Review Article

Classical Medicinal Plants Associated with Anti Obesity Activity

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ABSTRACT

Obesity is a condition aroused due to an in equilibrium between the energy consumption and expenditure. It is a global health concern for the population of different age groups. An individual's BMI defines his rate of obesity and is associated with many health consequences. Pathophysiology revealed when compared to healthy individuals' amount of leptin in plasma was found to be high in obese individuals. Obesity mostly alters the brain circuits & neuroendocrine hormones concerned with pathological overeating, reduced physical activity and related pathophysiological conditions. There is a great need for the identification of natural products replaces synthetic medicines. These medicinal plants are potent anti-obesity agents offering less side effects compared to the modern medicines.

Keywords: Obesity, consumption, neuroendocrine, Pathophysiology.

INTRODUCTION

Obesity is generally a medical condition that reflects the excess fat deposition in the body leading to many health consequences. The amount of fat deposition in the body can be determined from relative weight and BMI and can be measured as the percentage of body fat.[1] It is basically a condition aroused due to an in equilibrium between the energy consumption and expenditure. [2]

BMI is the body mass index that indicates the exact amount of fat deposition in the body in terms of percentage. The BMI values are not appropriate in pregnant women and body builder (or) wrestlers. It is calculated by a simple formula composed of body weight (kilogram) to the square of height (meters)[2] and is usually expressed in metric as well as US customary units.

$$BMI = \frac{weight\ (kg)}{height\ (m)^2}$$

Units = Pounds.

An individual's BMI defines his rate of obesity. According to WHO 2000, the classification of weight is done based on BMI values.[3]

Table 1: Body weight is classified based on BMI.[4]

BMI	<18.5	18.5-24.9	25.0-29.9	30.0-34.9	35.0-39.9	>-40.0
Classification	Under weight	Normal weight	Over weight	Class-1 obesity	Class-III obesity	Class-III obesity

Obesity is considered as one of the major factor responsible for morbidity & mortality the world wide.[5]

- It is the greatest and most active neglected [6] current social health issue[2] in developing and developed nation.[7]
- It is a global health concern for the population of different age groups.[8]
- Obese patients are more prone to morbidity & motility when compared to the normal individuals.[9, 10]

Obesity is associated with many health consequences such as hypertension, dyslipidamia, Diabetes mellitus, myocardial infractions, osteoarthritis, cancers, stroke, sleep apnea[11] reproductive conditions,[12] fatty liver and atherosclerosis.[13] It worsens chronic and metabolic syndrome thereby reducing the quality of life & elevating the mortality of the individuals.[14]

Epidemiology observations on obesity in 2014 revealed that obesity is the leading cause for the cancer of breast, colon, endometrial, esophagus, gastric cardiac, gall bladder, kidneys, and liver etc.[15]

Obesity mostly alters the brain circuits & neuroendocrine hormones concerned with pathological overeating, reduced physical activity and related pathophysiological conditions.[16]

ETIOLOGY

There are many reasons that contribute to obesity. Some of them are enlisted as-

- Excess intake of calorie loaded food

- Reduced physical activity[17, 18]
- Personality traits
- Depression
- Pharmaceutical concominent – effects and drug intoxication[19]
- Food obsession
- Genital / hereditary predisposition[16]
- Economic growth
- Lifestyle modifications[20]
- The latest treatment of obesity includes physical exercise, drug treatment such as lipase inhibitors,[21] Orlistat, rimonabans.[22, 23]

In order to combat obesity, modern treatments stages of obesity

- Anorectics. These synthetic medications are costly, offers side effects and potential toxicity, as a result their consumption is limited.[24]
- There is a great need for the identification of natural products/ herbal supplements to replace synthetic medicines.[25]
- Development of new drugs.[26] this product includes crude extracts from medicinal plants that are used traditionally in many diseases.[27] Many traditional plants have been identified as antiobesity agents. That tends to reduce weight as well as overcomes the diet based obesity[28]These medicinal plants are potent antiobesity agents offering fewer side effects compared to the modern medicines.

PATHOPHYSIOLOGY

Changes in homeostatic mechanism regulating energy balance leads to obesity, As the mechanisms involved in obesity are intense, the reason behind disturbance of balance is not clear.

Changes in leptin kinetics might be the energy imbalance observed in obese people along with leptin receptor malfunction & insufficient leptin in mice.

Compared to healthy individuals amount of leptin in plasma was found to be high in obese individuals.[29]

Malfunctions or defects in following leads to obesity

- Altered function of TNF (cytokine) may lead to obesity. Quantity of TNF was found to be more in adipose tissue of insulin resistant obese people (a cyctokine which transmits information from fat to brain).[30]
- In obese patients, UCP-2 was found to be defective which a proton, that uncouples oxidative phosphorylation in leucocytes.[31]
- Enhanced expression of NPY c or reduced expression of CRF may leads to obesity.[32]
- Defects of attachment or receptor of leptin may cause obesity.[33]
- Both environment & genetic factors may involve in pathophysiology of obesity.

  Ex: Obesity may be a result of destructive lesions in paraventricular & ventromedial nuclei areas, along with hypothalamic injury from surgery.
- Changes in ANS activity & hyperphagia are the 2 major reasons for hypothalamic obesity.[34]

Table 2: Traditional anti-obesity plants, their parts used, dose and duration.

S.No	Medicinal Plants	Parts Used	Dose and Duration
1	*Agave tequilana*	Fructans extract[35]	10% supplement
2	*Acanthopanax senticosus*	[36]	0.5gms/kgm (12 weeks)
3	*Allium victorialis var*	Leaves [37]	100mg/kg (2 weeks)
4	*Aesculus turbinate blume*	Escins extract [38]	2% (11 weeks)
5	*Arachis hypogaea*	Nut shells [39]	1% (12 weeks)
6	*Astragalus*	Roots [40]	400mg/kg (5 weeks)
8	Black Chinese	Leaves [41]	333mg prior to every meal (12 weeks)
9	Bofu- tsusho- san	[42]	1/4%, 4/7 % of weight of food (8 weeks)
10	*Camellia Sinensis*	Leaves [43]	2 cups , 4 cups per day (8 weeks)
11	Catechin enriched green tea	Leaves [44]	458 mg, 468 mg, 886 mg (12 weeks)
12	Capsinoids	Powder [45]	6mg per day (12 weeks)
13	Chinese ginseng	Leaves, Stem [46]	100 or 200mg/kg (12 weeks) 150, 300 mg/kg (12 weeks)
14	*Cucurbita moschata*	[47]	500mg/kg (8weeks)
15	*Crocua sativus*	Leaves [48]	176.5mg/day (8 weeks)
16	*Cyperus rotandus L*	Tubers [49]	45, 220mg/kg (8weeks)
17	*Cornus mas*	Cherries [50]	1gm/kg (8Week)
18	*Coleus forskohlii*	Roots [51]	50gms/kg

19	*Dioscorea nipponica makino*	[52]	5% (8weeks)
20	*Dimocarpus longan*	Slunax extract [53]	6 weeks
21	*Dasylirion spp*	[54]	10% supplement
22	*Epigallocatechin-3-gallate*	Leaves [55]	300-600mg (3 days)
23	*Evodia rutaecarta*	Fruit [56]	0/02%, 0/03% of the diet (12 weeks)
24	Fenugreek	Fibers [57]	4 or 8 gms (for every 3.5 hours)
25	*Galega officinalis*	[58]	10% wgt/volume of diet (4 weeks)
26	*Garcinia atroviridis*	[59]	2 mo
27	Guggulu	[60]	1/5, 3gms (4 weeks)
28	*Garcinia cambogia*	Seeds [61]	200, 400 mg/kg (5 weeks)
29	*Guangdong kudingcha*	Leaves [62]	-
30	Ginseng berry	Berries [63]	150mg/kg (12 days)
31	*Hibiscus sabdariffa*		100mg per day or 1.5mg/kg /mole
32	*Irvingia gabonensis*	Plant [64]	150mg (10 weeks)
33	*Jiang-zhi jian-fei yao*	Rhubarb [65]	
34	*Juniperus chinensis*	[66]	1% supplement (11weeks)
35	*Kochia scoparia*	[67]	1%, 3% (3 days)
36	*Laminaria digitata*	Sea weeds [68]	6 caps for a day (1.5 weeks)
37	*Lycium barum*	[69]	30, 60 and120 ml (2 weeks)
38	Licorice flavonoids oils	[70]	0/5%, 1%, 2%(8 weeks)
39	*Momordica charantia L.*	Fruit [71]	5% (4 weeks)
40	*Morus alba*	[72]	12 weeks
41	*Melissa officinalis*		12 weeks
42	*Magnolia officinalis*	[73]	750mg (6 weeks)
43	*Neelambo nucifera*	Gaertn leaves [74]	50%
44	*Nomame Herba*	[75]	8 weeks, 12 weeks, 6 mo
45	*Nigella sativum*	Flour [76]	2 caps of 750 mg twice a day (3 mo)
46	*Oolong tea*	Leaves [77]	8gms (6 weeks)
47	*Phaseolus vulgaris*	Kidney beans [78]	130, 150, 280 gms/kg (1 to 10 weeks)
48	*Paenia suffruticosa*	Peony roots [79]	0/5% (30 weeks)
49	*Parasitic loranthus*	[80]	20 days
50	*Platycodon grandiflorum*	[81]	150mg/kg (7 weeks)
51	*Phellodendron amurense*	[73]	750mg (6 weeks)
52	*Pine bark*	[82]	200mg/day (12 weeks)
53	*Pistachio*	[83]	53gms (12 weeks)
54	*Psyllium*	Fibers [84]	12 weeks
55	*Punica granatum*	Seeds oil [85]	400mg twice a day (4 weeks)
56	Puer tea	Leaves [86]	4 caps twice a day (3 mo)
57	Quercetin	[87]	150mg/day (6 weeks)
58	*Rhus vemiciflua*	Stokes [88]	8 weeks
59	*Salacia reticulata*	[89]	0/5% (8 weeks in mice) 0/2% (4.5 weeks in rats)
60	*Semen cassia*	[90]	6%
61	*Tifblue vaccinium ashei and rubel vaccinium corymbosum*	Blue berries [91]	22.5 gms twice a day (6 weeks)
62	*Trigonella foenum-graecum*	Seeds [92]	1176mg or 14mg/kg for a day (6 weeks)
63	*Zingiber officinalis*	Plant [93]	1%, 3% (8 weeks)

CONCLUSION

Synthetic drugs used in the treatment of obesity have various side effects which enables the researchers to find a treatment with lesser side effects and those that are economical and beneficial to mankind. Various plants showing potent anti-obesity action are described in Ayurvedic and Unani system of medicine. The medicinal plants mentioned in the table exhibits promising weight loss through different mechanisms. Further studies on them help to define the pharmacology and the active constituents responsible for weight loss. Medicinal

products serve as an effective option to reduce weight. Some of the studies have reported the antioxidant activity in many of these plants which can support the management of obesity and its co-morbid conditions. There is still a great need of further research to be conducted to develop the pharmaceutical market. Safety and efficacy of these plants and their extracts should be done by applying advanced and well developed clinical trials.

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