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Review Article

OBESITY IS A PROBLEM OF PANDEMIC PROPORTIONS IN OUR YOUTH

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ABSTRACT
Childhood obesity can also lead to life-threatening conditions including Type 2 diabetes, insulin resistance, high blood pressure, heart disease, sleep problems, cancer, and other disorders. Overweight prevalence is higher in boys (32.7 percent) than girls (27.8 percent). In adolescents, overweight prevalence is about the same for females (30.2 percent) and males (30.5 percent). Global rise in obesity is attributable to a number of factors. Being a lifestyle disease, and how they may be responsible for obesity. The prevention and treatment of excess weight is critical for the health of both individuals and our society. Multilevel interventions are needed if we are to stem the pandemic and prevent the growing negative consequences of overweight and obesity in our youth.

KEY WORDS: NPY, AGRP, POMC, CART

INTRODUCTION

Obesity is defined as an abnormal or excessive fat accumulation that may impair health. The World Health Organization (WHO) defines “overweight” as a BMI equal to or more than 25, and “obesity” as a BMI equal to or more than 30. BMI is defined as the weight in kilograms divided by square of the height in meters (kg/m2). Today, obesity is one of the world’s major lifestyle diseases. The prevalence and incidence of obesity are increasing rapidly especially among the adolescent and young adult population in both developed and developing countries.An increasing number of countries are grappling with whether morbidly obese children should be taken from their parents amid the Western world's obesity pandemic. Childhood obesity can lead to a plethora of health problems usually emotional or psychological. Childhood obesity can also lead to life-threatening conditions including Type 2 diabetes, insulin resistance, high blood pressure, heart disease, sleep problems, cancer, and other disorders. Some of the other disorders would include liver disease, early puberty or eating disorders such as anorexia and bulimia, skin infections, and asthma and other respiratory problems. Obesity during adolescence has been found to increase mortality rates during adulthood. Childhood obesity is a condition where excess body fat negatively affects a child's wellbeing. The diagnosis of obesity is often based on Body mass index (BMI). Due to the rising prevalence of obesity in children and its many adverse health effects it is being recognized as a serious public health concern. [1-2] (Figure-1)

Prevalence, Trends and Gender

WHO’s latest projections indicate that globally in 2005: Approximately 1.6 billion adults (age 15+) were overweight. At least 400 million adults were obese. WHO further projects that by 2015, approximately 2.3 billion adults will be overweight and more than 700 million will be obese. Obesity is recently classified as a growing epidemic by WHO. Approximately 30.3 percent of children (ages 6 to 11) are overweight and 15.3 percent are obese. For adolescents (ages 12 to 19), 30.4 percent are overweight and 15.5 percent are obese. Excess weight in childhood and adolescence has been found to predict overweight in adults. Overweight prevalence is higher in boys (32.7 percent) than girls (27.8 percent). In adolescents, overweight prevalence is about the same for females (30.2 percent) and males (30.5 percent).[3]

Here are some interesting facts about childhood obesity are,

1. Both adults and children with lower education and income levels are more likely to become overweight or obese.
2. Children that have overweight or obese parents are more likely to be overweight or obese as well.
3. Children that were not breastfeed have higher risk of becoming obese children and adults.
4. Children watch about 10 to 20 food and drink commercials per day.
5. Children eating many of these products which are extremely high in sugar, fat and calories.
6. Obese children have a higher risk of dying prematurely than children of normal weight
7. Young female children that have physically inactive mothers are more likely to be sedentary and ultimately become overweight.
8. Statistics show that children and teens that spend more than 4 hours per day watching television or on computer are more likely to become overweight or obese.[4]

What is Body Mass Index?

Body mass index is a formula measuring height against weight (as kilograms divided by meters squared). It is expressed as a number from about 17 through 60. it is a very useful measure. The measurement is relatively easy to calculate; it has defined risk categories (overweight, BMI ≥25 kg/m^2; and obese, BMI ≥ 30 kg/m^2), and it is closely correlated with body fat in most people. BMI is a reliable and valid measure for identifying adults at increased risk of overweight- and obesity-related morbidity and mortality. (Figure-2)

BMI Interpretation

Underweight	<19.0
Normal range	19.1- 26.9
Overweight (85th)	27.0–29.9
Obese (95th)	>30

Etiological Factors for Obesity

Global rise in obesity is attributable to a number of factors. Being a lifestyle disease, and how they may be responsible for obesity. The primary reason leading to obesity is the energy imbalance between the calories consumed on one hand and calories expended on the other. This is reflected in the changes in dietary habits and reduction in physical activity owing to urbanisation, modernisation and westernisation. Change in lifestyle, upgradation in standard of living and rise in overall level of income have greatly contributed to the two primary reasons of obesity as mentioned above.

A change in dietary habits and increased consumption of energy-dense food is one of the major causes of obesity among children and adolescents. The composition of food changes to include greater saturated fats and less fiber causing accumulation of fat in the body leading to the condition of obesity.

The fast food culture: Two minute noodles and instant coffee, grabbing a bar of chocolate than going through the ritual of consuming a wholesome breakfast. (Figure-3)

Stress and tension related over consumption is another major reason for obesity. Increasing stress levels, depression, peer pressures etc. are all gifts of lifestyle changes.

A considerable reduction in physical activity which has been observed more in urban areas is a very big culprit leading to conditions of obesity and overweight.

The couch potato effect: Again, technological advancements and higher incomes have ensured the presence of an LCD, Xbox, computer video games, PSPs and likes at every home in urban cities, obviating the need of outdoor games and activities.

Sedentary lifestyle & Nature of work: With the advent of science and technology, there has been a considerable relaxation in department of errands requiring physical labour. This is true for both household and industry related work.Earlier women swept floors and washed clothes and utensils that required a lot of energy and physical efforts but now there are vacuum cleaners, washing machines and dishwashers to do the job.

Medical illness like; Cushing's syndrome (a condition in which the body contains excess amounts of cortisol) may also influence childhood obesity. Hypothyroidism is a hormonal cause of obesity, but it does not significantly affect obese people who have it more than obese people who do not have it.

Childhood obesity is often the result of an interplay between many genetic and environmental factors. Polymorphisms in various genes controlling appetite and metabolism predispose individuals to obesity when sufficient calories are present. As such obesity is a major feature of a number of rare genetic conditions like; Prader-Willi syndrome, Congenital leptin deficiency, Leptin receptor mutations that often present in childhood.[5-7]

Warning sign of Obesity

Excess body fat and a very low ratio of muscle to a very high ratio of fat is the biggest sign of obesity.

An extremely large waistline can be a sign of obesity. a large excess of abdominal fat can place you in the obesity category.

Difficulty sleeping is a common symptom of obesity. They can also show up as sleep apnea, a condition where you temporarily stop breathing while asleep.

Heavy sweating and a feeling of always being hot can be a symptom of obesity. This is due to the heavy layering of fat around your body. The fat can trap natural heat and make it harder for your body to cool itself down.

Lack of energy and constantly feeling tired can be a symptom of obesity. This can mean it is difficult for you to perform physical activity, or that you quickly become short of breathe after minor physical exertion.

Pain and soreness in your joints or muscles can be a sign of obesity. The pain is caused by the constant strain your weight puts your body under.

Rashes, especially heat and friction rashes usually develop in the excessive folds of skin that remain sweaty and bunched together due to your weight.

Type 2 diabetes can sometimes be a resulting symptom of obesity. Though obesity and diabetes may not always be linked, it is a common sign. You do not need to be obese to get diabetes, but many obese people do eventually end up with type 2 diabetes.[8]

Pathophysiology of Obesity

Hypothalamus

Hypothalamus and thalamus of our brain having an area known as “Eating Center” or arcuate nucleus coauda (ARC).(Figure-4) This arcuate nucleus coauda (ARC) of the brain contains two sets of neurons with opposing effects. First set of neurons known as AGRP/NPY neurons on activation of this neurons result in to increases appetite and metabolism, whereas second set of neurons known as POMC/CART neurons on activation of this neurons result in to decreases appetite and metabolism. Many appetite-regulating hormones like Leptin, Insulin and Grehlin work through the ARC, This leads to the thought that there is an association between weight gain, and obesity, potentially causing a decrease or reduction in this hormone. The combination of these factors has clearly been linked to obesity and warrants further research.(Figure-5)

Hormones that control eating such as, leptin and insulin (lower part of the figure) circulate in the blood at concentrations proportional to body-fat mass. They decrease appetite by inhibiting neurons that produce the molecules NPY (Neuropeptide Y) and AGRP(agouti related peptide) responsible for stimulate eating, while stimulating Proopiomelanocortin (POMC) and coccaineamphetaminerelatedtranscript (CART) producing neurons in the arcuate-nucleus region of the hypothalamus, near the third ventricle of the brain responsible for inhibit eating. Same way; gastric hormone, ghrelin stimulates appetite by activating the NPY/AGRP-expressing neurons and inhibiting Proopiomelanocortin (POMC) producing neurons So any kind of polymorphism of the neurons, their receptors and increasing and decreasing amount the hormones lead to Obesity.[9] (Figure-6)

Medical Risks of Obesity

While many people believe our society places an unhealthy emphasis on physical attractiveness, there are many legitimate reasons to be concerned about the rise of obesity. Obesity has been linked to several serious medical problems, including:

Heart disease, Hypertension, Diabetes, Cancer, Cerebrovascular disease, Gallstones, Osteoarthritis, Additional consequences, Sleep apnea, dyslipidemia, asthma, Heart failure, menstrual irregularities, pregnancy complications, social discrimination

ANTICIPATION AND ADMINISTRATION OF OBESITY

Home Remedies for Obesity

1. When you wake up in the morning, have a tablespoonful of honey mixed in an equal amount of water.
2. Drinking hot water continuously throughout the day also helps to dissolve the excess fat in the body.
3. Ginger is effective in dissolving fat. Have it twice or thrice a day in the form of tea.
4. Every one day a week, have a totally liquid diet. Fasting entirely can also be done if it is physically tolerable. This helps to flush out the toxins and excess fats accumulated throughout the week.
5. Regular exercise is one of the most important things. It helps to reduce the excess fats in the body and also keep the person fresh and active throughout the day.

Dietary Treatments for Obesity

There is a direct relation between the diet one eats and obesity. Controlling the diet is a sure method of controlling obesity. The following guidelines must be observed:-

1. Foods that are excessively rich in carbohydrates must be avoided. These include rice and potatoes. Wheat must be used instead of rice. Barley and maize can also be used effectively.
2. Fatty substances must be avoided. Hence, people who consume lots of hydrogenated fats have greater risk of cholesterol buildup in their arteries.
3. Obesity increases the chances of diabetes mellitus. Hence, people who are overweight must reduce their intake of sugars and other sweet foods.
4. Bitter and pungent foods are found to be effective in the control of weight and also preventing the dangers of diabetes in obese people. The bitter gourd and the bitter variety of drumstick are beneficial in this aspect.
5. Obese people must avoid preserved foods. The same applies to refrigerated drinks and cold foods.
6. Among meats, avoid red meats as they have high fatty contents. While buying meats, ask for the lean cuts and get the fats trimmed from them before cooking.

Useful Herbs in the Treatment of Obesity

1. Guduchi (Tinospora cordifolia)

Guduchi is an indigenous Indian herb which is not very well-known out of India. It is a commonly prescribed herb in Ayurveda for the condition of obesity. It helps in the proper canalization of fats in the body and thus reduces obesity.

2. Guggulu (Commiphora wightii)

A great deal of research has been done on the guggulu plant in recent times. The guggulsterone present in it is an alkaloid that has been found to be especially effective in heart ailments. Among its myriad other benefits, one is the reduction of fat accumulation in the body, giving people a leaner physique. Guggulu is the Ayurvedic drug of choice for obesity.

3. Indian Gooseberry (Emblica officinalis)

Known as amalaki in Indian medicine, the Indian gooseberry is the richest source of vitamin C. Vitamin C can disintegrate fatty buildup in the body. Hence, it is a very effective herb for the treatment of obesity and related conditions. The amalaki is an integral component of Triphala, which is commonly prescribed in the treatment of obesity.

4. **Ayurvedic massages**, **Panchakarma**, **yoga exercises** and **meditation** helps in calming down the nerves and relieves you of all stress and frustrations in day-to-day lives. It also helps remove harmful toxins from the body, making you feel good and relaxed, strengthens bones, muscles and important organs like heart, liver etc and improves blood circulation and keep a check on sugar levels.

Useful Drugs in the Treatment of Obesity

Orlistat (Xenical) reduces intestinal fat absorption by inhibiting pancreatic lipase.

Sibutramine (Reductil or Meridia) is an anorectic or appetite suppressant, reducing the desire to eat. Rimonabant (Acomplia) is a recently developed anti-obesity medication. It is cannabinoid (CB1) receptor

antagonist that acts centrally on the brain thus decreasing appetite. It may also act peripherally by increasing thermogenesis and therefore increasing energy expenditure.

Metformin In people with Diabetes mellitus type 2, the drug metformin (Glucophage) can reduce weight.

Exenatide (Byetta) is a long-acting analogue of the hormone GLP-1, which the intestines secrete in response to the presence of food. Among other effects, GLP-1 delays gastric emptying and promotes a feeling of satiety.

Pramlintide (Symlin) is a synthetic analogue of the hormone Amylin, which in normal people is secreted by the pancreas in response to eating. Among other effects, Amylin delays gastric emptying and promotes a feeling of satiety.[10]

Surgery and surgical indications for obesity

Gastric bypass is indicated for the surgical treatment of morbid obesity, a diagnosis which is made when the patient is seriously obese, has been unable to achieve satisfactory and sustained weight loss by dietary efforts, and is suffering from co-morbid conditions which are either life-threatening or a serious impairment to the quality of life.

The Consensus Panel of the National Institutes of Health (NIH) recommended the following criteria for consideration of bariatric surgery, including gastric bypass procedures: (Figure-7)

People who have a body mass index (BMI) of 40 or higher. Or,

People with a BMI of 35 or higher with one or more related comorbid conditions.

Bariatric surgery is the most effective treatment for morbid obesity

Gastric bypass is one of four types of operations for morbid obesity.

Laparoscopic surgery is equally effective and as safe as open surgery.

Patients undergo comprehensive pre-operative evaluation, and should have multi-disciplinary support, for optimum outcome.[11]

Insurance coverage requirements

Many individuals who are considering bariatric surgery as a means of solving severe obesity look to insurance for coverage. Their goal is to obtain coverage for expenses like laboratory fees, surgeon and surgical fees.

Send in a letter of medical requisite for a bariatric surgeon

Provide documentation of a medically supervised diet prior to obtaining coverage

One must provide evidence of failed attempts to lose weight via diet and exercise

While some may obtain coverage for some of the expenses related to bariatric surgery, most insurance companies do not cover supplements post operation.[12]

CONCLUSIONS

Lifestyle interventions have proven effective in preventing and treating obesity and its health consequences. The prevention and treatment of excess weight is critical for the health of both individuals and our society. With this aim, a variety of resources have been developed to address the issues of overweight and obesity at the community and population levels. Multilevel interventions are needed if we are to stem the pandemic and prevent the growing negative consequences of overweight and obesity in youth.

REFERENCES

1. Flegal KM, Carroll MD, Ogden CL, Johnson CL 2002 Prevalence and trends in obesity among U.S. adults, JAMA 1999–2000: 288; 1723–1727
2. Ogden CL, Flegal KM, Carroll MD, Johnson CL Prevalence and trends in overweight among U.S. children and adolescents,1999–2000; 288:1728–1732
3. Harnack LJ, Jeffery RW, Boutelle KN Temporal trends in energy intake in the United States: an ecologic perspective. Am J Clin Nutr, 2000; 71:1478–1484
4. Centers for Disease Control and Prevention 2004 Trends in intake of energy and macronutrients—United States,. MMWR Morb Mortal Rep,1971–2000; 53:80–82
5. Nielsen SJ, Siega-Riz AM, Popkin BM Trends in energy intake in U.S. between 1977 and 1996: similar shifts seen across age groups. Obes Res, 2002; 10:370–378

6. French SA, Lin BH, Guthrie JF National trends in soft drink consumption among children and adolescents age 6 to 17 years: prevalence, amounts, and sources, J Am Diet Assoc, 2003; 103:1326–1331
7. Field AE, Coakley EH, Must A, Spadano JL, Laird N, Dietz WH, Rimm E, Colditz GA Impact of overweight on the risk of developing common chronic diseases during a 10-year period. Arch Intern Med ,2001; 161:1581–1586
8. Seidell JC, Verschuren WM, van Leer EM, Kromhout D Overweight, underweight, and mortality. A prospective study of 48,287 men and women. Arch Intern Med 1996; 156:958–963
9. Harris TB, Ballard-Barbasch R, Madans J, Makuc DM, Feldman JJ Overweight, weight loss, and risk of coronary heart disease in older women. The NHANES I Epidemiologic Follow-up Study. Am J Epidemiol, 1993; 137:1318–1327
10. Must A, Jacques PF, Dallal GE, Bajema CJ, Dietz WH Long-term morbidity and mortality of overweight adolescents. A follow-up of the Harvard Growth Study of 1922 to 1935. J Med, 1992; 327:1350–1355
11. Must A, Spadano J, Coakley EH, Field AE, Colditz G, Dietz WH The disease burden associated with overweight and obesity. JAMA ,1999; 282:1523–1529
12. Chan JM, et al Obesity, fat distribution, and weight gain as risk factors for clinical diabetes in men, 1994; 17:961–969

Figure-1: Pandemic Child hood Obesity.

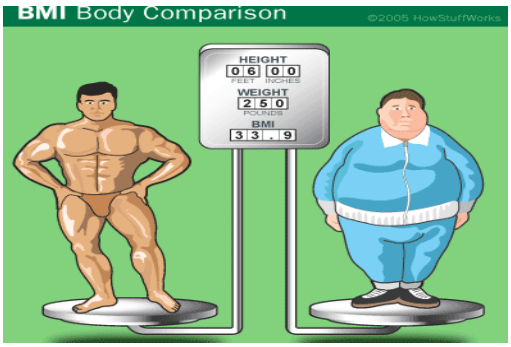

Figure-2: Measurement of Obesity by Body Mass Index.

Figure-3: Remarkable Changes in Childhood Lifestyle.

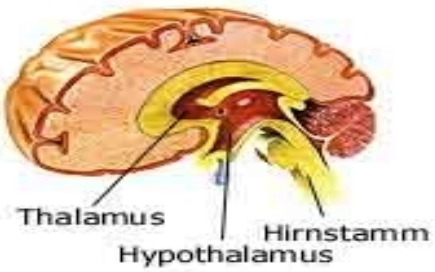

Figure-4: Hypothalamus and Thalamus.

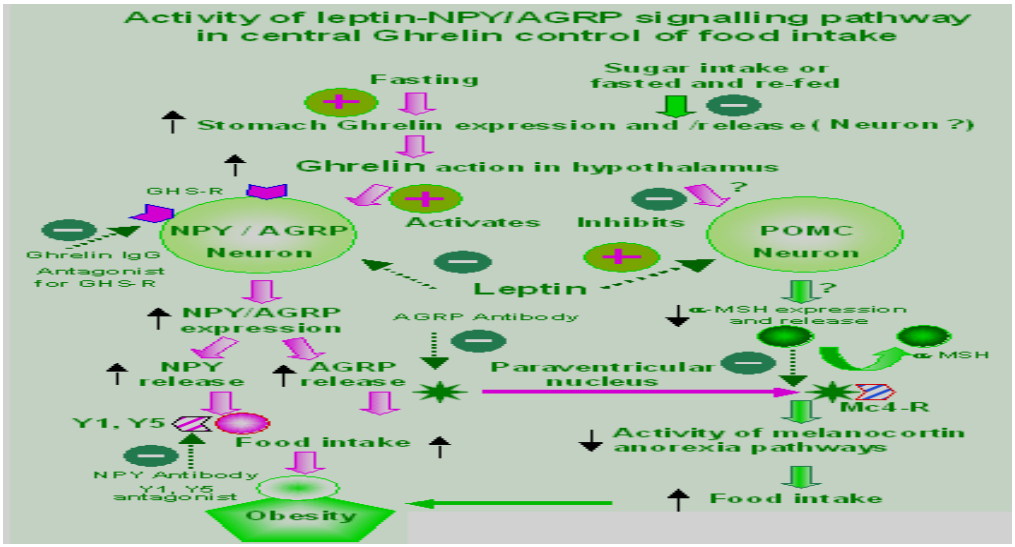

Figure-5: Signaling Pathway of Energy Expenditure and Energy Gain

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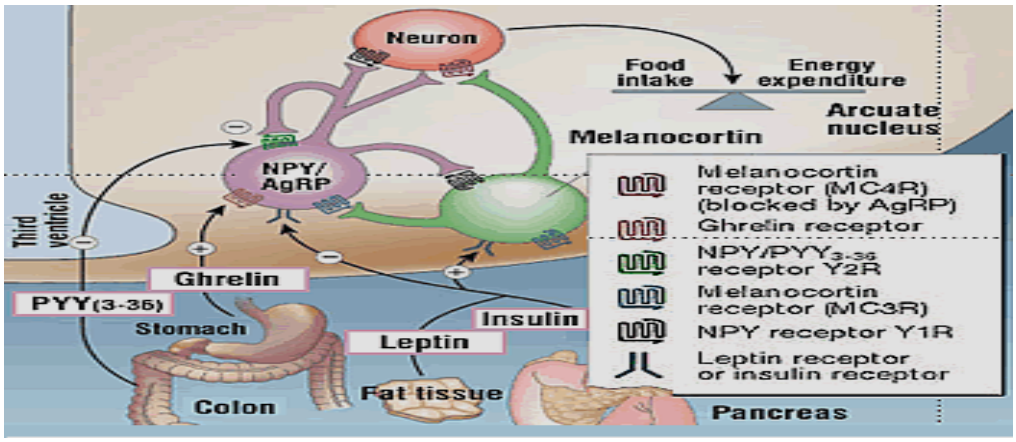

Figure-6: Hormones like Grehlin; Leptin and Insulin acting on Nauronal Transcript

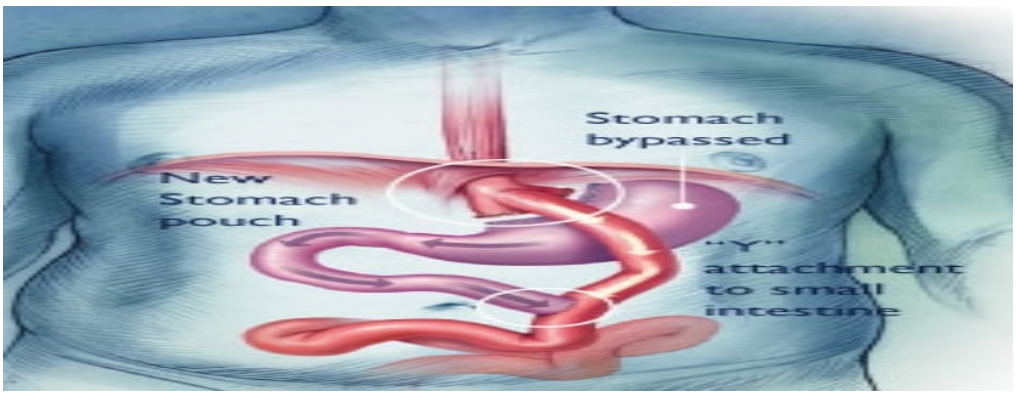

Figure-7: Surgery in obesity should be extreme?