A REVIEW ON ANTI-OBESITY

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ABSTRACT

Obesity is a global health concern associated with high morbidity and mortality. Therapeutic strategies include synthetic drugs and surgery, which may entail high costs and serious complications. Plant-based medicinal agents offer an alternative approach. A review of the studies on accessible botanical sources for the treatment of obesity is provided, which attempts to explain how these medicinal plants act to cause weight loss and which approach is safer and more efficient. Information was gathered for the period of 1991 to 2012. Five basic mechanisms, including stimulating thermogenesis, lowering lipogenesis, enhancing lipolysis, suppressing appetite and decreasing the absorption of lipids may be operating. Consumption of standardized medicinal plant extracts may be a safe treatment for obesity. However, some combinations of medicinal plants may result in either lower efficacy or cause unexpected side-effects. Since the time immemorial plants have been in use as sources of medicine throughout the world. The demand for plant-based medicines is ever growing as crude or processed products from plants have less or no adverse effects. The present review covers the taxonomy, habitat, distribution, extraction and identification of active principle of potential medicinal plants used in obesity treatment. The different biochemical markers used to evaluate the anti-obese effect of each plant is also considered.

KEYWORDS: Medicinal plants, fat absorption, dietary supplements, obesity, extraction.

INTRODUCTION

Ayurveda (Ayur = life, Veda = knowledge), which is “Science of Life”, originated from the Vedic times and is a part of holistic health care system. The chief source of ancient Indian
Aryan culture and medicine are the four Vedas that are traditionally believed to be revealed to the sages by Brahma (the creator) some 6000 years before Christian era. Ayurveda’s primary emphasis is on preservation and promotion of health, it also provides treatment for disease. Many undesirable constitutions (about eight) in the body are mentioned in “Charka Samhita”, an authentic source of Ayurveda. Obesity or “Medora” is one among them. It is said that it is comparatively easy to help an underweight person, rather than an overweight person. The overweight problem can be due to an actual increase in the fat component (MedaDhatu), or it can be due to malfunctioning. These, accordingly, will need different approaches. In very few cases it can be an off-shoot of other metabolic disorders.\[1\]

Accumulation of fat over the limit led to ill/adverse effect in the body known as obesity. Obesity is becoming one of the most prevalent health concerns among all populations and age groups worldwide resulting into a significant increase in mortality and morbidity related to coronary heart diseases, diabetes type 2, metabolic syndrome, stroke and cancers. Prevention and treatment of this problem are an important deal for health systems, whose aim is to reduce the obesity and overweight prevalence, and related complications over the world. Both lifestyle and pharmacotherapy interventions have been considered by physicians and other health care professionals as obesity treatment modalities. Studies show that only 5-10% subjects can maintain their weight loss over the year’s. The complex pathogenesis of obesity indicates the need of different intervention strategies to confront this problem with a simple drug therapy which is more acceptable to patients.\[1\]

Disappointing results, after cessation the lifestyle modification or pharmacotherapy indicated the need of other treatment modalities to produce better and long lasting results, in terms of weight loss. Herbal supplements and diet-based therapies for weight loss are among the most common n complementary and alternative medicine [CAM] modalities.\[1\] A vast range of these natural products and medicinal plants, including crude extracts and isolated compounds from plants can be used to induce weight loss and prevent diet-induced obesity. Obesity and overweight occurs due to imbalance between calories consumed and calories utilized. Globally, there have been two reasons for overweight and obesity.\[1,3\]

1. An increased intake of energy-dense foods that are high in fat, salt and sugars but low in vitamins, minerals and other micronutrients.
2. A decrease in physical activity due to the increasingly sedentary nature of Many forms of work, changing modes of transportation, and increasing urbanization Obesity and
overweight occurs due to imbalance between calories consumed and calories utilized. Globally, there have been two reasons for overweight and obesity: 1) an increased intake of energy-dense foods that are high in fat, salt and sugars but low in vitamins, minerals and other micronutrients; and, 2) a decrease in physical activity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization.\textsuperscript{[1,2]}

**The Probable Reasons for Obese Person to Prefer Herbal Products for Weight Management**

1) Health benefits of weight loss without any side effects.
2) Less demanding than accepted lifestyle changes, such as exercise and diet.
3) Easily available without a prescription.
4) More easily accepted than a professional consultation with a physician or a nutritionist.
5) 100% natural origin and perception that natural means safe.

In the recent decades, these have been vastly used in management of obesity due to containing a large variety of several components with different anti-obesity and anti-oxidant effects on body metabolism and fat oxidation. Herbal products for weight reduction may be effective in the management of obesity and associated disorders. Consistent and safe herbal product for weight reduction is a need of developed and developing countries. In our literature survey, herbal products showed potential effects on weight control. However, for the majority of products, more data are needed to assess the suitability as an anti-obesity product.

Medicinal plants have been investigated and reported to be useful in treatment of obesity, diabetes and other chronic diseases. To date, some reviews on anti-obesity agents have been accomplished including, our systematic review on efficacy and safety of herbal plants in the treatment of obesity that published 4 years ago. Because of the increasing number of randomized clinical trials conducted in the recent years, we felt the need for a new systematic review on this topic with a special focus on clinical trials. Therefore, the aim of the present review was to update data on potential anti-obesity herbal plants, and review the scientific data, including experimental methodologies, active components, and mechanisms of action against obesity in human.
Types of cholesterol
Lipids consist of a number of different chemicals: free fatty acids, triglycerides, sterols (cholesterol and cholesterol esters), and phospholipids (phosphoric acid esters of lipids). Triglycerides exist in nature as solids (fats) or liquids (oils). This depends on room temperature, the length of the fatty acid chain, and the extent of their hydrogen ion saturation. Triglycerides with short fatty acids and/or unsaturated fatty acids exist as liquids at room temperature (plant oils such as olive oil, corn oil, sunflower oil, etc). Triglycerides with long fatty acid chains and/or saturated fatty acids exist in the solid form at room temperature (animal fats such as butter, fat of meat, etc.).

There are three main types of cholesterol
1. Very Low Density Lipoprotein (VLDL)
This cholesterol is produced by the liver and is made up of 50% to 65% glycerides and 20% to 30% cholesterol. It is responsible for transporting triglycerides synthesized in the liver to adipose and muscular tissue. What remains of VLDL is broken down to LDL (Harikumar et al., 2013).

2. Low Density Lipoprotein Cholesterol (LDL)
LDL, often referred to as the “bad cholesterol,” consists of a predominantly cholesterol inner core. It forms as a result of the breakdown of the metabolites of VLDL. It is made up of 51% to 58% of cholesterol and 4% to 8% of triglycerides. It makes up about 60% to 75% of all plasma cholesterol (Harikumar et al., 2013). Its main function is to deliver cholesterol from the liver cells. If large quantities of LDL are carried and no new LDL receptors are formed, the LDL absorption will be diminished and a harmful buildup of LDL will take place which may increase the risk of CHD. A 25% reduction in plasma LDL level may reduce the occurrence of CHD by 50%.

3. High Density Lipoprotein (HDL)
This cholesterol, which is known as “good cholesterol,” tends to prevent arterial disease from occurring as it takes cholesterol away from the cells and back to the liver. Once in the liver, it may breakdown or be excreted from the body as waste. It is the smallest and densest of lipoproteins. High density lipoprotein constituents include 18% - 25% cholesterol and 2% - 7% triglycerides. It contributes approximately 20% - 30% of total cholesterol in the bloodstream. The main function of HDL is to transport cholesterol from the body tissue to the liver where it is broken down and excreted in the bile. Thus, accumulation of cholesterol is
prevented. The amount of transported cholesterol is about 25% of the cholesterol in plasma. Unlike high LDL and VLDL blood levels, high HDL blood levels reduce the risk of incidence of CHD. It has been shown that healthy diet and physical exercise tend to elevate HDL blood level (Harikumar et al., 2013).

Causes of obesity
Hyperlipidemia is due to genetic and environmental factors, including:
1. Presence of diseases that tend to increase LDL blood levels. Such diseases include, but are not limited to: diabetes, hypertension, hyper triglyceridemia, kidney and liver diseases.
2. Family history of developing CHD or CVA early in their lives (under 55 for brother and father and under 65 years of age for mother and sister). Likewise, family history of hyperlipidemia early in life will increase the risk of developing hyperlipidemia.
3. Gender: Men have a greater chance of developing hyperlipidemia than women.
4. Age: As a person becomes older, so does the chance for developing atherosclerosis and hyperlipidemia.
5. Many foods such as eggs, butter, liver, kidneys, and certain sea foods contain cholesterol in amounts that will not drastically change cholesterol blood levels. Other foods, especially if consumed in relatively large quantities and frequently, can detrimentally affect cholesterol and triglyceride blood levels. Red meat, many cheeses, creamy cakes, ice cream, sausages and hot dogs have high contents of saturated fats and may affect the outcome of cholesterol blood concentration.
6. Sedentary lifestyle: It has been shown that non-vigorous physical activity tends to reduce LDL and elevate HDL blood levels.
7. Smoking: It has been reported that smoking contributes to about 400,000 deaths annually in the US. In addition to contributing to cancer and cardiovascular diseases, it detrimentally affects the levels of LDL and HDL. Cigarette smoking decreases HDL level while it elevates LDL.
8. Alcoholic Beverages: Persons who regularly consume large quantities of alcoholic beverages exhibit high LDL and low HDL levels. Cholesterol blood level is normally unaffected in people who do not drink or who drink in moderation.

The Indian Traditional Medicine like Ayurveda, Siddha and Unani are predominantly based on the use of plant materials. Herbal drugs have gained importance and popularity in recent
years because of their safety, efficacy and cost effectiveness. The association of medical plants with other plants in their habitat also influences their medicinal values in some cases. One of the important and well-documented uses of plant products is their use as hyperlipidemia agents. Hence, there is an ever in-creasing need for safe hyperlipidemia agent.

HERBS RECOMMENDED FOR OBESITY

Evidences are emerging to support that an increasing consumption of herbs are effective strategy for obesity control and weight management. Usage of plants and plant products has potential to keep the increasing prevalence of metabolic syndrome in control. There are few drugs in the market to prevent/manage obesity but there are the costs, efficacy and side effects to consider. For centuries people across the countries have been using natural products as plant based dietary supplements for weight control.[24]

According to the World Health Organization (WHO), approximately 80% of the world's population currently uses herbal medicines in healing different ailments. Among the estimated 400,000 plant species, only 6% have been studied for biological activity, and about 15% have been investigated phytochemically. This shows a need for planned activity guided phyto pharmacological evaluation of herbal drugs. This article is aimed to provide an overview of research work done on 20 anti obese plants with more emphasis on solvent used to extract, dosage administered, active principle identified and biochemical parameters employed to validate anti- hyperlipidemia effect of each plant.[17]

Table: Medicinal plants having anti-hyperlipidemia activity

<table>
<thead>
<tr>
<th>S.no</th>
<th>Plant</th>
<th>Family</th>
<th>Plant Part Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Achyrathus aspera</td>
<td>Amaranthaceae</td>
<td>Leaf</td>
</tr>
<tr>
<td>2.</td>
<td>Acorus calamus</td>
<td>Araceae</td>
<td>Roots</td>
</tr>
<tr>
<td>3.</td>
<td>Cissus quadrangularis</td>
<td>Vitaceae</td>
<td>Whole Plant</td>
</tr>
<tr>
<td>4.</td>
<td>Garcinia cambogia</td>
<td>Guttifera</td>
<td>fruit and the rind of this plant</td>
</tr>
<tr>
<td>5.</td>
<td>Gymnema sylvestre</td>
<td>Asclepiadaceae</td>
<td>Leaf</td>
</tr>
<tr>
<td>6.</td>
<td>Lagerstremia speciosa</td>
<td>Lythraceae</td>
<td>Whole Plant</td>
</tr>
<tr>
<td>7.</td>
<td>Momordica charantia</td>
<td>Cucurbitaceae</td>
<td>Fruit</td>
</tr>
<tr>
<td>8.</td>
<td>Myristica fragrans</td>
<td>Myristicaceae</td>
<td>Whole Plant</td>
</tr>
<tr>
<td>9.</td>
<td>Panax ginseng</td>
<td>Aralioidae</td>
<td>Whole Plant</td>
</tr>
<tr>
<td>10.</td>
<td>Solanum melongena</td>
<td>Solanaceae</td>
<td>Fruits</td>
</tr>
<tr>
<td>11.</td>
<td>Zingiber officinale</td>
<td>Zingiberaceae</td>
<td>Whole Plant</td>
</tr>
<tr>
<td>12.</td>
<td>Tamarindus indica</td>
<td>Fabaceae</td>
<td>Pulp</td>
</tr>
<tr>
<td>13.</td>
<td>Plumbago zeylanica</td>
<td>Plumbaginaceae</td>
<td>Root</td>
</tr>
<tr>
<td>14.</td>
<td>Coleus forskohlii</td>
<td>Lamiaceae</td>
<td>Whole Plant</td>
</tr>
<tr>
<td>15.</td>
<td>Allium sativum</td>
<td>Alliaceae</td>
<td>Whole Plant</td>
</tr>
</tbody>
</table>
CONCLUSION

Different methods have been used to reduce body weight and its complications for many years. Disappointing results after cessation the lifestyle modification or pharmacotherapy compelled the researchers and physicians to rethink to find a new, safe and striking therapeutic alternative for this global health concern. Herbal medicines have been in attention as an effective option to reduce body weight and body fat. Taking all results collectively, Nigella sativa, Camellia syntheses, green tea, and black Chinese tea were found to have acceptable anti-obesity effects.

Many studies reported the anti-obesity effects of different herbal plants containing minerals or chemical extracts of plants. Anti-obesity effects such as decreasing bodyweight; body mass index or waist circumference in humans was seen in most of these studies. Some of them showed an anti-obesity effect by decreasing total body fat. A study showed a significant decrease in body weight by IssusQuadrangular is (CQ), Sambuca’s Ingra, Asparagus Officials, Garcia Atroviridis, Ephedra and Caffeine, Smilax (extract of several plants, including Zingierofficinal and Bofutsushosan). In this study, the effect of Epigallocatechin-3-gallate in combination with caffeine was evaluated, with no important changes in body weight or energy expenditure. We believe that safety of these plants remains to be elucidated by further long-term studies.

REFERENCES


