REVIEW ARTICLE

A Review of the Psychological Aspects of Childhood Obesity: Causes, Consequences and Treatment

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ABSTRACT

The psychological and social effects of the worldwide epidemic of childhood obesity are widespread. Psychosocial factors may play role in childhood fatness, and this has piqued the curiosity of researchers. Childhood obesity is connected through psychological and social consequences such as physical inactivity, negative social interactions, stress, depression and anxiety and lower self-esteem and symptoms of psychiatric dysfunction. The purpose of this review was to broaden knowledge of childhood obesity-related treatment, causes, and consequences. This article also elaborates the evidence-based diagnosis, current treatment involves dietary management, psychosocial involvement, behavioral modification and some traditional medicine used for the treatment of obesity.

Keywords: Childhood obesity, Behavioral modification, Dietary management, Traditional medicine.

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INTRODUCTION

The majority of studies examining the psychological effects of childhood obesity compare children who are both overweight and those who are not. Research has been conducted mostly on humans or animals, but not both.[1] There has been some good news: rate of severe obesity is decreasing, but generally obesity rate in children ages 2 to 19 has remained stable at 17% over the past decade.[2] Regarding the psychological effects of childhood obesity, there is still a lot of debate.[3] Children who are overweight are often the target of bullying, mockery, and various forms of psychological stress, all of which can have severe consequences for their health and well-being. No one knows for sure if psychological and mental health problems are the causes or consequences of childhood obesity.[4]

Obesity continues to be common in kids and teenagers.[5] The consequences of childhood obesity frequently continue into adolescence and adulthood. In addition, it raises the probability that a kid may develop a variety of chronic diseases (NCDs) later in life.[6] Negative peer reactions, fewer positive social contacts, increased melancholy, and lower self-esteem have all been linked to childhood obesity. The correlation between obesity and psychopathology has been studied using a variety of psychological inventory measures, such as those for behavioral problems, anxiety, family stress, depression, and mental dysfunction.[7] Childhood obesity continues to rise worldwide, despite the fact that it is associated with numerous health problems. There are numerous contributors to the development of obesity. Energy intake and expenditure are influenced by environmental factors in addition to genetic predisposition. In order to better prevent and treat overweight and obesity, it is necessary to improve our understand of psychological aspects that contribute to their development and maintenance. Biological factors, as well as environmental ones including views of parents and family consuming food, activity, and nutritional patterns, interact with children's behavior, cognition, and management stress to contribute to the development of childhood obesity.[8]

Causes

Psychological impact

Childhood obesity can have serious consequences for children's health, happiness, and self-concept.[9] Kids and teens who are overweight are at improved threat for emotional and behavioral problems. These include low self-esteem, poor social and academic performance, bullying from peers, feeling like a victim in society, and cognitive impairment.[10] Some of the

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early work suggests a connection between childhood obesity and psychopathologies like depression, ADD/ADHD, and low self-esteem.[11]

Physical and social inactivity

Rising academic pressure and competitive tension are commonly cited as potential causes for Indian children spending more time than ever before sitting still. Children who are overweight are more likely to be targeted for bullying, harassment, and other forms of social exclusion. Psychological and social factors, particularly those with a familial basis, can play an extensive role in both onset and maintenance of obesity.[12]

Stress, depression and anxiety

Emotional eating is more common among worried children, and stress is a major psychosocial element in obesity. The emotional development of a child is severely stunted by obesity.[13] The disruption brought on by these traumatic occurrences raised the possibility of poor mental health and emotional suffering in children. Weight increase throughout adolescence may be connected to sadness, unfavorable emotional states, and low self-esteem, according to prior research on the connection involving depression and eating disorders.[14]

Self-esteem

William James (1890) offered this definition of self-esteem: "the harmony between one's actual achievements and one's ideals."[15] Controlled research that consistently found decreased confidence in children with severe and chronic obesity is the main source of associational data.[16] Parents' positive reactions to their children's obesity had a positive effect on their children's self-esteem, but parenting has no effect on their level of body dissatisfaction.[17]

Socio-emotional consequences

When children who are overweight feel threatened, they may seek comfort in familiar places like their family, where they may turn to food. Overweight children have a harder time keeping up with their peers during physical activity because they tire more quickly and have more trouble breathing than their leaner counterparts. Negative social difficulties can affect a child's sense of self-worth, confidence, and body image, all of which can have repercussions on the child's academic success. All of the aforementioned disadvantages of obesity are particularly severe for young people. When compared to youngsters of a similar weight, kids who are overweight are more likely to have some friends, which limits their social activities and leads to more time spent alone.[18] Many methods have been used to measure body image. The simplest tests require respondents to choose their actual and ideal figures from drawings of figures that get bigger and bigger. Studies using measures of perceptual assessment of appearance rather than only size judgments are included in this study.[19]

Diagnosis

Clinical evaluation

Analytical framework: anthropometrics and history. No single method exists that is quick enough, cheap enough, accurate enough, or reproducible adequate to determine fat mass in infants, children, or adolescents, making it difficult to identify which children are at medium or high risk for cardiac along with metabolic disease in childhood and adulthood. It is important to differentiate between primary or idiopathic obesity and secondary obesity caused by things like genetic abnormalities, endocrine dysfunction, central nervous system lesions, or even medical interventions.

A full medical history, physical examination, and set of lab tests can only help. The age at which solid meals were first introduced is an important part of a dietary profile, as is an assessment of caloric consumption that accounts for dietary quality in terms of nutritional balance across food groups and types.[20] The doctor should question as to the child's degree of physical activity, whether or not they are limited by their weight, and whether or not they are experiencing any respiratory issues (such as coughing or lethargy) that may be related to a sleep disorder. Examining general body proportions and the presence or absence of distinctive or body dysmorphia attributes are important first steps in the diagnosis of atypical obesity diseases. Patients should have a graph made of their height, weight, body mass index, and waist size based on measurements taken at each visit.

Quantitation of body fat in childhood

Because obesity and overweight can be traced back to a similar underlying cause: an excessive buildup of fat in the body. Increasing morbidity is linked to increased body fat, hence the concept of overweight and obesity should be connected to health risks. Since it is challenging to measure fat directly, the body mass index (BMI) is a straightforward and low-cost method for making an obesity diagnosis. In both children and adults, there is a correlation between BMI and overall fatness.[21] The World Health Organisation (WHO) and the United States Department of Agriculture (USDA) both define obesity as a body mass index (BMI) of 30 kg/m^2 or more, while overweight is defined as a BMI of 25 to 29.9 kg/m^2. If your BMI is between the 85^{th} and 95^{th} percentiles for your age group, you are at risk for becoming overweight. Having a BMI that falls 85 to 95% is indicative of being overweight or obese. These charts have benefit of allowing for graphical plotting of serial BMI measurements, which allows for the follow-up of a child over time. The charts' reliance on arbitrary statistical metrics rather than biological information pertaining to the likelihood of future morbidity is a drawback.

Quantitation of body fat in infancy

Under 2-year-olds often use weight for length. In the United States, a person is considered overweight if they are heavier than 95^{th} percentile for their height. The percentile ranks are broken down by age and gender, and the definition is statistical in nature. A particularly large head could change the weight-to-length ratio hence it is crucial to determine circumference measurements.

Laboratory tests for body fat

In other cases, for as with short, strong people, BMI provides an erroneous impression. BMI does not differentiate between

the two types of fat, visceral and subcutaneous. Therefore, it is essential to utilize additional measurements of both total and regional body fat.

Skin fold thickness

Since it can be performed on several body areas, this quick, easy, and affordable approach provides data on fat distribution and is excellent for community pediatrics and big research. Although it doesn't require a great level of technical competence, the approach does need a qualified individual to standardize the measurements because, without that, it is difficult to replicate, especially at the highest BMIs. When paired with BMI, the triceps skinfold has a correlation with fat mass and improves the sensitivity for calculating body fat percentage.

Bioelectric impedance assay

Body composition testing using bioelectric impedance assay (BIA) is easy, rapid, reasonably priced, and noninvasive. BIA levels can fluctuate substantially due to factors like diet, activity, menstruation, illness, kidney disease, and irregularities in water and electrolyte balance.

Hydro-densitometry

Underwater weighing is mostly utilised for research and necessitates specialized equipment; It can't be used for regular medical treatment. It's useful for ensuring the precision of new methods of measuring body fat.

Dual-energy X-ray absorptiometry

It's an extremely expensive but secure technology that provides excellent subject-specific precision and convenience for determining total body fat. Exposure to X-rays is very low. The inability of dual-energy X-ray absorptiometry (DEXA) to differentiate between visceral and subcutaneous fat is another restriction. The technique works best for investigation.

Imaging

Visceral fat can be measured accurately using abdominal magnetic resonance imaging (MRI) and computed tomography (CT).[20] The drawbacks of computerized tomography, meanwhile, are its high cost and radiation exposure. These procedures call for additional time to complete and specialized interpretation. As a result, these techniques are only advised for study purposes.

Anthropometrics

As proximal indicators of intra-abdominal adipose tissue, waist circumference or waist to hip ratios is employed. Similar to BMI, there is some debate over the ideal cutoff points for adults. Abdominal measurements beyond 95 cm are associated with higher mortality rates. In children who are obese, this measure also serves as a predictor of cardiovasmetabolic risk factors. In both adults and children, visceral or intra-abdominal obesity are linked to metabolic syndrome (see definitions in risks). Visceral fat cannot be measured using techniques like DEXA, skinfolds, or BIA. Waist circumference is the least invasive and cost-effective measurement for identifying obese children at increased risk for metabolic disorders. There aren't enough pediatric reference values for waist size currently, so additional ones must be created.

Treatment

Obesity prevention is the most effective strategy for reducing the epidemic's prevalence. Therefore, the issue of childhood obesity needs to be raised at each and every well-child checkup. Both breastfed and bottle-fed infants are susceptible to obesity, however, overfeeding becomes more common in bottle-fed infants and should be taken into account by parents. It's important to show parents that it's okay for a baby to not drink every bottle, and to help them follow their child's hunger cues. Weight problems in the future may be mitigated by breastfeeding and postponing the introduction of solid foods.

Whole milk can be safely substituted with skim milk after age of two. Food should never be eaten for pleasure, comfort, or any other non-nutritional motive. Children learn to value dessert meals more and may find them more appetizing if desserts are offered as a reward for finishing a meal. Family dinners should be centered on a healthy diet with no more than 30% of calories coming from fat. Last but not least, parents should restrict the amount of media their children can watch and encourage active play in its place.

Preventing obesity: tips for parents

- A child doesn't have to finish his or her bottle or meal every time.
- Avoid processed and sugary foods as much as you can.
- Cut back on the quantity of unhealthy snacks you keep on hand.
- Provide a healthy diet where fat accounts for no more than 30% of total calories.
- Feed the kid a high-fiber diet.
- Two-year-olds and up can switch from full milk to skim milk without any ill effects.
- Never use food as a consolation or incentive for someone.
- Never accept dessert as payment for a full meal.
- Cut down on your TV time.
- The encouragement of physical activity through play.
- Plan frequent outside activities like hikes, sports, and more to do as a family.
- When a child does become obese, a genuine effort should be made to treat it. identifies the elements of a successful.

Setting goals for weight loss (Table 1)

The goals for losing weight must be realistic and should allow for ongoing growth. To avoid overwhelming or discouraging the child, modest starting goals should be set. Five to ten pounds is a reasonable initial goal, but if you like, you might set a monthly rate of one to four pounds.

Dietary management

The child's nutrition can be evaluated with the use of a daily food plan. When keeping a food diary, it's important to record not just the meals eaten but also the time, location, and company with which they were consumed. For estimating total calories consumed, the notebook will likely be wrong, but it will be

Table 1: Components of a successful weight loss plan

Component	*Comment*
Reasonable weight-loss goal	5–10 lb initially, or 1–4 lb every month.
Dietary management	Diet plans should detail not just the overall number of calories to be consumed each day, but also the percentages of those calories that should come from fat, protein, and carbohydrates.
Physical activity	The goal (in addition to any educational activity) should be 20–30 minutes every day, and the starting point should be the child's physical capacity.
Behavior modification	Nutritional knowledge, self-monitoring, stimulation management, altering eating patterns, exercise, altering one's mood, and rewarding oneself.
Family involvement	Examine the family's routines for watching TV and engaging the parents in nutritional advice.

useful for analyzing problematic foods and eating habits. A simple diet recommendation should be provided, maintaining in brains that 3,500 calories must be lowered through food and exercise for every pound lost. An exact daily calorie recommendation that meets with requirements for the ratios of fat, protein, and carbs must be given to parents. Moreover, dietary fiber is essential because it keeps individuals satisfied for longer and substitutes for dietary fats.

Physical activity

Exercising is essential to keep weight off and shift body fat from muscle. As a result, it is a necessary component of some regimens for weight management. To prevent potential discouragement, exercise guidelines should start out small and be gradually increased. The target is for each child to engage in 20 to 30 minutes of reasonable activity daily in addition to their schoolwork.

Behavior modification

Food and physical activity records help children monitor their own health because they make them more conscious of their eating and exercise habits. The family and the child should both get nutritional education. Food labeling, good eating habits, and the value of dietary fiber should all be discussed. The patient should be aware that there are 3,500 calories in a pound of body fat, that protein and carbs give only four calories per gram, and that fat contributes nine calories per gram. Moreover, 25% of the energy from carbohydrates will go towards converting them into fat, which the body will then store. One valuable objective for behavior adjustment is activity patterns. The kid should collaborate on setting a weekly activity goal, agree to take part in it, and pick out a reward for succeeding. The amount of time spent watching television as a family should be analyzed and modified as needed. Attitude can be improved by teaching children to replace negative self-statements with more positive ones and by modeling appropriate responses to criticism. The doctor's and family members' verbal reinforcement and physical incentives for reaching nutritional, exercise and weight-loss objectives are the final reinforcements and rewards. Incentives that encourage more physical exercise, like sporting goods or a trip to the skating rink, should be chosen with the child's input. Stimulus control measures include limiting easy access to fatty meals, eating together as a family at established times, and only eating what is served to you once (no second helpings). Children shouldn't be verbally coaxed to eat by their parents, and they shouldn't be made to finish their meals. Eating habits can be changed in a number of ways, including by taking smaller chunks, chewing for a longer period of time, and putting down the fork among bites.

Family involvement

While addressing childhood obesity, it's crucial to involve the entire family. Many investigations have shown familial clustering of obesity risk factors and the family serves as a child's primary social culture surroundings. It has been shown that targeting both parents and children in a weight control program, as opposed to only the child greatly increases the program's long-term (10 years) success.

Alternative therapies

The American Food and Drug Administration (FDA) has not yet approved any anorexiant medications for use in children. Gastric bypass surgery, for example, has not been properly researched in youngsters to recommend its usage. Teens and preteens need parental and doctor approval to join weight loss programs like weight watchers or Jenny Craig (Table 2).

Indian herbal plants used to treat obesity

Herbs used in traditional medicine and chemical compounds having anti-obesity potential are examples of natural remedies used in traditional Indian medicine to treat obesity. A number of herbal energy drinks and appetite suppressants contain *Garcinia cambogia* Lin, an extract from the dried peel of the *G. cambogia* Lin fruit. *G. cambogia*'s main active component, (-)-hydroxy citric acid, combats obesity by reducing hunger and preventing the creation of lipids. According to studies, this natural extract may also delay the process by which extra calories are transformed into body fat. As a result, *G. cambogia* is a highly efficient herbal remedy for lowering cholesterol and obesity. A natural chemical known as HCA, or hydroxycitric acid, is obtained from the *G. cambogia* fruit's peel. In experiments with animals HCA successfully suppresses lipogenesis, decreasing cholesterol and fat while improving the liver's ability to produce glycogen (Figure 1).

Commiphora mukul, a resin from the Bursa family, was first used to treat obesity in Ayurveda medicine. It improves the body's metabolic process by boosting it. Low and very low-density lipoproteins (LDL and VDRL), respectively and triglycerides in serum have been demonstrated to be dramatically decreased by extracts containing ketogenic steroids such guggulsterone. It also increases HDL cholesterol levels or high-density lipoprotein (HDL) cholesterol. As per studies, total cholesterol can drop by up to 30% after 12 weeks, LDL can drop by 35%, and HDL can rise by 20% after three

Table 2: Weight-loss treatment with their metabolic effects and adverse events

Drug	*Population treated*	*Age (years)*	*Duration*	*Effects on BMI or other metabolic effects*	*Adverse events*
Orlistat	357 obese adolescent	12–16	1 year	BMI: −0.55 SD	Mild to moderate gastrointestinal tract adverse events (9–50%)
Metformin	28 obese adolescent	9–18	6 months	BMI: −1.26 Kg/m^2; waist circumference: −2.8 cm; fasting insulin: −2.2 mU/liter	Nausea
Metformin	29 obese adolescent	12–19	6 months	BMI: decline of 0.12 SD and a 5.5% reduction in serum leptin in girls. Metformin caused a progressive decline in fasting blood glucose and a reduction in fasting insulin levels.	Transient abdominal discomfort or diarrhea
Metformin	82 obese adolescent	10–16	16 weeks	In improved glycemic control, the adjusted mean change from baseline in fasting plasma glucose was −2.4 mmol/L. Mean Hb values were significantly lower.	Gastrointestinal side effects (diarrhea)

months. *C. mukul*'s active constituent, guggulsterone, inhibits the farnesoid X receptor and lowers the liver's ability to produce cholesterol (Figure 2).

The active component is derived from the roots or rhizomes of *Picrorhiza kurroa*, a plant that belongs to the Blackulariaceae family. Gall bladder secretion is enhanced by picrorhizachlora, which also helps fat metabolism and digestion. It effectively controls the liver's lipid metabolism. Daily doses of *P. kurroa* aqueous extract effectively decreased total cholesterol, triglycerides, and LDL levels after 12 weeks in research in hyperlipidemic mice administered an elevated meal (Figure 3).

The healthy fat homeostasis is maintained by *Areca* seeds from the *Areca* family, and the conversion of carbs to fat is decreased. Besides that, it suppresses fictitious hunger, improves weight reduction through exercise, and decreases excess body fat. It considerably lowered triglycerides (Figure 4).

From the classical era, entire plants such as *Boerhaavia diffusa*, Nyctaginaceae, and Punarnava have been utilized in traditional medicine. It plays a crucial part in the management of obesity, and it may be found in nearly every natural remedy for the condition. Another herb that has been utilized in traditional medicine for centuries is vidanga, also known as Emberiaribes balm root. It is the most popular Ayurveda herb used for weight loss or lipid-lowering benefits in India (Figure 5)**.**

Obesity is managed with the root bark of the *Plumbago zeylanica* plant, a member of the Plumbaginaceae family. Asperachyranthes (apamalga) *Achyranthes aspera* L. seeds from the sunflower family have been demonstrated to increase thyroid hormone production and lower blood sugar levels in animal models. These two activities support weight loss and battle obesity (Figure 6). According to animal studies, the legume glycyrrhiza root lowers cholesterol. Licorice, a NADPH-dependent enzyme found in adipose tissue, has been shown to inhibit 11-hydroxysteroid dehydrogenase type 1 in human investigations. Licorice root has been found in studies to have antihyperlipidemic and antihypertriglyceridemia effects. Lowered dietary fat absorption from the intestine seems to

Figure 1: *Garcinia cambogia* (Vrikshamla)

Figure 2: *Commiphora mukul* (Guggul/Guggul)

Figure 3: *Picrorhiza kurroa* (Kutki)

be one way that *Glycyrrhiza glabra*'s anti-obesity action is mediated. A novel nutrient found in functional foods called licorice flavonoid oil (LFO) may help fat persons (Figure 7).

Among the various anti-obesity treatments utilised in Ayurveda is aloe vera leaves, which are a member of the Asteraceae family and have a bitter flavor. Effects that lower serum lipid levels have been shown in studies on hyperlipidemic patients. Turpetum of *Operculina* (Nisonth) The root of the Convolvulaceae family, *Opelculina turpethum*, is effective in treating fatty liver and promoting hepatic lipid metabolism. By reducing body fat percentages, it successfully fights

obesity (Figure 8). The *Acorus calamus*, an Acoraceae root and rhizome, aids in weight loss and reduces triglycerides and LDL cholesterol. According to research done on animals, *calamus* root and rhizome alcoholic or aqueous extracts decreased cholesterol and triglyceride levels while raising HDL concentrations during an atherogenic diet. Although these trials suggest that calamus may have an anti-hyperlipidemic effect, its therapeutic applicability is still unknown. In wistar rats fed a fatty diet, the anti-obesity efficacy of *Gymnema sylvestre* leaves of the Asclepiadaceae family was examined. Wistar rats were given an aqueous saponin-rich extract that prevented increases in body weight, organ weight, and plasma lipids. Obesity can be treated with *G. sylvestre*, which also modifies lipid and glucose metabolism (Figure 9).

Camellia sinensis leaves enhance metabolic rate by 4% without elevating heart rate, promote thermogenesis, and stimulate fat oxidation, however, they do not result in quick weight loss.

In a human investigation on green tea extract, a man who took an extract containing epigallocatechin-3-gallate (EGCG) discovered that green tea increased his daily caloric intake more than the placebo group. Obesity is linked to the extract's metabolic impact (Figure 10).

A member of the Solanaceae family, *Withania somnifera* root is quite good at promoting healthy weight loss without causing any negative side effects. Medication with ashwagandha significantly lowered serum levels of total cholesterol, triglycerides, LDL, and VDRL in a human case study (Figure 11).

The labate family *Clerodendron grandulosum* Coleb leaves are used in an aqueous leaf extract by locals from northeast

Figure 4: *Areca catechu* (Khadir)

Figure 5: *Borhavia diffusa* (Punarnava)

Figure 6: *Plumbago zeylanica* (Chitrak)

Figure 7: *Glycyrrhiza glabra* (licorice)

Figure 8: *Aloe vera*

Figure 9: *Acorus calamus* (Vacha)

Figure 10: *Camellia sinensis* (green tea)

Figure 11: *Withania somnifera* (Ashwagandha)

Figure 12: *Clerodendron glandulosum*

India to control obesity. Lep expression and peroxisome proliferator-activated receptor (PPAR–2)–related genes are both down-regulated as part of its mode of action to limit adipocyte formation and visceral fat (Figure 12).

CONCLUSION

Childhood obesity is a developing problem that poses risks to children's physical and mental health. At the earliest signs of obesity, preventative measures can be put into place. The decisions that parents and children make about what to eat and how they behave are profoundly influenced by the school system. Moreover, a balanced nutritional diet, physical activity, a healthier lifestyle and with family support obesity and many associated problems could be avoided.

FUTURE SCOPE

Herbal medicine is the best alternative for treating the psychological impact of childhood obesity. Nowadays, there is an increasing demand to herbal medicines it is very beneficial in the future for treating the psychological impact of childhood obesity. In developing country, the demand of herbal medicines are increasing due to their inexpensiveness and also for increased awareness about the beneficial properties of herbal products.

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