

Risk Factors, Consequences and Prevention Strategies of Childhood Overweight and Obesity: An Indian Context

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ABSTRACT

India belongs to growing economics facing various types of non-communicable diseases including childhood obesity. India has several schemes for reduces the malnutrition of children. But there does not exist any program for childhood obesity. Childhood obesity is one of the foremost serious public health challenges of the 21st century. The prevalence of childhood obesity has increased at an alarming rate. Effective obesity prevention and treatment in children and adolescents is, therefore, a priority as it is far more cost-effective to prevent the onset of obesity in childhood compared to a lifetime of obesity-associated costs. Childhood obesity is a serious challenging phenomenon affecting all socioeconomic groups, irrespective of age, sex or ethnicity. Aetiopathogenesis of childhood obesity is multifactorial and includes genetic, endocrinology, metabolic, psychological, environmental and socio-cultural factors. Many co-morbid conditions like metabolic, cardiovascular, psychological, orthopedic, neurological, hepatic, pulmonary and renal disorders are seen in association with childhood obesity

Keywords: Childhood obesity, overweight, prevention.

INTRODUCTION

Childhood obesity has reached epidemic levels in the republic of India. India has the second-largest number of childhood obesity patients in the world, next to China. The prevalence of childhood overweight and obesity has substantially increased globally during the past few decades. It has been estimated that in 2014 worldwide approximately 14.4 million

children under the age group of 5 years were either overweight or obese, and obesity in children is now a serious public health issue in India because it's increasing the prevalence of chronic noncommunicable diseases, such as diabetes, hypertension, and renal failure, and increased cardiovascular risk.

Childhood obesity is one of the foremost serious public health challenges of the 21st century. The obesity problem is global and steadily affecting many low & middle-income countries, particularly in urban areas. The prevalence has increased at an alarming rate. Globally in 2010, the number of childhood obesity under the age of five is estimated to be over 42 million. Close to the 35 million of these are living in developing countries. ⁽¹⁾ Treating childhood obesity is critical to prevent adult obesity-related complications, both to decrease health care costs and to provide patients with a higher quality of life.

In the United States, obesity-related hospital costs among 7 year- to 17-year-olds have increased threefold over the past 20 years, reaching \$127 million per year. ⁽¹⁴⁾

Risk factor of childhood obesity

Genetic factors

The several decades shows that obesity is a heritable disorder. Obesity tracks in families, and one of the strongest predictors of child overweight is the BMI of the mother and father. In recent years, the progress was made for identifying genes that may contribute to this effect. The FTO (fat mass and obesity-associated) gene is a large gene on chromosome 16; in 2007,

three independent studies identified associations between single nucleotide polymorphisms on FTO and BMI, creating much excitement. ⁽²⁾ The obesity susceptibility gene variants described in this article interact with the diet to either increase consumption of saturated fat and refined carbohydrates, decrease energy expenditure, or alter regulation of lipid metabolism to increase weight gain and adiposity. ⁽³⁾

Dietary factors

Childhood obesity is largely influenced by the excessive intake of energy-dense foods that are high in fat and sugars but low in proteins, vitamins, minerals, and other healthy micronutrients. One of the factors that could significantly affect children's energy intake is the increasing availability of energy-dense, high-calorie foods/snacks, and drinks in their school canteens. Working mothers or single-parent families may also increase the demand for taking away foods or increase the frequency of eating out and cause reliance on pre-prepared process foods. The higher per capita income also increases the family's economic capacity and thus the affordability to buy high-calorie foods from restaurants shopping malls. ⁽⁴⁾

Tremendous advertisement

Children's exposure to the tremendous advertisement of unhealthy food products (i.e., high-calorie, high fat, low-nutrient snacks, fast foods, and sweetened drinks) are a significant high-risk factor of childhood obesity. Obesity in youngsters will increase because they are spent time watching tv. Ads for junk food can increase the number of unhealthy food choices kids make within as little as 30 minutes after exposure to the advertisements.

Physical inactivity

Physical inactivity trends have been increasing, not just in adults but also among children and adolescents mainly due to the switch to sedentary activities such as watching television, playing computer games, mobiles game, indoor games, etc. Children and youth spend most of their

waking hours at school, so the availability of regular physical activity in that setting is critical. Many reasons are declared for the lack of physical activity among youngsters and youth. These reasons include inactive role models (parents and other caregivers), unsafe environments, lack of open space & playground in school & communities along with increasing pressure on children to perform in academics and reduced emphasis on sports, availability mobile & computer, lack of recreation facilities, insufficient fund for physical activity and inadequate access to quality daily physical education.

Socio economic factors

Overprotection and forced feeding by parents, false traditional beliefs about health and nutrition, lack of health education knowledge about paediatric nutrition in parents and caregivers also contribute to obesity. Again limited availability of open spaces and parks due to population expansion and illegal settlements with an abundance of fast-food outlets and eating points increase the chance of the child becoming obese. Urbanization related intake behaviours that have been shown to promote obesity include frequent consumption of meals at fast-food outlets consumption of oversized portions at home and restaurants consumption of high-calorie foods, such as high-fat, low-fibre foods and intake of sweetened beverages. ⁽¹⁶⁾

Environmental Factors

Psychosocial and emotional distress contributes to excess weight gain in children via maladaptive coping strategies such as eating too suppress negative emotions, appetite up-regulation, and low-grade inflammation. The changes in the environment contributing to increased caloric intake have been accompanied by factors predisposing to decreased caloric expenditure such as reduced levels of physical activity and increasing time spent in sedentary activities such as the use of television, computers, phones, and tablet. ⁽⁵⁾

Early feeding practice

Lack of breastfeeding practice increased formula feed, complementary feeding before 4 months to contribute to childhood obesity

Medications

Several medications can contribute to weight gain such as glucocorticoids, antipsychotic drugs, anticonvulsant drugs, etc.

Psychological factors

Personal, parental and family stress can increase childhood obesity. Early life stressors, such as experiencing chronic early-life poverty or adverse childhood experiences such as abuse or domestic violence exposure, are associated with obesity and overweight in adults and increasing evidence has been found for associations in adolescents and children. ⁽⁶⁾

COMORBIDITIES OF CHILDHOOD OBESITY

Cardio vascular effect

Childhood obesity conferring an increased lifetime risk for cardiovascular disease & metabolic disorder. ⁽⁷⁾ Childhood obesity leads to influences the risk factors such as hypertension, diabetes mellitus, respiratory problem, hypercholesterolemia, and the metabolic syndrome, as well as non-cardiac sequel that include musculoskeletal defects, non-alcoholic hepatitis, gallstones, sleep apnea, thromboembolic disease & cancer. Excess abdominal fat mass is associated with reduced aortic distensibility and increased pulse wave velocity. ⁽⁸⁾ Obesity influenced increased risk of morbidity and mortality as well as reduced life expectancy and quality of life.

Polycystic ovary syndrome

PCOS (Polycystic ovary syndrome) is the most common hormonal abnormality in reproductive-age women. The Polycystic Syndrome influenced the secretions of the reproductive hormone, increased androgen production and disordered gonadotropin secretion leading to menstrual irregularity, hirsutism, dyslipidemia, and infertility. In addition to these important reproductive manifestations, PCOS has metabolic characteristics that include

prominent defects in insulin action and β -cell function, defects that confer a substantially increased risk for glucose intolerance and type 2 diabetes. Polycystic ovary syndrome (PCOS) is the most common hormonal disturbance affecting an estimated 5–10% of reproductive-age women in the United States. ⁽⁹⁾

Type 2 diabetes

Childhood Obesity has led to a dramatic increase in the incidence of type 2 diabetes (T2DM) among children and adolescents in India. Childhood type 2 diabetes produces various types of following complications atherosclerotic cardiovascular disease, stroke, myocardial infarction, and sudden death; renal insufficiency and chronic renal failures; limb-threatening neuropathy and vasculopathy; and retinopathy leading to blindness. A study conducted among adolescents aged 14–19 years reported that 64% of the obese adolescents in India had fasting hyperinsulinemia, a surrogate marker of insulin resistance. ⁽¹⁰⁾

Respiratory problem

However, studies examining asthma risk associated with overweight in children and adolescents have yielded inconsistent findings. Childhood Obesity may also be associated with asthma severity and/or poor asthma control in children and adults. Studies have shown that obese patients with asthma are often prescribed a greater number of β -agonists and oral corticosteroids and have more frequent emergency department visits and hospitalizations for asthma exacerbations than their normal-weight counterparts. ⁽¹¹⁾

The increasing prevalence of childhood obesity seems to be associated with an increased prevalence of obstructive sleep apnea syndrome (OSAS) in children. The condition refers to a breathing disorder characterized by recurrent, partial, or complete upper airway obstruction due to the obesity, commonly associated with intermittent hypoxemia and sleep fragmentation

Psychological problem

Childhood obesity is associated with behavior problems when Indian girls started their school life. At this early age, there already appears to be gender differences because obese Indian boys are not similarly affected. Impairment in psychosocial functioning is much broader in scope than psychiatric impairment. Despite not meeting the threshold for specific psychiatric diagnoses, psychological consequences of child obesity are significant. ⁽¹²⁾

Idiopathic intracranial hypertension

Idiopathic intracranial hypertension (IIH) is a disorder that typically presents with headache and blurred vision and is diagnosed by the presence of papilledema and elevated intracranial pressure (ICP) in the absence of infectious, vascular, or structural causes. It most often affects obese or overweight adult females and can lead to blindness in up to 10% of patients, particularly if it is not recognized or treated promptly. ⁽¹³⁾

Dyslipidaemia

The dyslipidemia pattern associated with childhood obesity consists of a combination of elevated triglycerides (TG), decreased high-density lipoprotein cholesterol (HDL), and top normal to mildly elevated low-density lipoprotein cholesterol (LDL). A study from India has reported a prevalence of childhood obesity is 63%. ⁽¹⁵⁾

Strategies for Childhood Obesity

Prevention

1. Surveillance

Monitoring of nutritional and obesity status all pediatric age group patients of the population.

- Regular measurement of BMI and plotting of results on a BMI chart to track changes over time
- Assessment of all children for obesity-related risk factors to allow for early intervention. This includes recording the obesity status (BMI) of the biological parents and assessing key nutritional and physical activity habits
- For children with obesity, weight-related comorbidities should be assessed through a focused review of systems,

physical examination, and laboratory screen

- Maintain a nationwide database on secular trends in obesity and diabetes.

2. Home based intervention

- Eat meals with family in a fixed place and fixed time and fixed amount.
- Do not skip any meal
- Always eat homemade food
- Avoid high energy sourced process food/junk food
- Remove the television from the children's bedroom
- restrict times for television viewing and computer games
- mandatory 60 min expend for sports/physical activity by supervision of parents

3. School based intervention

- Increase and enhance wellness curriculum
- supply Healthy foods in school cafeteria, ban on sweetened beverages and energy-dense junk food /processed food.
- Trained to the all-student about health education
- The teacher to encourage the student for physical activity
- Reduce the tremendous process of food advertising in schools

4. Health education & promotion

- To early teach about the importance of physical activity, and healthy food eating to all children and their parents.
- Nutrition and physical advice through audio-visual media , poster, new paper , etc
- Endorsement of a healthy lifestyle by prominent people and local champions
- For children who are overweight or obese, a series of clinical counselling& health check-up facility in the primary care setting is the suggestion
- Educational materials are available from a variety of sources to facilitate counselling. These materials have much in common and have not been directly compared; it is reasonable for providers

to select materials with messaging that is best suited to their community.

5. Government Policy & Regulation

- Creation of national fund for reduces childhood obesity
- The Decrease in taxes and prices natural of fruits and vegetables and accessible to supply
- Mandatory required proper labeling of all children food (information nutritional value, expiry date, warning, quality, doses, eating process etc.)
- More government policy requires (playgrounds, parks, green field) in the community for children
- Restriction on the advertisement of commercial foods on television at prime time and during children's programs and the ban on unfair nutrition claims for commercial process food/junk food.
- Encourage transnational food companies to manufacture healthy snacks
- Prohibition of promotional gifts with junk foods
- Ban on monetary sponsorship of youth festivals by cola companies.

REFERENCES

1. Krushnapriya Sahoo, Bishnupriya Sahoo, Ashok Kumar Choudhury, Nighat Yasin Sofi, Raman Kumar, Ajeet Singh Bhadoria. Childhood obesity: causes and consequences. *J Family Med Prim Care*. 2015 Apr-Jun; 4(2): 187–192.
2. Loos RJ, Bouchard C. FTO: the first gene contributing to common forms of human obesity. *Obes Rev*. 2008;9:246–250.
3. Onland-Moret NC, Grobbee DE, van Vliet-Ostaptchouk JV, Wijmenga C, van der Schouw YT. Obesity genes identified in genome-wide association studies are associated with adiposity measures and potentially with nutrient-specific food preference. *Am J Clin Nutr*. 2009 Oct;90(4):951-9.
4. Harish Ranjani, RajendraPradeepa, T. S. Mehreen, Ranjit Mohan Anjana. Determinants, consequences and prevention of childhood overweight and obesity: An Indian context. *Indian J Endocrinol Metab*. 2014 Nov; 18(Suppl 1): S17–S25.
5. Taber DR, Chriqui JF, Powell L, Chaloupka FJ. Association between state laws governing school meal nutrition content and student weight status: implications for new USDA school meal standards. *JAMA Pediatr*. 2013;167(6):513-519.
6. Richardson AS, Dietz WH, Gordon-Larsen P. The association between childhood sexual and physical abuse with incident adult severe obesity across 13 years of the National Longitudinal Study of Adolescent Health. *Pediatr Obes*. 2014;9(5):351-361.
7. Julian Ayer, Marietta Charakida, John E. Deanfield, David S. Celermajer. Lifetime risk: childhood obesity and cardiovascular risk. *European Heart Journal*, Volume 36, Issue 22, 7 June 2015, Pages 1371–1376, available from <https://doi.org/10.1093/eurheartj/ehv089>
8. Rajarshi Banerjee, Paul Leeson. Tackling Childhood Obesity as a Strategy in Cardiovascular Risk Reduction. *European Cardiology* 2011;7(3):160-3
9. Ramanand SJ, Ghongane BB, Ramanand JB, Patwardhan MH, Ghanghas RR, Jain SS. Clinical characteristics of polycystic ovary syndrome in Indian women. *Indian J Endocr Metab* [serial online] 2013 [cited 2019 Nov 10];17:138-45. Available from: <http://www.ijem.in/text.asp?2013/17/1/138/107858>
10. Vikram NK, Misra A, Pandey RM, Luthra K, Wasir JS, Dhingra V. Heterogeneous phenotypes of insulin resistance and its implications for defining metabolic syndrome in Asian Indian adolescents. *Atherosclerosis*. 2006;186(1):193–9. doi:10.1016/j.atherosclerosis.2005.07.015

11. Mary Helen Black ,Ning Smith ,Amy H. Porter, Steven J. Jacobsen .Higher Prevalence of Obesity Among Children With Asthma. *Obesity* (2012) 20, 1041–1047. doi:10.1038/oby.2012.5
 12. Leigh Small,Alexis Aplasca .Child Obesity and MentalHealth:A Complex Interaction. *Child Adolesc Psychiatric Clin N Am* 25 (2016) 269-282. <http://dx.doi.org/10.1016/j.chc.2015.11.008>
 13. Ball AK, Clarke CE. Idiopathic intracranial hypertension. *Lancet Neurol.* 2006;5:433–42
 14. Roseann T. Spiotta and Gregory B. Luma. Evaluating Obesity and Cardiovascular Risk Factors in Children and Adolescents.*Am Fam Physician.* 2008 Nov 1;78(9):1052-1058.
 15. Ambili Susan Jacob, Reetha G. Prevalence of metabolic comorbidities in obese children. Jacob AS et al. *Int J Contemp Pediatr.* 2017 Jul;4(4):1450-1455. DOI: <http://dx.doi.org/10.18203/2349-3291>
 16. Raj M, Kumar R K. Obesity in children & adolescents. *Indian J Med Res* 2010;132:598-607
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