Comprehensive Review of Its Bioactive Production, Formulation, and Analysis with Future Perspectives. *ACS Omega*, *7*(30), 25948-

25957. https://doi.org/10.1021/acsomega.2c02838
Macit, M. S., Sözlü, S., Kocaadam, B., & Acar-Tek, N. (2019). Evaluation of Ginger (Zingiber Officinale Roscoe) on Energy Metabolism and Obesity: Systematic Review and Meta-Analysis [Review]. *Food Reviews International*, *35*(7), 685-706. https://doi.org/10.1080/87559129.2019.1608556
Marshall, C., Lengyel, C., & Utioh, A. (2012). Body dissatisfaction among middle-aged and older women. *Can J Diet Pract Res*, *73*(2), e241-e247. https://doi.org/10.3148/73.2.2012.e241
Marx, W., McKavanagh, D., McCarthy, A. L., Bird, R., Ried, K., Chan, A., & Isenring, L. (2015). The Effect of Ginger (Zingiber officinale) on Platelet Aggregation: A Systematic Literature Review. *PLoS One*, *10*(10), e0141119. https://doi.org/10.1371/journal.pone.0141119
Massounga Bora, A. F., Ma, S., Li, X., & Liu, L. (2018). Application of microencapsulation for the safe delivery of green tea polyphenols in food systems: Review and recent advances [Review]. *Food Research International*, *105*, 241-249. https://doi.org/10.1016/j.foodres.2017.11.047
Maunder, A., Bessell, E., Lauche, R., Adams, J., Sainsbury, A., & Fuller, N. R. (2020). Effectiveness of herbal medicines for weight loss: A systematic review and meta-analysis of randomized controlled trials. *Diabetes Obes Metab*, *22*(6), 891-903. https://doi.org/10.1111/dom.13973
Miao, M., Jiang, B., Jiang, H., Zhang, T., & Li, X. (2015). Interaction mechanism between green tea extract and human alpha-amylase for reducing starch digestion. *Food Chem*, *186*, 20-25. https://doi.org/10.1016/j.foodchem.2015.02.049
Miyata, Y., Shida, Y., Hakariya, T., & Sakai, H. (2019). Anti-cancer effects of green tea polyphenols against prostate cancer [Review]. *Molecules*, *24*(1), Article 193. https://doi.org/10.3390/molecules24010193
Mohamed, S. (2014). Chapter 10 - Herbs and Spices in Aging. In V. R. Preedy (Ed.), *Aging* (pp. 99-107). Academic Press. https://doi.org/http://dx.doi.org/10.1016/B978-0-12-405933-7.00010-X
Moran-Ramos, S., Avila-Nava, A., Tovar, A. R., Pedraza-Chaverri, J., Lopez-Romero, P., & Torres, N. (2012). Opuntia ficus indica (nopal) attenuates hepatic steatosis and oxidative stress in obese Zucker (fa/fa) rats. *J Nutr*, *142*(11), 1956-1963. https://doi.org/10.3945/jn.112.165563
Mortensen, A., Aguilar, F., Crebelli, R., Frutos, M. J., Galtier, P., Gott, D., . . . Dusemund, B. (2017). Re-evaluation of guar gum (E 412) as a food additive. *EFSA Journal*, *15*. https://doi.org/10.2903/j.efsa.2017.4669
Mou, W., Zhang, P., Cui, Y., Yang, D., Zhao, G., Xu, H., . . . Liang, Y. (2025). Mechanistic Study on the Inhibitory Effect of Dandelion Extract on Breast Cancer Cell Proliferation and Its Induction of Apoptosis. *Biology*, *14*(8), 910. https://www.mdpi.com/2079-7737/14/8/910
Mukherjee, K., Biswas, R., Chaudhary, S. K., & Mukherjee, P. K. (2015). *Botanicals as Medicinal Food and Their Effects against Obesity*. Elsevier.
Mudgil, D., Barak, S., & Khatkar, B. S. (2014). Guar gum: processing, properties and food applications-A Review. J Food Sci Technol, 51(3), 409-418. https://doi.org/10.1007/s13197-011-0522-x
Munda, S., Dutta, S., Haldar, S., & Lal, M. (2018). Chemical Analysis and Therapeutic Uses of Ginger (Zingiber officinale Rosc.) Essential Oil: A Review [Review]. *Journal of Essential Oil-Bearing Plants*, *21*(4), 994-1002. https://doi.org/10.1080/0972060X.2018.1524794
Nikkhah Bodagh, M., Maleki, I., & Hekmatdoost, A. (2019). Ginger in gastrointestinal disorders: A systematic review of clinical trials. *Food Sci Nutr*, *7*(1), 96-108. https://doi.org/10.1002/fsn3.807
Noack, J., Timm, D., Hospattankar, A., & Slavin, J. (2013). Fermentation profiles of wheat dextrin, inulin and partially hydrolyzed guar gum using an in vitro digestion pretreatment and in vitro batch fermentation system model. *Nutrients*, *5*(5), 1500-1510. https://doi.org/10.3390/nu5051500

Noreen, S., Naizi, M., Tufail, T., Hassan, F., & Awuchi, C. (2023). Nutraceutical, functional, and therapeutic properties of Garcinia cambogia: a review. *International Journal of Food Properties*, *26*, 729-738. https://doi.org/10.1080/10942912.2023.2178458

Nunez-Lopez, M. A., Paredes-Lopez, O., & Reynoso-Camacho, R. (2013). Functional and hypoglycemic properties of nopal cladodes (O. ficus-indica) at different maturity stages using in vitro and in vivo tests. *J Agric Food Chem*, *61*(46), 10981-10986. https://doi.org/10.1021/jf403834x

Ohishi, T., Fukutomi, R., Shoji, Y., Goto, S., & Isemura, M. (2021). The Beneficial Effects of Principal Polyphenols from Green Tea, Coffee, Wine, and Curry on Obesity. *Molecules*, *26*(2). https://doi.org/10.3390/molecules26020453

Olas, B. (2022). New Perspectives on the Effect of Dandelion, Its Food Products and Other Preparations on the Cardiovascular System and Its Diseases. *Nutrients*, *14*(7). https://doi.org/10.3390/nu14071350

Onakpoya, I., Hung, S. K., Perry, R., Wider, B., & Ernst, E. (2011). The Use of Garcinia Extract (Hydroxycitric Acid) as a Weight loss Supplement: A Systematic Review and Meta-Analysis of Randomised Clinical Trials. *Journal of Obesity*, *2011*, 509038. https://doi.org/10.1155/2011/509038

Onakpoya, I. J., O'Sullivan, J., & Heneghan, C. J. (2015). The effect of cactus pear (Opuntia ficus-indica) on body weight and cardiovascular risk factors: a systematic review and meta-analysis of randomized clinical trials. *Nutrition*, *31*(5), 640-646. https://doi.org/10.1016/j.nut.2014.11.015

Ozcan, M. M., & Matthaus, B. (2017). Composition, use and bioactive properties of prickly pear (Opuntia ficus-indica L Mill.) fruit and seeds [Review]. *Zeitschrift fur Arznei- und Gewurzpflanzen*, *22*(4), 177-180. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85051230549&partnerID=40&md5=2d0485436206b7eeb21940b648964721

Ozkur, M., Benlier, N., Takan, I., Vasileiou, C., Georgakilas, A. G., Pavlopoulou, A., . . . Saygili, E. I. (2022). Ginger for Healthy Ageing: A Systematic Review on Current Evidence of Its Antioxidant, Anti-Inflammatory, and Anticancer Properties. *Oxid Med Cell Longev*, *2022*, 4748447. https://doi.org/10.1155/2022/4748447

Pan, M. H., Tung, Y. C., Yang, G., Li, S., & Ho, C. T. (2016). Molecular mechanisms of the anti-obesity effect of bioactive compounds in tea and coffee. *Food Funct*, *7*(11), 4481-4491. https://doi.org/10.1039/c6fo01168c

Pang, J., Zhang, Z., Zheng, T., Yang, Y. J., Li, N., Bai, M., . . . Zhang, B. (2015). Association of green tea consumption with risk of coronary heart disease in Chinese population. *Int J Cardiol*, *179*, 275-278. https://doi.org/10.1016/j.ijcard.2014.11.093

Pendleton, M., Brown, S., Thomas, C., & Odle, B. (2012). Potential toxicity of caffeine when used as a dietary supplement for weight loss. *J Diet Suppl*, *9*(4), 293-298. https://doi.org/10.3109/19390211.2012.736460

Pimentel, G. D., Lira, F. S., Rosa, J. C., Caris, A. V., Pinheiro, F., Ribeiro, E. B., . . . Oyama, L. M. (2013). Yerba mate extract (Ilex paraguariensis) attenuates both central and peripheral inflammatory effects of diet-induced obesity in rats [Article]. *Journal of Nutritional Biochemistry*, *24*(5), 809-818. https://doi.org/10.1016/j.jnutbio.2012.04.016

Pomportes, L., Brisswalter, J., Hays, A., & Davranche, K. (2019). Effects of carbohydrate, caffeine, and guarana on cognitive performance, perceived exertion, and shooting performance in high-level athletes [Article]. *International Journal of Sports Physiology and Performance*, *14*(5), 576-582. https://doi.org/10.1123/ijspp.2017-0865

Portella Rde, L., Barcelos, R. P., da Rosa, E. J., Ribeiro, E. E., da Cruz, I. B., Suleiman, L., & Soares, F. A. (2013). Guarana (Paullinia cupana Kunth) effects on LDL oxidation in elderly people:

an in vitro and in vivo study. *Lipids Health Dis*, *12*, 12. https://doi.org/10.1186/1476-511X-12-12

Prasanth, M. I., Sivamaruthi, B. S., Chaiyasut, C., & Tencomnao, T. (2019). A review of the role of green tea (camellia sinensis) in antiphotoaging, stress resistance, neuroprotection, and autophagy [Review]. *Nutrients*, *11*(2), Article 474. https://doi.org/10.3390/nu11020474

Preciado-Ortiz, M. E., Gembe-Olivarez, G., Martínez-López, E., & Rivera-Valdés, J. J. (2025). Immunometabolic Effects of Ginger (Zingiber officinale Roscoe) Supplementation in Obesity: A Comprehensive Review. *Molecules*, *30*(14). https://doi.org/10.3390/molecules30142933

Rath, M. (2012). Energy drinks: what is all the hype? The dangers of energy drink consumption. *J Am Acad Nurse Pract*, *24*(2), 70-76. https://doi.org/10.1111/j.1745-7599.2011.00689.x

Rather, S., Masoodi, F. A., Akhter, R., Rather, J. A., & Amin, F. (2017). Effects of guar gum as a fat substitute in low fat meat emulsions: RATHER et al. *Journal of Food Processing and Preservation*, *41*, e13249. https://doi.org/10.1111/jfpp.13249

Rehman, G., Hamayun, M., Iqbal, A., Khan, S. A., Khan, H., Shehzad, A., . . . Lee, I. J. (2017). Effect of methanolic extract of dandelion roots on cancer cell lines and AMP-activated protein kinase pathway [Article]. *Frontiers in Pharmacology*, *8*(NOV), Article 875. https://doi.org/10.3389/fphar.2017.00875

Riachi, L. G., & De Maria, C. A. B. (2017). Yerba mate: An overview of physiological effects in humans [Review]. *Journal of Functional Foods*, *38*, 308-320. https://doi.org/10.1016/j.jff.2017.09.020

Rodriguez-Casado, A. (2014). The Health Potential of Fruits and Vegetables Phytochemicals: Notable Examples. *Crit Rev Food Sci Nutr*, 0. https://doi.org/10.1080/10408398.2012.755149

Rodriguez-Rodriguez, C., Torres, N., Gutierrez-Uribe, J. A., Noriega, L. G., Torre-Villalvazo, I., Leal-Diaz, A. M., . . . Tovar, A. R. (2015). The effect of isorhamnetin glycosides extracted from Opuntia ficus-indica in a mouse model of diet induced obesity. *Food Funct*, *6*(3), 805-815. https://doi.org/10.1039/c4fo01092b

Sae-Tan, S., Rogers, C. J., & Lambert, J. D. (2015). Decaffeinated Green Tea and Voluntary Exercise Induce Gene Changes Related to Beige Adipocyte Formation in High Fat-Fed Obese Mice. *J Funct Foods*, *14*, 210-214. https://doi.org/10.1016/j.jff.2015.01.036

Safaei, M., Sundararajan, E. A., Driss, M., Boulila, W., & Shapi'i, A. (2021). A systematic literature review on obesity: Understanding the causes & consequences of obesity and reviewing various machine learning approaches used to predict obesity. *Comput Biol Med*, *136*, 104754. https://doi.org/10.1016/j.compbiomed.2021.104754

Santas, J., Espadaler, J., Cune, J., & Rafecas, M. (2012). Partially hydrolyzed guar gums reduce dietary fatty acid and sterol absorption in guinea pigs independent of viscosity. *Lipids*, *47*(7), 697-705. https://doi.org/10.1007/s11745-012-3682-1

Schimpl, F. C., da Silva, J. F., Goncalves, J. F., & Mazzafera, P. (2013). Guarana: revisiting a highly caffeinated plant from the Amazon. *J Ethnopharmacol*, *150*(1), 14-31. https://doi.org/10.1016/j.jep.2013.08.023

Scholey, A., Bauer, I., Neale, C., Savage, K., Camfield, D., White, D., . . . Hughes, M. (2013). Acute effects of different multivitamin mineral preparations with and without Guarana on mood, cognitive performance and functional brain activation. *Nutrients*, *5*(9), 3589-3604. https://doi.org/10.3390/nu5093589

Semwal, R. B., Semwal, D. K., Vermaak, I., & Viljoen, A. (2015). A comprehensive scientific overview of Garcinia cambogia. *Fitoterapia*, *102*, 134-148. https://doi.org/10.1016/j.fitote.2015.02.012

Semwal, R. B., Semwal, D. K., Vermaak, I., & Viljoen, A. (2015). A comprehensive scientific overview of Garcinia cambogia. *Fitoterapia*, *102*(0), 134-148.

https://doi.org/http://dx.doi.org/10.1016/j.fitote.2015.02.012

Setayesh, L., Pourreza, S., Zeinali Khosroshahi, M., Asbaghi, O., Bagheri, R., Rezaei Kelishadi, M., . . . Ghanavati, M. (2023). The effects of guar gum supplementation on lipid profile in adults: a GRADE-assessed systematic review, meta-regression and dose-response meta-analysis of randomised placebo-controlled trials. *Br J Nutr*, *129*(10), 1703-1713. https://doi.org/10.1017/s0007114522002136

Shanahan, C. J., & de Lorimier, R. (2016). From Science to Finance—A Tool for Deriving Economic Implications from the Results of Dietary Supplement Clinical Studies. *Journal of Dietary Supplements*, *13*(1), 16-34. https://doi.org/10.3109/19390211.2014.952866

Shirakami, Y., & Shimizu, M. (2018). Possible mechanisms of green tea and its constituents against cancer [Review]. *Molecules*, *23*(9), Article 2284. https://doi.org/10.3390/molecules23092284

Singletary, K. W. (2023). Ginger Update: Potential Health Benefits. *Nutrition Today*, *58*(6). https://journals.lww.com/nutritiontodayonline/fulltext/2023/11000/ginger_update__potential_health_benefits.9.aspx

Sirotkin, A. (2024). Can Yerba Maté (Ilex paraguariensis A.-St.-Hil) and Its Constituents Affect Health and Obesity? *Journal of Cellular Signaling*, *5*, 87-90. https://doi.org/10.33696/Signaling.5.115

Snoussi, C., Ducroc, R., Hamdaoui, M. H., Dhaouadi, K., Abaidi, H., Cluzeaud, F., . . . Bado, A. (2014). Green tea decoction improves glucose tolerance and reduces weight gain of rats fed normal and high-fat diet. *J Nutr Biochem*, *25*(5), 557-564. https://doi.org/10.1016/j.jnutbio.2014.01.006

Srinivasan, K. (2017). Ginger rhizomes (Zingiber officinale): A spice with multiple health beneficial potentials [Review]. *PharmaNutrition*, *5*(1), 18-28. https://doi.org/10.1016/j.phanu.2017.01.001

Talasaz, A. H., McGonagle, B., HajiQasemi, M., Ghelichkhan, Z. A., Sadeghipour, P., Rashedi, S., . . . Bikdeli, B. (2025). Pharmacokinetic and Pharmacodynamic Interactions between Food or Herbal Products and Oral Anticoagulants: Evidence Review, Practical Recommendations, and Knowledge Gaps. *Semin Thromb Hemost*, *51*(5), 560-571. https://doi.org/10.1055/s-0044-1790258

Tanasa , M.-V., Negreanu-Pirjol, T., Olariu, L., Negreanu-Pirjol, B.-S., Lepadatu, A.-C., Anghel , L., & Rosoiu, N. (2025). Bioactive Compounds from Vegetal Organs of Taraxacum Species (Dandelion) with Biomedical Applications: A Review. *International Journal of Molecular Sciences*, *26*(2), 450. https://www.mdpi.com/1422-0067/26/2/450

Tesoriere, L., Attanzio, A., Allegra, M., Gentile, C., & Livrea, M. A. (2013). Phytochemical indicaxanthin suppresses 7-ketocholesterol-induced THP-1 cell apoptosis by preventing cytosolic Ca(2+) increase and oxidative stress. *Br J Nutr*, *110*(2), 230-240. https://doi.org/10.1017/S000711451200493X

Torres, E., Pinaffi-Langley, A., Figueira, M. S., Cordeiro, K. S., Negrão, L. D., Soares, M. J., . . . de Camargo, A. C. (2022). Effects of the consumption of guarana on human health: A narrative review. *Compr Rev Food Sci Food Saf*, *21*(1), 272-295. https://doi.org/10.1111/1541-4337.12862

Tzeng, T.-F., & Liu, I. M. (2013). 6-Gingerol prevents adipogenesis and the accumulation of cytoplasmic lipid droplets in 3T3-L1 cells. *Phytomedicine*, *20*(6), 481-487. https://doi.org/http://dx.doi.org/10.1016/j.phymed.2012.12.006

Uebelhack, R., Busch, R., Alt, F., Beah, Z. M., & Chong, P. W. (2014). Effects of cactus fiber on the excretion of dietary fat in healthy subjects: a double blind, randomized, placebo-controlled, crossover clinical investigation. *Curr Ther Res Clin Exp*, *76*, 39-44. https://doi.org/10.1016/j.curtheres.2014.02.001

Van Kleef, E., Van Trijp, J. C., Van Den Borne, J. J., & Zondervan, C. (2012). Successful development of satiety enhancing food products: towards a multidisciplinary agenda of research challenges. *Crit Rev Food Sci Nutr*, *52*(7), 611-628. https://doi.org/10.1080/10408398.2010.504901

Vasques, C. A., Schneider, R., Klein-Junior, L. C., Falavigna, A., Piazza, I., & Rossetto, S. (2014). Hypolipemic effect of Garcinia cambogia in obese women. *Phytother Res*, *28*(6), 887-891. https://doi.org/10.1002/ptr.5076

Ventura-Aguilar, R. I., Bosquez-Molina, E., Bautista-Baños, S., & Rivera-Cabrera, F. (2017). Cactus stem (Opuntia ficus-indica Mill): anatomy, physiology and chemical composition with emphasis on its biofunctional properties [Review]. *Journal of the Science of Food and Agriculture*, *97*(15), 5065-5073. https://doi.org/10.1002/jsfa.8493

Villiger, A., Sala, F., Suter, A., & Butterweck, V. (2015). In vitro inhibitory potential of Cynara scolymus, Silybum marianum, Taraxacum officinale, and Peumus boldus on key enzymes relevant to metabolic syndrome. *Phytomedicine*, *22*(1), 138-144. https://doi.org/10.1016/j.phymed.2014.11.015

Wang, B., Zhang, W., Zhou, X., Liu, M., Hou, X., Cheng, Z., & Chen, D. (2019). Development of dual-targeted nano-dandelion based on an oligomeric hyaluronic acid polymer targeting tumor-associated macrophages for combination therapy of non-small cell lung cancer [Article]. *Drug Delivery*, *26*(1), 1265-1279. https://doi.org/10.1080/10717544.2019.1693707

Wiechert, M., & Holzapfel, C. (2021). Nutrition Concepts for the Treatment of Obesity in Adults. *Nutrients*, *14*(1). https://doi.org/10.3390/nu14010169

Xing, L., Zhang, H., Qi, R., Tsao, R., & Mine, Y. (2019). Recent Advances in the Understanding of the Health Benefits and Molecular Mechanisms Associated with Green Tea Polyphenols [Review]. *Journal of Agricultural and Food Chemistry*, *67*(4), 1029-1043. https://doi.org/10.1021/acs.jafc.8b06146

Yan, J., Zhao, Y., & Zhao, B. (2013). Green tea catechins prevent obesity through modulation of peroxisome proliferator-activated receptors. *Sci China Life Sci*, *56*(9), 804-810. https://doi.org/10.1007/s11427-013-4512-2

Yu, S., Yue, S., Liu, Z., Zhang, T., Xiang, N., & Fu, H. (2015). Yerba mate (Ilex paraguariensis) improves microcirculation of volunteers with high blood viscosity: a randomized, double-blind, placebo-controlled trial. *Exp Gerontol*, *62*, 14-22. https://doi.org/10.1016/j.exger.2014.12.016

Zhang, M., Zhao, R., Wang, D., Wang, L., Zhang, Q., Wei, S., . . . Wu, C. (2021). Ginger (Zingiber officinale Rosc.) and its bioactive components are potential resources for health beneficial agents. *Phytother Res*, *35*(2), 711-742. https://doi.org/10.1002/ptr.6858

Zhou, J., Ho, C. T., Long, P., Meng, Q., Zhang, L., & Wan, X. (2019). Preventive Efficiency of Green Tea and Its Components on Nonalcoholic Fatty Liver Disease [Review]. *Journal of Agricultural and Food Chemistry*, *67*(19), 5306-5317. https://doi.org/10.1021/acs.jafc.8b05032

Zhu, J., Chen, H., Song, Z., Wang, X., & Sun, Z. (2018). Effects of Ginger (Zingiber officinale Roscoe) on Type 2 Diabetes Mellitus and Components of the Metabolic Syndrome: A Systematic Review and Meta-Analysis of Randomized Controlled Trials [Review]. *Evidence-based Complementary and Alternative Medicine*, *2018*, Article 5692962. https://doi.org/10.1155/2018/5692962