



A REVIEW ON THE VARIOUS HERBAL PLANTS USED FOR THE TREATMENT OF OBESITY

**Padmavathi Sakinala*, Vani Thammireddy., Sai Sreelakshmi Gasi., Vara Lakhshmi.Tanga.,
Aishwarya Annapureddy., Asha Gummadi and Sravani Gotteparthi**

Department of Pharmaceutical Chemistry and Phytochemistry, Nirmala College of Pharmacy,
Atmakur, Mangalagiri, Guntur- 522503

ARTICLE INFO

Article History:

Received 06th July, 2018

Received in revised form 14th August, 2018

Accepted 23rd September, 2018

Published online 28th October, 2018

Key words:

Herbal Drugs, Antiobesity,
Phytopharmaceuticals

ABSTRACT

Obesity is the most commonly caused by combination of excessive food intake, lack of physical exercise and genetic susceptibility. There are various synthetic drugs available for the treatment of obesity but they are having the side effects. There is search for the herbal medicines for the treatment obesity. In the listed plants most of the plants, the underground parts having active phytochemical constituents which are having antiobesity activity by inhibiting the enzymes alpha- glucosidase and human pancreatic lipase. In some plants aerial parts such as leaves, fruits, stems, flowers, seeds are having active phytochemical agents which inhibits serum triglycerides, LDL, Cholesterol levels. Near about seventy plants are listed which are having antiobesity activity they can be used for further research by isolating screening of phytopharmaceuticals.

Copyright©2018 Padmavathi Sakinala et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health. People are generally considered obese when their body mass index(BMI), a measurement obtained by dividing a personal's weight by the square of the personal' height, is over 30 kg/m², with the range 25-30 kg/m² defined as overweight. Obesity increases the likelihood of various diseases and conditions, particularly cardiovascular diseases, type 2 diabetes, obstructive sleep apnea, certain types of cancer, osteoarthritis and depression.

Obesity is most commonly caused by a combination of excessive food intake, lack of physical activity, and genetic susceptibility. In few cases it is caused due to genes, endocrine disorders, medications, or mental disorder. The view that obese people eat little yet gain weight due to a slow metabolism is not medically supported. On average, obese people have a greater energy expenditure than their normal counterparts due to the energy required to maintain an increased body mass.

Obesity is mostly preventable through a combination of social changes and personal choices. Changes to diet and exercising are the main treatments. Diet quality can be improved by reducing the consumption of energy-dense foods, such as those

high in fat or sugars, and by increasing the intake of dietary fibres. Medications can be used, along with a suitable diet, to reduce appetite or decrease fat absorption. If diet, exercise, and medication are not effective, a gastric balloon or surgery may be performed to reduce stomach volume or length of the intestines, leading to feeling full earlier or a reduced ability to absorb nutrients from food.

Obesity is a leading preventable cause of death worldwide, with increasing rate in adults and children. Obesity is most common in women than in men.

Causes of obesity

1. Diet or behaviour
2. Community environment.
3. Genetics
4. Other illness

Diet or behaviour

Healthy behaviour includes a healthy diet pattern and regular physical activity. Energy balance of the number of calories consumed from foods and beverages with the number of calories the body uses for activity plays a role in preventing excess weight gain. A healthy diet pattern follows the dietary guidelines for Americans which emphasizes eating whole grains, fruits, vegetables, lean protein, low- fat and fat-free dairy products and drinking water. Having a healthy diet pattern and regular physical activity is also important for long term health benefits and prevention of chronic diseases such as type2 diabetes and heart diseases.

*Corresponding author: **Padmavathi Sakinala**

Department of Pharmaceutical Chemistry and
Phytochemistry, Nirmala College of Pharmacy,
Atmakur, Mangalagiri, Guntur- 522503

Community environment

A person may choose not to walk or bike to the store or to work because of a lack of sidewalks or safe bike trails. Community, home, child care, and work place settings can influence people’s daily behaviour.

Genetics

Genetic changes in human population occur too slowly to be responsible for the obesity epidemic. Nevertheless, the variation in how people respond to the environment that promotes physical inactivity and intake of high-calorie foods suggests that genes do play in the development of obesity. Genes gives the body instructions for responding to change in its environment. Rarely, a clear pattern of inherited obesity within a family is caused by a specific variant of a single gene.

Other factors: diseases and drugs





Some illnesses may lead to obesity or weight gain. These may include Cushing’s disease, and polycystic ovary syndrome. Drugs such as steroids and some antidepressants may also cause weight gain. The science continues to emerge on the role of other factors in energy balance and weight gain such as chemical exposures and the role of the micro biome.

A health care provider can help you learn more about your health habits and history in order to tell you whether behaviours, illnesses, medications, and/psychological factors are contributing to weight gain or making weight loss hard.

Medications or drugs used to cure obesity

Weight-loss Medications	Approved for	How it works	Common side Effects	Warning
ORLISTAT (xenical) Available in lower dose without prescription.	Adults and Children ages 12 and older.	Works in your Gut to reduce The amount of fat your body absorbs from the food you eat.	<ul style="list-style-type: none"> • Diarrhoea • Gas • Leakage of oily stools • Stomach pain 	Rare cases of severe liver injury have been reported. Avoid taking with cyclosporine. Take a multivitamin pill daily to make sure you get enough of certain vitamins that your body may not absorb from the food you eat.
LORCASERIN (BELIQ)	ADULTS	Acts on the serotonin receptors in your brain may help full after eating smaller amounts of food.	<ul style="list-style-type: none"> • Constipation • Cough • Dizziness • Dry mouth • Feeling tired • Headaches • nausea 	Tell your doctor if you take antidepressants or migraine medications, since some of these can cause problems when taken together.
NALTREXONE-BUPROPION (CONTRAVE)	ADULTS	A mix of two medications: naltrexone, which is used to treat alcohol and drugs dependence and bupropion, which is used to treat depression or help people quit smoking. May make you feel less hungry or full sooner.	<ul style="list-style-type: none"> • Constipation • Dizziness • Dry mouth • Diarrhoea • Headache • Increased blood pressure • Increased heart rate • Insomnia • Liver damage • Nausea • vomiting 	Don’t use if you have uncontrolled high blood pressure, seizures or a history of anorexia or bulimia nervosa. do not use if you are dependent on opioid pain medications or withdrawing from drugs or alcohol. Do not use if you are taking bupropion
PHENTERMINE-TOPIRAMATE	Adults	A mix of two medications: phentermine, which lessens your appetite, and topiramate, which is used to treat seizures or	<ul style="list-style-type: none"> • dizziness • dry mouth • taste changes, especially with carbonated beverages • tingling of your hands and feet • trouble sleeping • nausea • diarrhoea • constipation • abdominal pain • headache • raised pulse • Dry mouth 	Don’t use if you have glaucoma or hyperthyroidism. Tell your doctor if you have had a heart attack or stroke, abnormal heart rhythm, kidney disease, or mood problems. may lead to birth defects. do not take if you are pregnant.
LIRAGLUTIDE Available by injections only	Adults	May make you feel less hunger or full sooner. At a lower dose under a different name, victoza	<ul style="list-style-type: none"> • Constipation • Difficulty sleeping • Dizziness • Feeling nervous • feeling 	May increase the chance of developing pancreatitis. Has been found to cause a rare type of thyroid tumour in animals.
Other medications that curb your desire to eat include	Adults	Increase chemical in your brain to make you feel you are not hungry or that you are full.	<ul style="list-style-type: none"> • phentermine • benzphetamine • diethylpropion • phendimetrazine 	Do not use if you have heart disease, uncontrolled high blood pressure, hyperthyroidism, or glaucoma. Tell your doctor if you severe anxiety or other mental health problems.

Medicinal plants used to cure obesity

Lno	PLANT NAME	PART	MECHANISM	PHOTO
1.	Achyranthes asperal (amaranthaceous)	seed	The plant lowers total cholesterol, total triglyceride, and ldl-cholesterol, and increases HDL cholesterol level.	
2.	Acorus calamus (araceae)	Rhizome, Roots and leaves	Ethyl acetate extract of A. calamus inhibits Alpha-glycosidase activity.	
3.	Achyranthes bidentata (amaranthaceae)	Root	The drug effects on differentiation of adipocyte and decrease of phosphor- atk expression.	
4.	ACTINIDIA POLYGAMA MAX	FRUIT	Serum levels of aspartate decreased in the mice treated with the extract without changes in serum levels of alanine transaminase blood urea nitrogen and creatinine.	
5.	ADENOPHORA TRIPHYLLA HARA (campanulaceae)	Root	Anti-obesity effect of A. triphyllais mediated by increasing adipocytes adiponectin and activating pathway like AMPK, and PPAR-a, and decreasing adipokinases, GPHD. It also actively expresses low-density lipoprotein receptor and inhibits expression of HMG-coA REDUCTASE.	

6. AEGLE
MARMELOSA

Leaves

The active chemical constituents of this plant for anti- adipogenic activity are halfordinol, ethyl ether aegeline and esculetin were responsible for the decrease in adipocyte accumulation. Active compound umbelliferone and esculetin depletes lipid content in the adipocytes and by decreasing the hyperlipidaemia.



7. ALLIUM CEPA
(amaryllidaceae)

Peel

The mrna levels of activating protein is down-regulated by A.cepa and those of carnitine palmitoyl tranferase-1 and fatty acid binding protein 4 are up regulated. It is also proposed that it increases level of mrna and il-6 mrna levels



8. ALLIUM
FISTULOSUM

Root

Significant reduction in body weight as well as adipocyte size



9. ALLIUM NIGRUM
(Amaryllidaceae)

Bulb

Extract of A.nigrum up regulates AMPK, FOXO1,SIRT1,ATGL,HSL, PERILIPIN, ACO, CPT-1, AND UCP1 IN THE adipose tissues, whereas it down regulates cd36



10.

ALLIUM SATIVUM
amaryllidaceae

Stem, bulb
and roots

It increases antioxidant enzymes and suppresses glutathione depletion and lipid peroxidation in hepatic tissue. Oil isolated from A. sativum down regulates sterol regulatory element binding HMG COA reductase



11.

ALPINIA
GALANGA

Rhizome

Galangin , the principal component of this plant decreases serum lipids, liver weight, lipid peroxidation and accumulation of hepatic TGs.



12.

ALPINIA
OFFICINARUM

Root

The drug controls and improves lipid profile in animals by lowering serum total-c tg, and leptin content.



13.

ANGELICA GIGAS
NAKAI

Root

Decurion the active constituent of A. gigas improves glucose tolerance. Decursin along with the HFD significantly reduces secretion of adipocytokinases such as leptin



14. ARGYERIA NERVOSA Root Serum contents of leptin, total cholesterol, LDL, and triglycerides by this plant.



15. ARTEMISIA IWAYOMOGI Whole plant It down regulates adipogenic transcription factors and their target gene CD36, ap2, and FAS. The extract decrease gene expression of proinflammatory cytokines including MPC1, IL-6 in epididymal adipose tissue and reduces plasma levels of MPC1.



16. ATRACTYLODES LANCEA Rhizome It inhibits human pancreatic lipase.



17. ASTER PSEUDOGLEHNI LIM, HYUN & SHIN Leaves It suppresses expression of adipogenesis-related genes including SREBP1c.



18. BAUHINIA VARIEGATA Stem and root barks It increases brain serotonin level and high-density lipoprotein with a concomitant decrease in total cholesterol, triglycerides and low-density lipo protein.



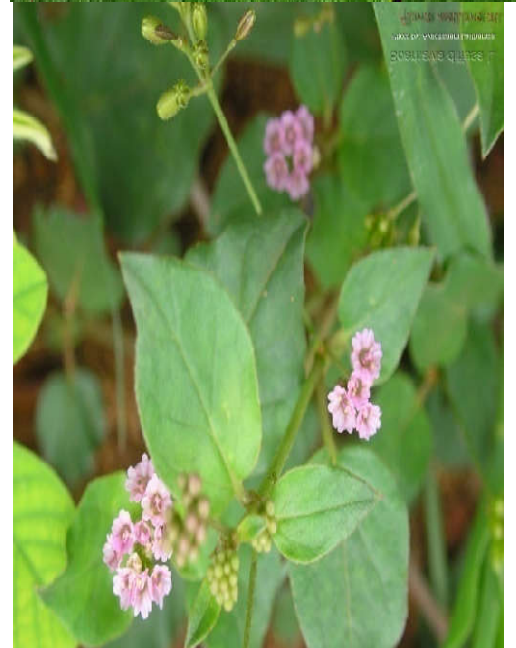
19. BERGENIA CRASSIFOLIA Leaves Galloylbergenin derivatives moderates anti-lipids accumulation activities.



20. BOEHMERIA NIVEA Leaves It reduces adipose tissue weight serum alkaline aminotransferase and lactate dehydrogenase activities. Serum triglycerides, total cholesterol, LDL-cholesterol level, atherogenic index and cardiac risk factors are decreased in animals fed with leaf powder.



21. BOERHAAVIA DIFFUSA Root The phytoconstituents compounds citosterol found in this plant which is structurally similar to cholesterol by lowering the level of LDL-cholesterol and cholesterol level decreased significantly in plasma.



22. BOMBAXY CEBIA Stem bark The extra and active constituent reserves the effect of HFD treatment on serum parameters. This activity may be due to the inactivation of acetyl-coA carboxylase.



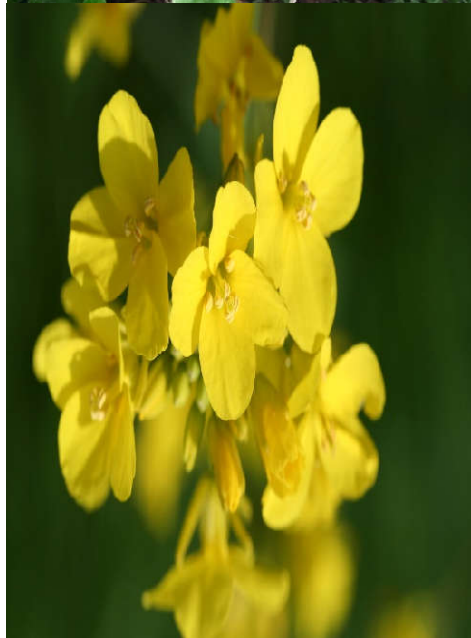
23. Anredera Cordifolia Leaves

It supresses lipid accumulation and down regulates PPAR γ and their target genes.



24. Brassica RAPA Root

Lipolysis-related genes including adrenergic reactions receptors, hormone-sensitive lipase, adipose triglyceride lipase are induced in white adipocytes of animals treated with extract



25. Buddleja Officinalis Whole plant

The extract reduces body weight gain induces through adipocytes differentiation.



26. Bursera Grandiflora Roots

This exerts anti-obesity activity by decreasing in the plasma-triglyceride levels.



27. Calanus Finmarchicus Wax

It reduces macrophages infiltration and down regulates expression of proinflammatory genes including tumour necrosis factor

CONCLUSION

There are seventy herbal plants which are having antiobesity activity. The phytopharmaceutical agents are present in various parts of the plants. Roots and rhizomes of the plants decreases serum lipids, liver weight, lipid peroxidation and accumulation of hepatic TGS. In some cases whole parts of the plants having the activity which regulates adipogenic transcriptopn factors and their target was geneCD36, ap2.

In some plants flowers are having combined effect of decreasing exogenous lipid absorption. Stems are having antiobesity activity due to the inactivation of acetyl co-A carboxylase. It suppresses lipid accumulation and down regulates PPAR γ and their target genes.

References

1. Centre WM (2015) Obesity and overweigh. World Health Organization.

2. Devlin MJ, Yanovski SZ, Wilson GT (2000) Obesity: what mental health professionals need to know. *Am J Psychiatry* 157: 854-866.
3. Rosen ED, Walkey CJ, Puigserver P, Spiegelman BM (2000) Transcriptional regulation of adipogenesis. *Genes Dev* 14: 1293-1307.
4. Pagliassotti MJ, Gayles EC, Hill JO (1997) Fat and energy balance. *Ann N Y Acad Sci* 827: 431-448.
5. Mandrup S, Lane MD (1997) Regulating adipogenesis. *J Biol Chem* 272: 5367-5370.
6. Ducharme NA, Bickel PE (2008) Lipid droplets in lipogenesis and lipolysis. *Endocrinology* 149: 942-949.
7. Akiyama T, Tachibana I, Shirohara H, Watanabe N, Otsuki M (1996) High-fat hypercaloric diet induces obesity, glucose intolerance and hyperlipidaemia in normal adult male Wistar rat. *Diabetes Res Clin Pract* 31: 27-35.
8. Yudkin JS (1999) C-reactive protein in healthy subjects: associations with obesity, insulin resistance, and endothelial dysfunction: a potential role for cytokines originating from adipose tissue? *Arterioscler Thromb Vasc Biol* 19: 972-978.
9. Freytag SO, Utter MF (1983) Regulation of the synthesis and degradation of pyruvate carboxylase in 3T3-L1 cells. *J Biol Chem* 258: 6307-6312.
10. Kim EJ, Jung SN, Son KH, Kim SR, Ha TY, *et al.* (2007) Antidiabetic and anti-obesity effect of cryptotanshinone via activation of AMP-activated protein kinase. *Mol Pharmacol* 72: 62-72.
11. Klop B, Elte JW, Cabezas MC (2013) Dyslipidemia in obesity: mechanisms and potential targets. *Nutrients* 5: 1218-1240.
12. Kopelman PG (2000) Obesity as a medical problem. *Nature* 404: 635-643.
13. Matson KL, Fallon RM (2012) Treatment of obesity in children and adolescents. *J Pediatr Pharmacol Ther* 17: 45-57.
14. Bhutani KK, Birari RB, Kapat K (2007) Potential antiobesity and lipid lowering natural products: a review. *Nat. Prod. Commun* 2: 331-348.
15. Drew BS, Dixon AF, Dixon JB (2007) Obesity management: update on orlistat. *Vasc Health Risk Manag* 3: 817-821.
16. Tziomalos K, Krassas GE, Tzotzas T (2009) the use of sibutramine in the management of obesity and related disorders: an update. *Vasc Health Risk Manag* 5: 441-452.
17. Connolly HM, Crary JL, McGoon MD, Hensrud DD, Edwards BS, *et al.* (1997) Valvular heart disease associated with fenfluramine-phentermine. *N Engl J Med* 337: 581-588.
18. James WP, Caterson ID, Coutinho W, Finer N, Van Gaal LF, *et al.* (2010) Effect of sibutramine on cardiovascular outcomes in overweight and obese subjects. *N Engl J Med* 363: 905-917.
19. Kang JG, Park CY (2012) Anti-Obesity Drugs: A Review about Their Effects and Safety. *Diabetes Metab J* 36: 13-25.
20. Glazer G (2001) Long-term pharmacotherapy of obesity 2000: a review of efficacy and safety. *Arch Intern Med* 161: 1814-1824.
21. Mayer MA, Höcht C, Puyó A, Taira CA (2009) recent advances in obesity pharmacotherapy. *Curr Clin Pharmacol* 4: 53-61.
22. Moro CO, Basile G (2000) Obesity and medicinal plants. *Fitoterapia* 71 Suppl 1: S73-82.
23. Han LK, Kimura Y, Okuda H (2005) Anti-obesity effects of natural products. *Studies in Natural Products Chemistry* 2005 30: 79-110.
24. Rani N, Sharma SK, Vasudeva N (2012) Assessment of Antiobesity Potential of *Achyranthes aspera* Linn. Seed. *Evid Based Complement Alternat Med* 2012: 715912.
25. Mythili Avadhani MN (2013) The Sweetness and Bitterness of Sweet Flag [*Acorus calamus* L.] – A Review. *Research Journal of Pharmaceutical, Biological and Chemical Sciences* 4: 598-610.
26. Oh SD, Kim M, Min BI, Choi GS, Kim SK, *et al.* (2014) Effect of *Achyranthes bidentata* Blume on 3T3-L1 Adipogenesis and Rats Fed with a High-Fat Diet. *Evid Based Complement Alternat Med* 2014: 158018.
27. Sung YY, Yoon T, Yang WK, Moon BC, Kim HK (2013) Anti-obesity effects of *Actinidia polygama* extract in mice with high-fat diet-induced obesity. *Mol Med Rep* 7: 396-400.
28. Hyun-Jin C, Mi Ja C, Seung-Shi H (2010) Antiobese and hypocholesterolaemic effects of an *Adenophora triphylla* extract in HepG2 cells and high fat diet-induced obese mice. *Food Chemistry* 119: 437-444.
29. Lee SE, Lee EH, Lee TJ, Kim SW, Kim BH (2013) Anti-obesity effect and action mechanism of *Adenophora triphylla* root ethanol extract in C57BL/6 obese mice fed a high-fat diet. *Biosci Biotechnol Biochem* 77: 544-550.
30. Karmase A, Birari R, Bhutani KK (2013) Evaluation of anti-obesity effect of *Aegle marmelos* leaves. *Phytomedicine* 20: 805-812.
31. Karmase A, Jagtap S, Bhutani KK (2013) Anti adipogenic activity of *Aegle marmelos* Correa. *Phytomedicine* 20: 1267-1271.
32. Kim OY, Lee SM, Do H, Moon J, Lee KH, *et al.* (2012) Influence of quercetin-rich onion peel extracts on adipokine expression in the visceral adipose tissue of rats. *Phytother Res* 26: 432-437.
33. Moon J, Do HJ, Kim OY, Shin MJ (2013) Antiobesity effects of quercetin-rich onion peel extract on the differentiation of 3T3-L1 preadipocytes and the adipogenesis in high fat-fed rats. *Food Chem Toxicol* 58: 347-354.
34. Sung YY, Yoon T, Kim SJ, Yang WK, Kim HK (2011) Anti-obesity activity of *Allium fistulosum* L. extract by down-regulation of the expression of lipogenic genes in high-fat diet-induced obese mice. *Mol Med Rep* 4: 431-435.
35. Chen YC (2014) Methanolic extract of black garlic ameliorates diet-induced obesity via regulating adipogenesis, adipokine biosynthesis, and lipolysis. *Journal of Functional Foods* 9: 98-108.
36. Kim I, Kim HR, Kim JH, Om AS (2013) Beneficial effects of *Allium sativum* L. stem extract on lipid metabolism and antioxidant status in obese mice fed a high-fat diet. *J Sci Food Agric* 93: 2749-2757.
37. Lai YS (2014) Garlic essential oil protects against obesity-triggered nonalcoholic fatty liver disease

- through modulation of lipid metabolism and oxidative stress. *J Agric Food Chem* 62: 5897-5906.
38. Kumar S, Alagawadi KR (2013) Anti-obesity effects of galangin, a pancreatic lipase inhibitor in cafeteria diet fed female rats. *Pharm Biol* 51: 607-613.
39. Jung CH, Jang SJ, Ahn J, Gwon SY, Jeon TI, *et al.* (2012) *Alpinia officinarum* inhibits adipocyte differentiation and high-fat diet-induced obesity in mice through regulation of adipogenesis and lipogenesis. *J Med Food* 15: 959-967.
40. Xia DZ, Yu XF, Wang HM, Ren QY, Chen BM (2010) Anti-obesity and hypolipidemic effects of ethanolic extract from *Alpinia officinarum* Hance (Zingiberaceae) in rats fed high-fat diet. *J Med Food* 13: 785-791.

How to cite this article:

Padmavathi Sakinala *et al* (2018) 'A Review on The Various Herbal Plants Used For The Treatment of Obesity', *International Journal of Current Advanced Research*, 07(10), pp. 15713-15722.
DOI: <http://dx.doi.org/10.24327/ijcar.2018.15722.2879>
