



Review Article

TRADITIONAL TO MODERN APPROACHES TO MODULATE OBESITY

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Abstract

From the last decade, till date, we are observing the alarm of obesity which is becoming a physical problem worldwide and specially in a developing countries. It causes in economic cost. Obesity has become a foremost health apprehension. It is affecting all the age groups and in some cases, it is related with an increase risk of premature death in adults below 65 years. Some of the causes of obesity are genetic factors, dietary trends and habit, physical inactivity, hypertension. Obesity leads to unhealthy lifestyle of the people. Also it give rise to different disease like Diabetes, Obstructive sleep apnoea, Cardiac Vascular disease, Polycystic ovarian disease and psychosocial problems etc. This review gives a short-term account of approaches to overcome the obesity in various ways such as Exercise/Yoga, Functional food, Keto-diet, Herbal medicines, Chinese medications and medicines.

Keywords: Obesity, Exercise, Keto-diet, Herbal medicines, Chinese medicines

Introduction

The abnormal and extreme accumulation of fat is defined as Obesity. It may also results in increasing rate of Mortality. Associated to the threat of mortality the classification of obesity is based on BMI intervals.

Obesity is categorized as Class I, Class II, Class III. Class I is for BMI between 30 to 34.9 which is related with a moderate risk of mortality. BMI between 35 to 39.9 which is concerned with high risk of mortality falls in Class II. The very high menace of mortality is seen for BMI 40 or above which comes under Class III. The degree of central (visceral, abdominal) vs. peripheral (subcutaneous) adiposity is measured by the percentage of waist-to-hip circumferences (WHR). Major risk for metabolic disorders is Visceral fats, while Peripheral fats seem to be mild to metabolic complications.

According to a new, first of its kind investigation of trend data from 188 countries, 2.1 billion people i.e. nearly 30% of the world's population are whichever obese or over weight. In both the established and the emerging world, there was increase in global obesity rates over the last 3 decades has been substantial and wide-spread, presenting a chief public health epidemic. Over the progression of study, among the adults, ratio of overweight and obesity have enlarged for both sex including for men from 29% to 37% and women from 29% to 38%. (James M. Jeffords Vermont university)

In developing countries womens exhibit higher level of obesity and overweight while in developed countries; men had greater level of obesity and overweight. (WWW.healthdata.org)

Quantification of Obesity

BMI

A value resulting from the mass (weight) and height of an person is the body mass index. The ratio of body mass and the square of body height is called as BMI. It is stated in units of kg/m² (Nammi, 2004).

To enumerate the extent of tissue mass is the attempt of the BMI which categories that individual as malnourished, normal weight, overweight or obese derived from that

value. BMI ranges: underweight: under 18.5, normal weight: 18.5 to 25, overweight: 25 to 30, obese: over 30.

Significance

Main aim of BMI is to categorizing people who are not physically dynamic and who have a middling body composition in a simple and quick calculation. It is generally reflected a good display of whether you're at a healthy, normal weight for your height (Nammi, 2004).

Uses of BMI

- It is an vital measurement contrivance
- It gives current health status and disease risk based upon weight and degree of obesity.

BMR

The minimum speed of energy disbursement per unit time by endothermic animals at break is known as BMR. On the effectiveness of Uniformity in the Definition of Basal Rate of Metabolism. Metabolism refers to the processes that the body needs to utility. The quantity of energy articulated in calories that a individual wants to stay the body operation at relax is the BMR. Breathing, blood circulation, controlling body temperature, cell growth, brain and nerve function, and contraction of muscles are some of these processes. A person burns calories at a speed and ultimately whether you maintain, gain, or loss weight is affected by BMR. 60- 70% of calories one burns every day are accounted in his /her BMR.

Under eating affects the ability of heart to pump blood which can be proved dangerous. The amount of calories needed depend upon the amount of exercise one does. The more exercise you do the higher your BMR will be.

For men:

$BMR = 10 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (years)} + 5$

For women:

$BMR = 10 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (years)} - 161$

Occurrence of Obesity in Different Parts of Lands

In 2014, 39% of adults aged 18+ were overweight (BMI ≥ 25 kg/m²) (39% of men and 40% of women) and 13% were obese (BMI ≥ 30 kg/m²) (11% of men and 15% of women). Thus, almost 2 billion adults world wide are overweight and of these surplus half a billion are obese. In the World Health Organization (WHO) Regions of the America's (61% for overweight in both genders, and 27% for obesity) the frequency of overweight and obesity were maximum and minimum in the WHO area for South East Asia 22% overweight in both sexes and 5% for obesity. Over 50% of women be overweight in the region of the Americans and European and Eastern Mediterranean Regions. In all Regions women were more expected to be obese than men. Women had generally double the obesity frequency of men in the WHO African, Eastern Mediterranean and South-East Asia Regions.

The frequency of overweight in soaring income countries was more than twice that of low and lower middle income countries. For obesity, in high income countries the prevalence is over four times higher compared to low income countries.

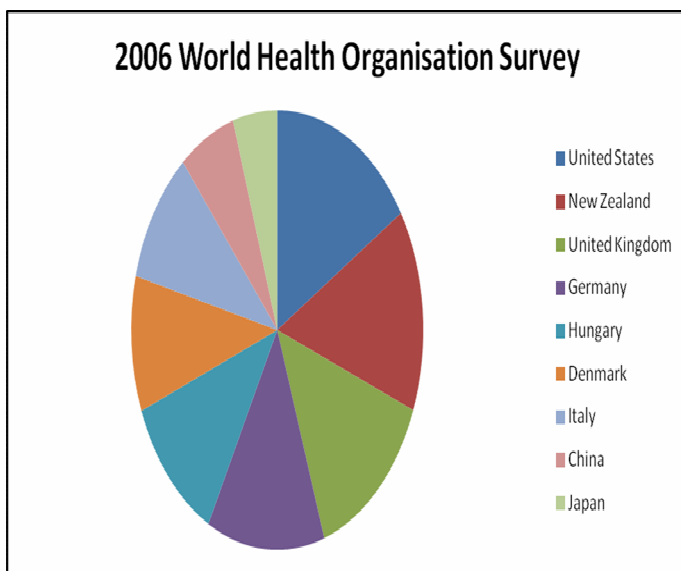


Fig. 1 : Obesity in the World

Causes of Obesity

Genetics

A significant link between obesity and genetics has shown by the research which was carried out for more than a century. The threat of rising obesity considerably increases, if one's father or mother is obese. Additionally, chances are high that an individual will be obese throughout his or her life, if obese is present during childhood. Studies indicates that genetic influences attributes to the person's BMI, with a 75% possibility that a child with 2 obese parents will be overweight and a 25%-50% chance with 1 obese parent.

In the growth of childhood obesity another significant consideration is the mass of the mother at the moment of giving birth. The mass of the new born is predicted by the mass of the mother and moreover the mass of the child is also predicted by mass of a new born. The new born with a mass of at least 10 pounds were twice(2) as likely turn into overweight by the age of 13 was indicated in a study in Denmark of 250,000 children than those with birth weight of about seven pounds (Slentz, 2004).

Lack of Exercise

Lack of exercise is the major contributing factors of obesity. One of the most important factors that relate obesity is caloric balance. According to CDCP, consumption too various calories and not receiving adequate exercise causes energy imbalance which results into obesity and overweight. Balancing calories consumed next to calories used by normal bodily functions and exercise, maintains caloric stability and body weight. Thus, a individual's weight will stay steady by eating as many calories as spent and vice-versa. If the food ingestion exceeds physical movement & an unusually large amount of energy is stored with the body results into obesity.

Obesity treatment emphasize on diet and not enough on one's activity level. Obesity has increased due to increasing popularity of sedentary activities like watching television and playing online. Decrease in physical activity levels is also due to increase use of electronic powered devices like escalators and elevators (Slentz, 2004)

Pollution

The hormone that controls body weight is manipulated by endocrine disruptors and is potential cause of obesity. Common sources of these disruptors are pharmaceutical, plastics, food and toys. Additionally, obesity is induced by some chemical pollutants such as benzo- α -pyrene. Organochloride pesticides & polychlorinated biphenyl (PCBs) are some carcinogens that focus on adipose (fat) tissue, which shows effects on weight (Slentz, 2004).

Eating Disorder

There is a linkage between dieting, eating disorder and obesity. While dieting is often convinced as a solution to the rising obesity epidemic, a number of studies suggest that dieting is not useful in preventing weight gain, and within some cases dieting may actually be related with an improved risk of obesity between children and adolescents. Weight loss is promoted by dieting but restrictive eating may provoke disordered eating which may lead to obesity. Binge eating disorder (BED) and Night eating syndrome (NES) are 2 types of eating disorder, which contributes to obesity. Most common eating disorder, affecting 3% of adults in US is BED and is most common among severely obese people. Individual having BED tend to engage in frequent dieting behavior. It was suggested that dieting is a precursor for BED. Three times the chances of becoming obese are seen in adolescent girls that diet than those that do not diet. This is owing to the cyclical patterns of restrictive eating followed by overeating or binge eating

Hormonal Influence

Many hormones affect the appetite. Through the action on melanocortin receptors, melanocortin hormone modifies appetite. Endo-cannabinoids carries various functions like enhancing absorption of nutrients, stimulating lipogenesis and increasing appetite. Cholecystokinin, Neuropeptide YY (PYY) and Glucagon like peptide-1 (GLP-1) are several gut hormones that induce satiety. Other than this there are two potent hormones namely Peptin and Amylin. The major hunger hormone is Ghrelin; it is secreted from stomach fundus. Several gut hormones such as Cholecystokinin, Neuropeptide YY (PYY) and glucagon like peptide-1 (GLP-1) induce satiety. Peptin and Amylin is also potent hormone. On contrary Ghrelin, which is secreted from stomach fundus, is major hunger hormone.

Approaches for Obesity Management

Exercise

Recommendations for physical activity

The terms 'exercise' and 'physical activity' are regularly used interchangeably, however for accepting exercise psychology their differences contain important implications. 'Physical movement is any bodily movement formed by skeletal muscles which outcome in energy expenditure and is frequently calculated in kilocalories per unit of time (Caspersen *et al.*, 1985). Walking, stair climbing, bicycling and swimming might be included in physical activity (Biddle, 2008)

'Exercise' is a division of physical activity for the reason of improving or maintaining physical condition or health and is planned, structured, cyclical bodily movement that someone is engaged. Exercise may include activities for example aerobic dance, cycling, running or jogging, brisk walking, swimming laps or weight-lifting. Moderate to enthusiastic levels are suggested in terms of intensity. In moderate intensity, people can engage in and at the same time continue a conversation with someone. While vigorous intensity (such as running or playing a fast sport such as

squash) is a level which makes conversation difficult because of the increased demand on breathing required (Ajzen, 1991).

A graduated approach to increasing activity is appropriate and will help avoid injury was suggested by physical activity/exercise. Individuals are encouraged to make active choices in everyday life which is an approach towards 'active living'. It includes walking rather than driving, choosing the stairs rather than the escalator or choosing to walk the dog more, and is recommended as a route to achieve regular activity without cost or the need to attend a particular facility.

Participation of children should be there in such physical behavior that are age appropriate, enjoyable and that offer variety. Usually every child spends almost 7.5 hours per day in front of screen, which includes watching television, a computer, or playing video games. If this is the case there is a higher risk of obesity in children. Adults should spend 60 to 90 min daily for physical activity. According to their capacity older adults and chronic medical condition should do physical activity to be physically active. Exercise should be done by those who have risk of falling to improve balance.(NICE 2006)

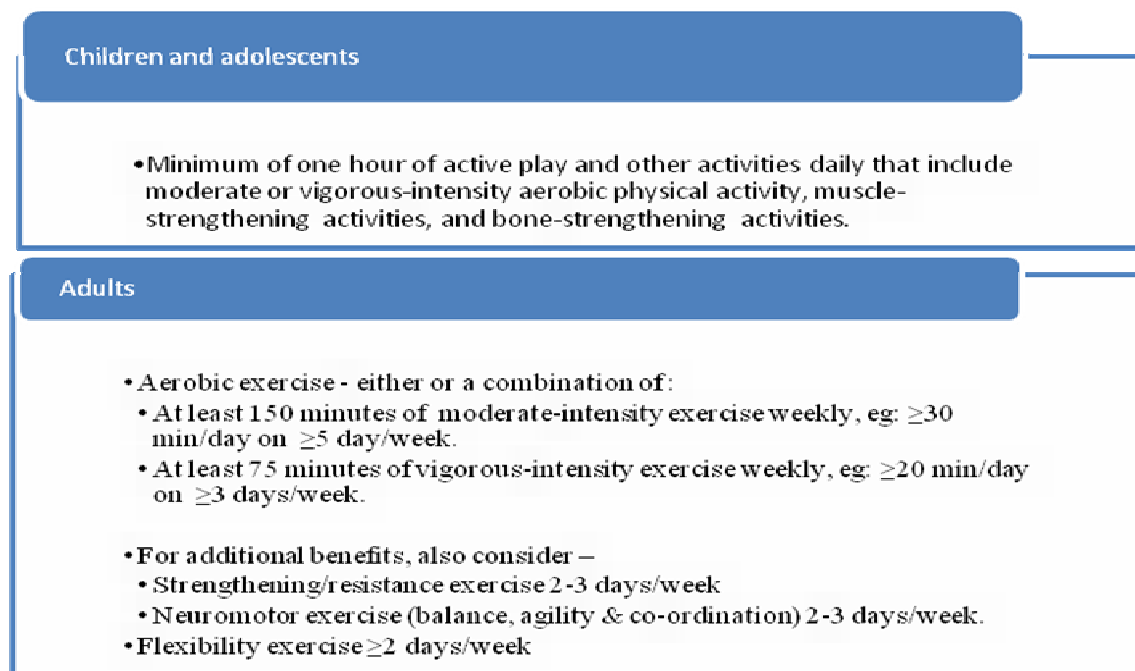


Fig. 2 : Exercise Protocol

Effects of Exercise

In a large number of people who are consistently expending fewer calories than they consume a lack of energy balance is reflected by the increasing occurrence of obesity. Compare with persons who have low energy expenditure, it is logical to assume that persons with moderately high daily energy spending would be less possible to gain weight over time. Adults are more expected to continue a healthy weight if they have an active lifestyle and reduce their physical immobility was seen in research. In early postmenopausal women, a systemic review of randomized control trials (RCTs) intentional that walking at least 30 minutes per day plus two times weekly resistance exercise sitting was possible to be efficient in preserving normal body weight. International consensus guidelines, based mostly around data from epidemiology prospective studies also suggested that to

prevent transition to overweight or obesity, adults supposed to be engage in 45 to 60 minutes of moderate and speed physical activity per day. Specific activity wanted to check weight gain are not well recognized using prospective study design. It differs in every individual the exact amount of physical action that will assist them to prevent unhealthy weight gain but in general more activity increases the chance of success. It is always considered so as to physical activity helps in losing weight, but physical activity appears to generate only modest increments of weight loss away from those achieved by dietary procedures and its effects no which differ among people.

On the function of physical movement in preventing weight recover after an initial considerable weight loss, several observation studies have been conducted. For weight maintenance after large weight losses it is necessary to do

60–90 minutes of moderate and vigorous physical activity per day which is supported through the studies using self-reported physical activity and energy expenditure.

Psychology of physical activity, exercise and sport

When examining the psychology of sport, exercise and physical activity, there is often some confusion in terminology. Investigative the interaction between physical movement and beliefs and emotions are involved in the psychology of activity and exercise. However, a primary

purpose of sport psychology is to inspect the assets of such variables which are frequently used in competitive sport to enhance performance. To improve the acceptance and maintenance of regular exercise and its effects on psychological comfort is the primary purpose of exercise psychology (Buckworth, 2002). To determine possessions of physical activity or exercise on mental health the psychological and biological cost of physical activity are studied (Bjorntrop, 1987).

Table 1: Yoga Training Protocol

Sr. No.	YOGASANA	PROCEDURE OF YOGASANA
1	Namaskarasana	Putting both hands together and eyes closed stand facing the sun. Both legs must be placed together with Great toes joined.
2	Hastuthanasana	Taking deep insight stretch both Hands straight over the head with backward bending of region beyond the waist.
3	Padhastasana	Continuing fromHastuthanasanakeep waist in straight, extending both hands in front and slowly bend ahead keeping the knees straight and touch the big toe with hands.
4	Ashvasanchalana	Keeping both hands in side of right leg, take deep inspiration and extend the left leg behind and flexing the right knee keep both hands on floor.
5	Parvatasana	Taking deep insight slowly enlarge the right leg upto the left leg, raise the hip region in structure of mountain and keeping the head in between the hands and bend.
6	Ashtangamadipadasana	From stage of Parvatasana, failing and raising head in a straight line, hands, chin, trunk and knees must be kept in touch with ground and the region between waist andumbilicus should be raised from the ground.
7	Bhujangasana	From above stage, with expiration rest the raised waist region on ground and move up the head above extending backwards, hand lie in front in straight position.

Keto-diet

Introduction

Low carbohydrate “Ketogenic” diets have established much attention since a way of rapid weight loss in current years. However, within categorize on the way to cause ketosis there is no obvious in the literature as to what carbohydrate intake constitutes a low-carbohydrate diet or to what extent carbohydrates must be controlled.

In refractory pediatric epilepsy the apply of ketogenic diets has been widely reviewed else where. These diets have a unusual composition & for the weight loss this want to generate elevated ketone levels than ketogenic diets were used (Abete, 2006).

Ketone body metabolism

The term “ketone bodies” consist of three compounds, viz, acetoacetate (AcAc), 3-hydroxybutyrate (3HB—not strictly a ketone but rather a hydroxyl fatty acid) and acetone. On their velocity of production (ketogenesis) & their rate of consumption (ketolysis), the circulating levels of ketone bodies are reliant.

The two major ketone bodies, AcAc and 3HB are produced and utilized for fuel below low-carbohydrate situation. By spontaneous decarboxylation of AcAc, acetone is formed and gives a feature smell to the breathe of ketotic subjects. In the mitochondria of pervious hepatocytes ketone bodies are produced, mostly from the oxidation of fatty acids, and are transported to additional tissues for utilize as an energy source. They are considered as crucial significance to the brain, when the blood glucose intensity is low these cannot originate energy from other sources. An autonomous, albeit minor, supply of ketone bodies are provided by

ketogenic amino acids (primarily leucine and lysine). The liver able to produce 185 g of ketone bodies per day in healthy adults. After an overnight fast, ketones supply 2-6% of the body’s energy necessity and 30-40% after a 3-day fast.

Ketolysis

Ketolysis is the progression in which ketone bodies are transformed to acetyl CoA for energy production. This procedure occurs in mitochondria of extra hepatic organs. The conversion of AcAc to acetoacetyl CoA by the enzyme succinyl CoA-oxoacidtransferase (SCOT), and the successive creation of acetyl CoA by the enzyme methylacetoacetyl CoA thiolase (MAT) are the two key steps involved in this process. The proportion of ketolysis is determined by the phasecatalysed by SCOT (Bilsborough, 2003).

Adaptation to ketosis

Ketone body levels rise during starvation from day 3 and endure to rise to extent a plateau around 8 mol/L after 5-6 weeks of starvation. Down-regulating of SCOT activity has been suggested for this phenomenon. However, utilization of ketone body by skeletal muscles declines and free fatty acids becomes the muscles’ principal fuel source, during prolonged starvation ketone body utilization by the brain increases.

Ketogenic diets for weight loss (Adam-perrot, 2006)

How low in carbohydrates?

Regarding the definition of a “low-carbohydrate diet”, the English language journalism has no apparent consensus. From carbohydrate, low-carbohydrate diets are considered to contain < 100 g/day or <30% of energy. The quantity of carbohydrate limit required to stimulate ketosis, currently there has no consensus, the term “ketogenic diet” is frequently imperfect to diets containing <50 g/day

carbohydrate. However, in subjects on diets with normal daily carbohydrate intakes linking 58 and 192 g/day, high serum or urinary ketones have also been reported. Conversely, with a imply daily carbohydrate eating of 29.5 g, in a study of participants on a diet, only 42% had urinary ketone levels of traces or larger at 24 weeks. An significant determinant of ketosis is the macro nutrient composition of diet. Ketosis may not caused by low-carbohydrate diet which is high in protein, as upto 57g glucose able to be created from 100 g dietary protein. According to store and Yudkin, a recognized formula states that when fat ingestion exceeds double the carbohydrate ingestion plus partly the protein eating, the ketosis will occurs. The input of limitation of either carbohydrate or total calories to the metabolic reaction to fasting in five average weight healthy men was evaluated by Klein and Wolfe. On two occasions, through individual of which lipid calories be infused intravenously to gather resting energy, each requirements subject fasted for 84 h.

Mechanism of effects

Several mechanisms have been projected by which ketogenic low-carbohydrate diets might stimulate weight loss. Due to a dieresis a few of the primary weight loss was observed, together as a outcome of glycogen depletion & ketonuria, which enhance renal sodium and water loss. Approximately 100 g of glycogen is stored within the liver & 400 g glycogen is stored in muscle, every gram of which is stored with about 2 g of water. Furthermore studied that ketones restrain appetite, by necessitating increased gluconeogenesis, and upregulating mitochondrial disconnection proteins with a subsequent wasting of ATP as heat KLC diets may have a “metabolic advantages”. Limitation of food choices, condensed lusciousness of low-carbohydrate diets, the satiating result of moderately high protein intake, amplified thermogenic consequence of protein, improved adipose tissue lipolysis as a effect of lowered circulating insulin levels, and improved fatty acid oxidation, concern to low carbohydrate diets in common, are other postulated mechanisms included not specifically those which induce ketosis. Weight loss was coupled with control of calorie intake, longer diet period and elevated baseline body weight, although with reduced carbohydrate substance was concluded by a systematic evaluation of low-carbohydrate diets (Bilborough, 2003).

Functional Foods

Protein Based Foods and Components

Phenolic compounds like flavanoids, isoflavones, phenolic acids and lignans are present in legumes rich in protein. They play an important role in metabolism. It has been studied that diet rich in protein causes fulfillment, suppresses hunger and intake of food. High satiety and thermogenic effects are induced by proteins as compare to its macronutrients like carbohydrates and fats as there is high requirement of energy for catabolism and protein synthesis. It has been observed that when an obese individual is supplemented by legumes with a hypocaloric diet at 4 servings/week for 8 weeks, reduces cholesterol level, oxidized low density lipoprotein (LDL), body weight, improve plasma antioxidant level. Adipocyte differentiation in 3T3L1 adipocyte cells is inhibited by plant protein bromelain by inducing apoptosis and lipolysis and thus decreases adipogenic expression. The test were carried out in humans for 12 week period to study the effect of black soy

peptides in falling body weight and fat. After 12 weeks it was observed that there was significant reduction in body fat, weight gain and leptin levels. The study was carried out for evaluation for weight gain, fat substance, adiponectin levels and gene expression of fatty acid and glucose metabolism in mice by the result of soy protein isolate added to a calorie restricted diet. In soy protein segregate fed mice body weight gain and fat content were extensively abridged as compared to the casein fed mice. Though, by feeding soy protein isolate, the level and expression of adiponectine were not affected. In humans, in a randomized manage trial, a low calorie soya based meal (24 g/day) was replaced for 12 weeks in humans. Individuals who expected soy meal lost extra weight and gained a smaller amount fat mass, total cholesterol and LDL after 12 weeks as compared to the control group individuals.

The function of soy protein against obesity works by the mechanism which comprise reduction in intestinal cholesterol absorption, fecal bile term, reduced triglyceride concentration, modifiable gene expression of lipogenic enzymes and fatty acid oxidation, enlarged peroxisome proliferator activated receptors (PPARs), inflection of sterol regulating element binding protein.

Carbohydrate Based Food

The fiber of brown rice contain γ -oryzanol. γ -oryzanol is a combination of ferulic acid esters. Kozuka *et al.* (2012) studied the favorite of dietary fat in the mice for the result of brown rice γ -oryzanol. A managed diet with normal fat above high fat diet was observed when the mice was fed with brown rice or γ -oryzanol. Due to the fall of hypothalamic endoplasmic reticulum stress, low dietary fat have been preferred.

The prevention of chronic disease is prevented through various mechanism by dietary fibers. The weight gain is affected by the glycemic index (GI) of carbohydrates and substance of fiber. little chain fatty acids are produced by fermentation of soluble fiber by the action of intestinal bacteria. The body fat is reduced by butyric acid supplementation in mice by 10% along with an increase in fat oxidation, hepatic energy expenditure and PPAR γ medicated PPAR α expression. In bring to mind satiety and dropping appetite macronutrient composition of the diet is important.

Fruits and Vegetables

In 8 weeks nutritional intervention study, it was observed low oxidized LDL and enhanced antioxidant aptitude when on obese men and women receive enriched fruits with an energy restricted routine. Black raspberry contains high level of anthocyanin. In mice feed high diet, condensed body weight gain, fasting serum glucose, leptin, insulin levels and homeostasis estimation of insulin resistance (HOMA-IR) was seen due to purified black raspberries and not whole black raspberries. Administration of apple in Wistar rats showed lowered body weight gain, fat deposits & glucose.

These anti-obesity properties are due to inflection of genes dependable for lipolysis, adipogenesis and fat oxidation. The retroperitoneal and epididymal adipose tissue weights are also condensed by dietary apples.

Decreased waist circumference, weight, vascular cell adhesion molecule and intercellular adhesion molecule of overweight and obese women due to administration of

bilberries and buckthorn (whole, phenolic extract, oil) for 30-35 days. Adipocyte separation in 3T3L1 cells by inhibited by bilberry anthocyanidin-enriched extracts by inhibiting the adipocyte transcription factors peroxisome proliferator activated receptor (PPAR) and Sterol regulatory element binding protein 1 c (SREBP 1 c) and tyrosine residues of IRS1 phosphorylation.

In obese rats, condensed body fat, liver weight, body weight, triglycerides, fasting insulin, abdominal fat accumulation is seen by hushbush blueberry at 2%, but enlarged adipose and skeletal muscle PPAR activity and affected PPAR transcripts occupied in fat and glucose metabolism. Adipocyte differentiation, adipogenesis and cell proliferation is suppressed by blueberry polyphenols.

Pomegranates are tropical fruits. It contains phytochemicals such as ellagitannins, anthocyanins, phenolic acids, and a diversity of volatile compounds in high amount. Pomegranates exhibited anti-obesity properties. In in-vivo and in-vitro studies by modulating PPAR pathways, it exhibit hypoglycaemic activity, enhance insulin sensitivity, inhibit α -glucosidase enzyme activity, lowered total cholesterol, enhanced blood lipid profiles, & retard inflammation.

In Asia bitter ground is widely available. During the development of obesity associated fatty liver, bitter ground was fed to C57BL/6 mice at 0.5 and 5% levels for exploring the effect of bitter ground on mitochondrial function. Lowered body and tissue mass gain, less hyperglycemia and, triglycerides, cholesterol, higher superoxide dismutase activity, lower protein oxidation, modulated mitochondria expression, and fewer activation of sterol regulatory element binding protein/fatty acid synthase (SREBP-1/FAS) pathway was seen when the bitter ground was fed to mice for 16 weeks.

Administration of Kochujang, fermented soya bean-based red pepper paste, 32g/day by humans for 4 weeks, it results in reduced visceral body fat, but not body weight and waist to hip ratio.

Calcium and Dairy Products

An important role played by dietary calcium is regulation of energy metabolism and obesity risk. The main source of dietary calcium is dairy products. Reduced intracellular calcium in adipocytes is seen on chronic increase in dietary calcium, and thus reduces appearance of fatty acid synthase, enzyme required for lipid synthesis. Inhibition of fat absorption, increased fecal fat excretion, reticence of bile acid absorption, a calcium induced enlarge in the conversion of cholesterol to bile acids may take place at GI tract during the potential hypolipidemic mechanisms.

Herbal

Obesity is the symptom of fundamental imbalance in the individual's body.

Mechanism of Herbal loss product:

- Bowel movement and/or urination is increased
- Central nervous system is stimulated.
- Serotonin is a chemical present in the brain which creates a "feeling of fullness". Level of Serotonin is increased.

Permanent weight loss is not produced by herbal preparation. Many ingredients are present in herbal weight-loss products, some of them have serious side-effects and can cause toxicity. The herbal manufacturer of these products make "false claim" about the health benefits. Thus, use of herbal products as weight-loss aid is not supported due to all these reasons.

Ginger (*Zingiber officinale*)

Japanese researcher, Han, studied that ginger has an action that boosts metabolism i.e. creates thermogenesis. He led a study, in which rats lose their weight when ginger extract was given to them while maintaining a high fat diet. This shows the connection between the ginger consumption and weight loss in humans. Ginger cleanses the body by decreasing the stomach's acidity and purging the digestive system of food lodged in it. The main cause of weight gain is the lodged food and thus purging helps to lose it.

Green Tea (*Camellia thea*)

Body's metabolism is accelerated by the Green Tea and thus it assists to burn fat. Green tea is very helpful in weight loss (Tariq, 2010).

A compound found in green tea was given to obese mice along with a high fat diet. It was observed that the treated mice gained weight significantly more gradually than a control group of mice that didn't receive the green tea supplement (Arab and Maroofian, 2011).

Active ingredient	Quantity (%)
Chatechins	30-40
Flavonols	5-10
Other Flavonoids	2-4
Theogalin	2-3
Ascorbic Acid	1-2
Gallic Acid	0.5
Quinic Acid	2
Theanine	4-6

Marketed Preparation

- 1) Lipton Green Tea
- 2) Patanjali DivyaPeya

Ginseng (*Panax ginseng*) (Wagner, 1994)

Blood sugar level is reduced by ginseng and also helps in weight loss. Differentiation of the cells that store energy as fats, is inhibited by the constituent of red ginseng i.e. ginsenosides Rg3. It was found that inhibition of differentiation of cells is effective by ginsenoside and causes cells less able to complete the process of fat storage. Body weight is regulated with the help of hormone, i.e. leptin.

Evaluation test was carried out on obese, leptin deficient mice, to study the anti-obesity effect of wild ginseng.

Process:

200 mg/kg wild ginseng was given orally to mice for 4 weeks when compared to control mice loss of body weight and decrease level of blood glucose was seen in treated mice.

Flax seed (*Linum usitatissimum*)

The flax plant seeds consist of a coating of mucilage. This seed when showing to water the coating of the seeds

swell. On soaking the whole flax seeds in water they act as the bulking agent and thus they give the feeling of fullness in your stomach. When soaked whole they neither digested nor absorbed in the body. Due to the filling of fullness it prevent the patient from over eating and help them to loose weight.

Ashwagandha (*Withnia somnifera*)

In Indian traditional medicine, ayurveda, Ashwagandha is commonly used as a healing herb. These days, Ashwagandha is likewise a prominent in the west. Ashwagandha has many medicinal advantages (Singh and Saxena, 2001).

Ashwagandha contributes in weight loss by two ways –

- Elevated cortisol levels are effectively decreased
- Blood sugar level is regulated and insulin sensitivity is improved (Panda and Kar, 1997).

Topical Preparation

Many People jump at the chance to specifically lose fat from a particular zone of their body. The area of most frequent concern for women seems to be the thighs and buttocks area (Distante, 2006).

The term anticellulite has been summed up to characterize the entire arrangement of change of the conjunctive subcutaneous tissue, particularly the deposit of subcutaneous fat in certain zone of the life form as the district situated beneath the posterior and on top of thighs (Ruiz, 2010).

Typically, the vascular supply to the fat tissue is portrayed by a fine and standard work of blood and lymph vessels that gives oxygen and the vital sustenance and permits the evacuation of lethal substances (Bud Brewster, 2013).

Ingredients and Products

- Avon'sCellu-Sculpt Anticellulite Slimming Treatment contains caffeine and natural concentrates with mitigating impacts(*Ginkgo biloba* leaf separate, *Panax ginseng* extricate, *Bupleurum falcatum* concentrate (rabbit's ear), *Lagerstremia indica* concentrate and *Malva sylvestris* (mallow) remove.
- Neutrogena Anti-Cellulite Treatment contains retinol, an unspecified ocean growth concentrate and caffeine.
- RoC RetinolActifPur Anti-Cellulite Treatment utilizes retinol, ruscus and caffeine to make the skin "show up" smoother and firmer. (Distante, 2006; Ruiz, 2010; Bud Brewster, 2013)
- **Efficacy of Anticellulite Product** (Distante, 2006; Ruiz, 2010; Bud Brewster, 2013)

In a 2006 article, 2 Rona,Carrera and Berardesca portrayed the principle noninvasive methods utilized as a part of checking a portion of the physical parameters identified with the cellulite condition. Thigh outline is utilized to screen edema. Ultrasound screens the thickness and the nature of the connective tissue and the edematous segment of cellulite. Laser Doppler Flowmetry gives data on blood stream and eythema by providing details regarding skin microcirculation. Thermography is a strategy for imaging the near by skin temperature as an element of blood stream. Skin distensibility, flexibility and hysteresis are among the

mechanical properties measured. Plicometry yields information for ascertaining the rate of fat in the human body.

- **Microcirculation:** "The initial phase incellulite treatment is icitement of microcirculation and the evacuation of gathered liquids and lethal components, "Distant has written." This can enhance the interstitial network basal direction, fibroblast movement and decline interstitial edema, with ensuing increment in lipolysis and a superior oxygen and nourishment of the fat tissue."

Medicines

In obese individuals supervision strategies for weight reduction contain different interventions considered as physical such as exercise, diet, and surgery, behavioural therapies, and pharmacological treatments. For greater efficacy these strategies may be used simply or in amalgamation (A pocket guide for ohysicians and nurses based on the workshop report, update 2005).

Drugs used in treating weight loss may lower appetite or increase satiety, lower the absorption of nutrients, or enhance energy expenditure. Moderate weight loss is seen in pharmacotherapies, that is, frequently 2 to 7.9 kg as compared to placebo treatment, thyroid hormone, dinitrophenol and amphetamines, subsequently amphetamine analogues, aminorex, and the fenfluramines is include in available past drug therapies. More recently, only orlistat and sibutramine were permitted for long term use (≥ 24 weeks) when a number of newer compounds have been trialed.

There have been numerous occurrences of market withdrawal amid the drugs marketed for weight loss due to serious adverse events. dinitrophenol, aminorex, the fenfluramines, phenylpropanolamine and most recently rimonabant are the ahents involved. Due to their abuse potential, other drugs such as the amphetamines are severely restricted. From the world market, fenfluramine and dexfenfluramine were elicited in 1997 due to apprehensions of an increased manifestation of valvular heart disease, and probable connotation with primary pulmonary hypertension. Several drugs such as phentermine, amfepramone (diethylpropion) and mazindol were withdrawn from the market by the suggestion of the European Medicines Agency (EMA), in April 2000, due to its unfavorable risk to benefit ratio. In the managing obesity the effectiveness and security of long term therapy is very important consideration which necessitates ongoing therapy to accomplish and sustain the weight loss (Ankad, Herur, 2011; Bjorn trop, 1987; Brand, Roorda, 2003)

Past Drug Therapies and Current Approved Drugs

Drugs that have been prescribed or evaluated for obesity, through their action on serotonin, noradrenergic or dopaminergic or the cannabinoid receptor system in the brain, may reduce fat absorption or regulate satiety.

Orlistat

From a naturally occurring lipase inhibitor, a synthetic drug, that is, orlistat (a gastrointestinal lipase inhibitor) is derived. As other obesity pharmacotherapies it does not straight act on appetite, rather it decrease fat absorption by binding to pancreatic lipase, the principle enzyme that hydrolyses triglyceride. In obesity a detailed review of the efficacy of orlistat treatment has previously been described.

In numerous RCTS of 2 to 4 year therapy the long period efficacy of orlistat (120 mg three times daily) for weight lost has been experienced as compared to placebo, as well as enhancements in blood pressure, insulin resistance, and serum lipid levels. With the use of orlistat, several systematic reviews in adults and a systematic review with 2 short-term studies in adolescents established considerably more weight loss than placebo, 6.2 kg (95% CI, 1.7 to 14.0 kg). Diarrhoea, flatulence, bloating, abdominal pain and dyspepsia are some of the common side effects of orlistat. Severe liver injury has been recently reported. Between 1999 and October 2008, the FDA received 32 reports of serious liver injury in patient using orlistat, with 6 cases of liver failure. An assessment of the safety of orlistat treatment has been undertaken by the FDA. Total of 13 cases of unadorned liver injury has been identified in this review (12 foreign reports with orlistat 120 mg and a US report with the lower dose over the counter product [orlistat 60mg]) and in May 2010 led to a label reconsideration and the addition of a warning of severe liver injury (Rajitha and Martha, 2014).

Sibutramine

A 5HT and NA uptake inhibitor, sibutramine, was formerly established as an antidepressant and consequently establish to diminish appetite. It consist of 2 active metabolites. These metabolites inhibit NA and 5HT uptake (and to a lesser extent DA) without any through outcome on neuronal NA, DA and 5HT release. It has been studied that sibutramine has a twofold action to enable weight loss, through β_3 adrenergic receptors peripherally an anorectic effect suggested to be mediated through the central α_1 and β_1 adrenergic receptors and thermogenic effects. Use of sibutramine treatment for 6 months resulted maximal weight loss and was dose related. In several RCTs, sibutramine has constantly demonstrated extensively more weight loss than placebo with ≥ 1 year of therapy. Lowered concentration of cholesterol and triglycerides, blood pressure and escalation in pulse rate has been resulted due to the treatment of sibutramine. With the use of sibutramine, increased in diastolic blood pressure (DBP) were reported in 2 meta-analyses, one in hypertensive patient which include 2 studies where the weighted mean difference was +3.2 mmHg (9.5% CI, +1.4 to +4.9mmHg), whilst another reported a placebo-controlled change in DBP of +1.7 (95% CI 0.7, 2.6) and a small nonsignificant change in systolic BP (+0.5mmHg, 95% CI -1.1, 2.1). Other than enhance in heart rate and blood pressure, some of the side effect such as, dry mouth, constipation, and headache were reported. Two sibutramine-related deaths in Britain and serious side effects in France were reported, thus the EMEA claimed a long-term trial in patients at great risk of cardiovascular disease and hence the Sibutramine Cardiovascular Outcome trial (SCOUT) was originated.

Rimonabant

As a outcome of clarification on the appetite stimulation related with recreational cannabis use, Rimonabant, an endocannabinoid receptor (subtype 1) blocker was developed. The drug has a range of central and metabolic peripheral effects and had also been studied for smoking cessation. In a pooled study of 5,580 patients without diabetes and 1,047 patients with diabetes taking rimonabant 20 mg daily for one year and a hypocaloric diet attrition rates were approximately 40%. Rimonabant reduced body weight

by 6.5 kg as linked to placebo ($P < .001$) in the non-diabetic subgroup. In 50.8% of the treatment group, $\geq 5\%$ weight-loss was achieved and waist circumference was abridged by 6.4 cm as compared to placebo ($P < .001$). In diabetic patients with a decrease in mean HbA1C levels of 0.6% ($P < .001$) there was an enhancement in glycaemic control. Due to the side effects seen in 13.8% of rimonabant patients and in 7.2% of placebo patients the use of the drug was cease. Gastrointestinal disorders, mood alterations with depressive symptoms, anxiety, dizziness, nausea and upper respiratory tract infections are some of the adverse effect seen.

Drug Monotherapies and Combination Therapies under Investigation

Pramlintide

Pramlintide is a synthetic analog of the pancreatic hormone amylin and was originally utilised for the treatment of type 1 and 2 diabetes. Through deferred gastrointestinal motility it has been related with reduced, appetite, food intake and increased satiety and is currently under examination as a potential treatment for obesity. 3.7% mean weight loss was demonstrated with pramlintide 240 μg as subcutaneous (SC) injection in a 16-week dose escalation RCT as compared to placebo ($P < .001$) and $\geq 5\%$ weight loss was obtained in 31% of patients. The more common side effect seen in this drug was nausea. In a 4 month RCT of pramlintide at doses of 120, 240 and 360 μg administered by obese patients for 2 or 3 times a day, followed by a single blind extension to 1 year, weight loss was regained in the placebo group but maintained or constant in all but the pramlintide 120 μg twice daily arm.

Pramlintide Combination Therapy

Pramlintide has been collective with recombinant methyl human leptin (metreleptin). Metreleptin is an adipocyte-derived hormone which is occupied in long term signalling of adiposity and energy intake. The composition of an amylin and a leptin agonist has confirmed greater weight loss than either drug alone in the early trails. With alone use of pramlintide or metreleptin, weight loss was 12.7% \pm 0.9% (mean \pm SE) to 20 week as compared with 8.4% \pm 0.9% for pramlintide and 8.2% \pm 1.3% for metreleptin. Combination of pramlintide with sibutramine and phentermine was also being evaluated. Weight loss was in subjects taking pramlintide and sibutramine was 11.1% \pm 1.1% (mean \pm SE), 11.3% \pm 0.9% for those taking pramlintide plus phentermine, 3.7% \pm 0.7% with pramlintide only, and 2.2% \pm 0.7% with placebo in a 24 week open label study. With combination treatment common side effect experienced were nausea, blood pressure and elevated heart rate. With the combination of pramlintide and sibutramine (3.1 \pm 1.2 beats/min, $P < .05$; 2.7 \pm 0.9mmHg, $P < .01$) and pramlintide with phentermine (4.5 \pm 1.3 beats/min, $P < .01$; 3.5 \pm 1.2mmHg, $P < .001$), there was a major increase in heart rate and blood pressure. For the treatment of obesity in diabetic and non-diabetic patients, pramlintide is also being examined with exenatide, the GLP-1 agonist.

Bupropion with Zonisamide

In Phase II trails, the combination of bupropion with the epilepsy agent, that is, zonisamide has been evaluated. Zonisamide has not been completely considered the mechanism of action, however it has established biphasic DA and 5HT activity. In the management of obesity the potential

of zonisamide was established in a small RCT where zonisamide patients experienced suggestively high weight loss than those on placebo. Greater weight loss was accomplished in a 24-week RCT of bupropion 300mg combine with zonisamide 400mg than either drugs alone (bupropion 6.6%, zonisamide 3.6%) or placebo (0.4%). In a randomized open-label study similar results were observed. In a 24 week multicentre RCT with either drug alone and different combinations of zonisamide SR with bupropion SR, weight loss were 1.4% with placebo, 3.2% with zonisamide SR 120 mg, 5.3% with zonisamide SR 360 mg, 2.3% with bupropion SR 360 mg, 6.1% with zonisamide SR 120 mg/bupropion SR 360 mg, and 7.5% for zonisamide SR 360 mg/bupropion SR 360 mg with $\geq 5\%$ weight loss in 15%, 27%, 44%, 21%, 47%, 60%, respectively. Insomnia, headache and nausea were the most frequent adverse effects reported. Greater weight loss was seen with zonisamide and bupropion than that observe with the bupropion / naltrexone combination over the identical phase of treatment.

Conclusion

Obesity is clearly a multi-disciplinary issues where policy, economics, socio-environment, genetics, biology, psychology and medical advances all plays a role. It is a medical condition which give rise to a different diseases and disorders. In this review, the different causes of obesity such as pollution, lack of exercise, hypertension, etc. have been described.

This review addresses to break the vicious circle of sedentary behavior and adopt and maintain a long-term increase in physical activity and exercise requires. It includes brief discussion of different measures to modulate obesity. By the fact the use of herbs in obesity management is limited and these are prescribed by non-professional people. Green Tea is the most important in weight reduction. At current simply two drugs are presently approved and offered for the long-term treatment of obesity – Orlistat and Sibutramine. Although, there are other drugs used in obesity management for short-term therapy, but this drug had shown various side effects. Hence, still research is going on this drugs.

Although numerous medicines under research, they have various side effects. Hence, the best way to modulate obesity is Physical activity and Exercise.

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