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Review Article

Nutrition, dietary supplements and herbal medicines: a safest approach for obesity

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INTRODUCTION

The obesity is refers have an abnormally high proportion of body fat; scientifically it can be measured in body mass index, or BMI to justify overweight or obese patient. BMI is calculated using a mathematical formula that takes into account both a person's height and weight. A person is considered overweight if they have a BMI of between 25 and 29.9. A BMI of more than 30 is generally considered a sign of moderate to severe obesity. Obesity is associated with many serious preventable diseases including heart disease, diabetes, high blood pressure, stroke, gallbladder disease, osteoarthritis, and respiratory disorders. Obesity is progressively becoming a major epidemic thought out the world. In addition, The tried and true methods of weight loss are long-term lifestyle changes that consist of reducing calorie and fat intake and increasing physical activity.^{1,2} Unfortunately, making these lifestyle changes is often difficult, which leads to the appeal for the many prescription and nonprescription diet products that purport to help people shed pounds.

NUTRITION AND DIETARY SUPPLEMENTS

Diet

The control of diet or diet plans are enormously popular today in control of obesity and weight gain. It is one of the safe and effective ways for weight loss. Studies have consistently shown, however, that low-fat diets combined with low-calorie intakes are the safest, most effective method of weight loss for overweight or obese individuals, and the best way for them to keep the pounds off for good. Although high protein diets (more popular in recent years) have also shown promise in helping overweight individuals reduce cholesterol and blood sugar levels as well as weight, it is not known if this diet is safe and effective for weight loss over the long term. Some experts suggest that increased levels of physical activity are necessary for weight loss when eating a diet high in protein. Before attempting any diet low fat or high protein it is important to consult a healthcare practitioner for help in determining an appropriate weight loss program [1,2]

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Other Nutrition and Supplements

The supplements described below can be used as treatments for obesity. Before using any of the below supplements, be sure to discuss their safety and appropriateness with a healthcare provider.

5-Hydroxytryptophan (5-HTP)

5-HTP is obtained from the seeds of the African plant *Griffonia simplicifolia* which can be able to reduce binge eating, mainly related with obesity and dieting. The mechanism by which 5-HTP acts by boosting serotonin levels in the central nervous system, leads to reduce hunger cravings. (Serotonin levels drop during dieting, often causing carbohydrate cravings and possible binge eating.) The patient on antidepressant medications (SSRIs or MAOIs) must avoid 5-HTP [3].

Calcium

The study on overweight women put on daily intake of 1000 mg of calcium was associated with a loss of 8 kilograms in weight, and 5 kilograms in body fat. Unfortunately, these effects cannot be specifically attributed to calcium since dairy sources of calcium contained other nutrients that may have been involved in the weight loss [4-6].

Fiber

The evidence suggested that dietary fiber may help lower insulin levels (insulin controls the amount of sugar in the blood). In addition, one study of nearly 3,000 young adults suggests that high levels of insulin in the bloodstream (associated with low-fiber diets) may contribute to excessive weight gain for several reasons, including increased appetite [7].

Vitamin C

The experiments suggested that obese individuals may have lower vitamin C levels than non-obese individuals. The scientists speculate that insufficient amounts of vitamin C may contribute to weight gain by decreasing metabolic rates and energy expenditures [8, 9].

Fish Oil

The investigation on the effect of fish oil on obesity indicated that eating fish rich in omega-3 fatty acids (such as salmon, mackerel, and herring) seems to improve glucose-insulin metabolism and cholesterol levels in obese people both with and without high blood pressure. These effects were most pronounced when daily servings of fatty fish were incorporated into a weight loss program that included physical activity and a low-fat diet. These researches also suggest that people who follow a weight loss program achieve better control over their blood sugar and cholesterol levels when fish is a staple in the diet. Fatty, coldwater fish should be consumed at least two to three times per week to obtain adequate amounts of omega-3 fatty acids. [10,11].

Conjugated Linoleic Acid (CLA)

The preliminary studies on human and animal studies suggest that CLA can help control weight in obese individuals by reducing body fat and enhancing lean body mass. More studies are needed, however, to determine whether CLA is a safe and effective treatment for obesity, until such time, use of this supplement is not recommended [12].



Chitin

Chitin is a positively charged, abundantly available natural polysaccharide. Chitin obtained from the shells of crustaceans such as shrimp, crab and lobster. Chitosan is deacetylated product of chitin, which is commercially available for weight loss. The positive charge of polysaccharide is supposed to attract negatively charged bile acids and free fatty acids. The bound acids cannot be absorbed thus preventing an increase in dietary fat [13-16]. A comparison study was done with chitin and orlistat (Xenical); chitin showed no clinical benefit on fat absorption.¹⁷ However, orlistat did significantly inhibit the absorption of fat by 40% [17]. People who are allergic to shellfish should avoid chitin-containing products [15,16]. In addition, people who take chitin may be decreasing their absorption of vitamins A, D, E and K, and may need to take vitamin supplements [13]. No drug interactions are known to occur with chitin. Chitin may reduce cholesterol, urea and creatinine levels, and increase hemoglobin levels in patients on chronic hemodialysis [14].

Dehydroepiandrosterone (DHEA)

Dehydroepiandrosterone has recently been studied in humans as a treatment for obesity, and the results have been conflicting with animal studies, showed found DHEA to be effective in reducing body weight, studies of non-obese men and women showed that DHEA produced no change in total body weight, but measures of total body fat and LDL cholesterol did improve. These differences may be due to the fact that higher dosages were used in the animal studies than in the human studies (such high doses would cause intolerable side effects in people) [18, 19].

Chromium Picolinate

Chromium, a mineral which essential for normal glucose metabolism [14-16] and the deficiencies of chromium are very rare, but when they do occur it can lead to diabetes and atherosclerosis [15]. In weight loss preparations chromium is purported to maintain muscle mass and facilitate fat metabolism [15-16]. The chromium picolinate was studied for its effect, reduce fat along with a regular physical activity regimen on naval bases around the U.S, [20] the trial lasted 16 weeks which included 95 obese navy personnel. The results after 16 weeks showed no significant decrease in weight, percent body fat, or lean body mass. The major side effects included like nausea, vomiting, and ulcers and more severe like circulatory shock, hepatitis, and acute tubular necrosis [15].

Vitamin D

The studies indicated that obese people tend to have lower levels of vitamin D than people who are not obese, and that supplementation may correct that deficiency [21].

Other Supplements

Pyruvate

It has been promoted as a weight loss and cholesterol lowering supplement in some countries, but there is no substantive body of research to support these claims.

L-Carnitine

The claims that L-Carnitine aids in the oxidation of fatty acids, leads to use this supplement in weight loss preparation [14-16]. The investigation on 36 overweight females over 8 weeks showed that L-carnitine did not significantly affect total body mass or fat mass [23]. More clinical studies in both males and females are still needed to support carnitine use for weight loss.



Herbal medicines

Ephedra (*Ephedra sinensis*)

It is also widely as ma huang, widely used as energy boosters and weight loss stimulants. If we look in to history, it has been used by the Chinese to treat asthma, cold symptoms, headaches, and edema.^{14, 15} It is a natural stimulant that has shown to increase 24-hour energy expenditure in humans [24]. Like other stimulant products, ephedra acts to increase the body's metabolic rate. There have been a couple short-term trials that have shown benefits of ephedra with the addition of caffeine or guarana (herbal product that contains high levels of caffeine) over placebo in promoting weight loss [25-28]. In a recent study comparing Ma Huang/ Guarana to placebo the investigators found that the treatment group had a larger degree of weight and fat loss over the placebo group. The major drawbacks of this study were its small sample size, short study period (8 weeks), and 27% of the experimental group dropped out because of treatment related side effects (insomnia, headache, and dry mouth) [29]. In addition, ephedra has been associated with 17 cases of sudden death and a case report of hepatotoxicity [13]. The side effects associated with ephedra include tremor, agitation, and insomnia, which are usually transient. Some of the more serious complications that can occur with ephedra use include hypertension, stroke, heart attack, seizures, and death [13-16]. Though ephedra has shown some promise in achieving short-term weight loss, pharmacists should still be cautious in recommending this product to their patients due to the variability in the actual amount of ephedra in commercial products, and due to the potential for serious side effects. In addition, potential drug interactions include use with methylxanthines due to increases in the stimulatory effects, use with digitalis may cause cardiac arrhythmias, increases in the clearance of dexamethasone, and use with monoamine oxidize inhibitors could increase the risk of hypertension. Contraindications to ephedra use include anxiety, anorexia, bulimia, hypertension, glaucoma, cerebral insufficiency, incomplete bladder emptying due to prostate enlargement, pheochromocytoma, thyrotoxicosis, heart disease, and diabetes. [14].

Hydroxycitric acid (*Garcinia cambogia* and *Garcinia indica*)

It is obtained from plants native to India. *Garcinia* is an herbal compound that purports to lower body weight by completely inhibiting the enzyme adenosine triphosphate-citrate-lyase that converts citrate to coenzyme A [13-16]. This competitive inhibition has shown to prevent the storage of excess fat and inhibit appetite in rats [30]. Studies, however, in humans have not shown favorable results, or have had too small of a study group to prove clinical efficacy [13]. Even though the evidence for the efficacy of *garcinia* has not been that favorable, many weight loss preparations contain this compound. There has been one large double-blind placebo controlled study done on the effects of *garcinia* in humans [31]. It was a 12-week trial that had a total of 135 subjects. The investigators of this study found no significant difference in weight loss between the *garcinia*-treated group and the placebo-treated group. Therefore, their conclusion was that *garcinia* proved to be no better than placebo in a clinical trial [31]. The major side effects seen with *garcinia* include a laxative effect, abdominal pain, and vomiting [13, 15]. There have been no reported interactions to occur with other medications or disease states [14].

Guggul Gum

Guggul resin obtained from the plant species *C. myrrha* and its ability to cause weight loss is due to reports of it having thyroid stimulating activity [14-16]. Still there have no reported human studies support to this claim. The side effects that can occur with the use of guggul include gastrointestinal upset, headache, nausea, belching, and hiccups. It could also interact with diltiazem and propranolol, causing a reduction in bioavailability, and it may increase the potential for toxic effects with thyroid preparations [14].

Oolong tea (*Thea sinensis*)

Oolong tea is traditionally reported to have anti-obesity and hypolipidaemic effects. The present study was performed to clarify whether oolong tea prevented obesity induced in mice by the oral



administration of a high-fat diet for 10 weeks. High-fat diet-induced obese mice were treated with oolong tea for 10 weeks. The effects of various active fractions isolated from oolong tea on noradrenaline-induced lipolysis were examined with isolated fat cells and a cell-free system consisting of lipid droplets and hormone-sensitive lipase (HSL). The results showed mean food consumption was not significantly different between high-fat diet-treated mice and high-fat plus oolong tea diet-treated mice. Oolong tea prevented the obesity and fatty liver induced by a high-fat diet. A water extract of oolong tea enhanced noradrenaline-induced lipolysis, and the active substance was identified as caffeine. Caffeine enhanced noradrenaline-induced lipolysis in fat cells without a concomitant increase in HSL activity and also accelerated the hormone-induced lipolysis in a cell-free system consisting of lipid droplets and HSL, but not in the cell-free system with sonicated lipid droplets and HSL. Oolong tea extract inhibited pancreatic lipase activity. It was demonstrated that the anti-obesity effects of oolong tea in high-fat diet-treated mice might be due partly to the enhancing effect of caffeine isolated from oolong tea on noradrenaline-induced lipolysis in adipose tissue, and to the inhibitory action of some other substance in oolong tea on pancreatic lipase activity. Caffeine was found to enhance lipolysis through acting on lipid droplets but not on HSL. The results suggest that oolong tea may be an effective crude drug for the treatment of obesity and fatty liver caused by a high-fat diet [32].

Capsaicin (*Capsicum frutescens*)

The main pungent ingredient of hot red and chili pepper is the substance called capsaicin (trans-8-methyl-N-vanillyl-6-nonenamide) [33]. The preliminary evidence indicates that capsaicin may help the body burn fat, particularly when eating a high-fat diet. Capsaicin has been proposed as a correction for obesity's decreased sympathetic nervous system activity. In some conditions, capsaicin can increase energy expenditure and reduce energy intake. It has been shown that a meal with red pepper added increases respiration and produces a slight increase in energy expenditure in humans.³⁴ Rats fed high fat diets with added capsaicin gained less weight than controls [34].

Psyllium (*Plantaginis ovatae*)

The research on Psyllium, a soluble fiber indicated that, it may increase the sensation of fullness or satiety and reduce hunger cravings, and thus can act to reduce the weight. It is well studied as a lipid lowering agent with generally modest reductions seen in blood levels of total cholesterol and low density lipoprotein ("bad cholesterol"). Effects have been observed following eight weeks of regular use. Psyllium does not appear to have significant effects on high density lipoprotein ("good cholesterol") or triglyceride levels. Because only small reductions have been observed, people with high cholesterol should discuss the use of more potent agents with their healthcare provider. Effects have been observed in adults and children, although long term safety in children is not established [35].

Green tea (*Camellia sinensis*)

The studies suggest that green tea extract may boost metabolism and help burn fat, but there have been no specific studies of this herb in obese individuals. The researcher have elucidate the anti-obesity effects of three major components of green tea, catechins, caffeine and theanine, female ICR mice were fed on diets containing 2% green tea powder and diets containing 0.3% catechins, 0.05% caffeine and 0.03% theanine, which correspond, respectively, to their concentrations in a 2% green tea powder diet, singly and in combination for 16 weeks. Body weight and food intake were determined monthly during this period, kidneys, adrenals, liver, spleen, brain, pituitary and intraperitoneal adipose tissues (IPAT) were weighed and lipid levels in the serum and liver were measured at the end of this period. The body weight increase and weight of IPAT were significantly reduced by the diets containing green tea, caffeine, theanine, caffeine + catechins, caffeine + theanine and caffeine + catechins + theanine. Noticeably, the IPAT weight decreased by 76.8% in the caffeine + catechins compared to the control group. Serum concentrations of triglycerides (TG) and non-esterified fatty acids (NEFA) were decreased by green tea, catechins and theanine. Moreover, caffeine + catechins, caffeine + theanine and caffeine + catechins + theanine also decreased NEFA in the serum. The TG level in the liver was significantly reduced by catechins and catechins + theanine in



comparison with the control. These results indicated that at least caffeine and theanine were responsible for the suppressive effect of green tea powder (GTP) on body weight increase and fat accumulation. Moreover, it was shown that catechins and caffeine were synergistic in anti-obesity activities [36].

CONCLUSION

In medical terminology the obesity is a serious disease even in normal terminology it not taken very seriously. Without long-term changes in lifestyle (reduced calorie intake, exercise, and behavior modification) it is unlikely that patients will be able to maintain the weight loss that can be achieved by using nutritional and other supplements, based products as above mention with safer way.

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