



## Causes and Concerns of Childhood Obesity Parameters

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### Abstract

Due to the adoption of western lifestyles, childhood obesity is on the rise in many developing nations, including India. This is especially true in upper socioeconomic strata. It encompasses a variety of risk factors, both modifiable and non-modifiable. Overweight and obesity are more prevalent among school-going children who miss breakfast, lack physical activity, watch television and video games, have a family history, and have junk food intake. Consequences of obesity include dyslipidemia, cardiovascular issues, impaired glucose tolerance, hypertension, PCOS, and metabolic syndrome. Lifestyle changes, the involvement of schools, family members, and society all have a part in preventing childhood obesity. As a result, minimizing childhood obesity is an important factor to consider for the future health of children.

**Keywords:** Consequences, obesity, overweight, physical inactivity, risk factor

### Introduction

According to the World Health Organization (WHO), "Obesity is defined as an abnormal or excessive fat buildup in the body that poses a health risk". Overweight and Obesity is measured in terms of Body Mass Index (BMI) of 25 or higher, and 30 or higher respectively. Obesity in children ranges from the ages of two to nineteen. Children between the ages of 2 and 19 are measured using BMI charts. These charts, created by the Centers for Disease Control and Prevention (CDC), are colour-coded by BMI percentile: 5<sup>th</sup> - 85<sup>th</sup> percentile (green), 85<sup>th</sup> - 95<sup>th</sup> percentile (yellow), and >95<sup>th</sup> percentile (red). BMI readings that are at or above the 95<sup>th</sup> percentile is considered as childhood obesity. <sup>[1-3]</sup>

According to the World Health Organization (WHO) and the International Obesity Task Force (IOTF), the global prevalence of overweight and obesity among

students aged 5 to 17 is around 10%. Obesity in children is a huge public health issue that affects people all over the world. "One of the most critical public health concerns of the twenty-first century," according to the WHO. Obesity prevalence in children aged 2 to 5 years is 13.9 per cent, in children aged 6 to 11 years is 18.4 per cent, and in children aged 12 to 19 years is 20.6 per cent, according to the CDC. <sup>[4]</sup>

In 2010, 43 million preschoolers (1 to 5 years) were overweight or obese, according to research analyzing trends in overweight and obesity in 144 developing and developed countries. The global prevalence of childhood obesity has been as follows during the last 40 years: 1990-4.2 per cent, 2010-6.7 per cent, and 2020-9.1 per cent. <sup>[5]</sup> The rapid rise in the frequency of childhood obesity shows that changes in children's environments and learnt behaviours may be

contributing to their excessive weight gain<sup>[6]</sup> (Figure 1)

According to a systematic review study conducted in India (2010), the estimated combined prevalence of childhood overweight and obesity was 19.3%, a considerable rise from the previous prevalence of 16.3% recorded in 2001-2005. Childhood obesity is more likely to lead to adult obesity and ill health later in life and is a key contributor to many preventable causes of morbidity.<sup>[7]</sup>

According to the European Association for the Study of Obesity (EASO), Obesity and overweight are the world's fifth leading cause of death. It is linked to 44% of diabetes, 23% of cardiovascular problems, 7% of certain malignancies, and 10% of other metabolic syndromes. All this evidence shows that Obesity and overweight in children have a negative influence on physical and mental health, as well as an increased risk of developing non-communicable diseases such as diabetes and cardiovascular disease. The world is undergoing a rapid epidemiological and dietary change, which is leading the child to become obese, in turn causing morbidity and mortality.<sup>[8-11]</sup> This study focuses on current knowledge of factors linked to childhood obesity, including the most recent prevalence rates, the efficacy of preventative interventions, and the risk of accompanying disease later in life.

### Risk Factors:

Childhood obesity has both modifiable and non-modifiable risk factors. Early modifiable risk variables include nutrition quality and quantity, dietary choices, physical exercise, especially time spent playing outside, screen time, sleep duration and quality, and household routines surrounding bedtime. Other risk variables, such as hereditary origins, are seen as nonmodifiable.<sup>[12]</sup> (Figure 2)

### Non-modifiable risk factors

Obesity runs in families, and there is always a belief that obesity is caused by genetics. Obesity in children is linked to obesity in their parents, and when both parents are obese, the level of obesity in the child rises. A prospective study done in India showed that the family history of overweight and obesity contribute to the development of this condition in children around 15 per cent.<sup>[13]</sup> Genetic abnormalities, both syndromic and monogenic, are

one of the major risk factors for juvenile obesity. Syndromic abnormalities include Albright's hereditary osteodystrophy, Cohen syndrome, WAGR, trisomy 21, Prader-Willi syndrome, etc., Monogenic disorders include leptin insufficiency and mutations in the melanocortin 4 receptor, and others<sup>[14]</sup> Hormonal problems such as hypothyroidism, growth hormone insufficiency, Cushing's syndrome, and hyperprolactinemia are other contributing factors.<sup>[15]</sup>

### Modifiable risk factors

1. Dietary Habits: While A Reduced Intake Of Dairy Products And Calcium Has Been Linked To Childhood Obesity, The Evidence Supporting A Larger Intake Of Fruits And Vegetables Is More Circumstantial. Beverages With Sugar Sweeteners, Such As Cold Drinks, May Lead To Childhood Obesity. Some Eating Habits, Such As Skipping Breakfast, Contribute To 33 Per Cent Of Overweight And Obesity While Dining Out Of The House, Such As Consuming Junk Food, Adds To 65 Per Cent Of Overweight And Obesity.<sup>[13][16]</sup>
2. Fast Food, Smoked Foods, Sugar Beverages, A High-Fat Protein Diet, And Processed Snacks Are All Contributing Factors To Behavioural Variables. As Dietary Habits Were Given Importance To Prevent Obesity Among Children So, According To The United States Preventive Service Task Force, Children Aged 6 And Above Should Be Tested For Obesity, And Those Who Are Obese Should Be Referred To Moderate To High-Intensity Behavioural Interventions.<sup>[17]</sup>
3. Lack Of Physical Activity: In Recent Years, Technological Advancements Have Resulted In A Decrease In Physical Activity, With Children Preferring To Stay At Home And Watch Television Without Restrictions, With Increased Screen Time, And Using Mobile And Play Stations Instead Of Playgrounds And Parks. Childhood Obesity Is Linked To Increased Idle Time And Decreased Physical Exercise.<sup>[18]</sup> One Prospective Study Showed That Lack Of Physical Activity Causes The Occurrence Of Overweight And Obesity About 65 Per Cent And It Also States That Childhood Obesity And Physical Activity Had An Inverse Association.<sup>[13]</sup>

4. Obesity In Children = 1/Physical Activity
5. The Centers For Disease Control And Prevention Recommends That Children Ages 6 To 17 Engage A Minimum Of 60 Minutes Of Physical Activity Each Day. This Can Range From A Low-Intensity Aerobic Activity Like Walking To High-Intensity Aerobic Activity Like Running. At Least Three Times Per Week, Including Vigorous Muscle-Strengthening And Bone-Strengthening Exercises.<sup>[19][20]</sup>
6. The Impact Of The Media On Obesity: Advertisements And The Media Play A Significant Role In Our Eating Patterns. Obesity Might Develop As A Result Of Too Much Time Spent In Front Of The Screen. Television Not Only Promotes Inactivity But Also Pushes Us To Consume More Calories. Snacking And Meal Consumption Increased As A Result Of Spending More Time In Front Of The Television Or Phone Screen. Children Will Make Unhealthy Eating Choices As A Result Of The Habit Of "Seat Time" And "Snacks," As Well As Product Advertisements On Television.<sup>[21]</sup>
7. Environmental/Social Risk Factors: New Evidence Reveals That The Environment Has A Greater Impact On Children's Health Than Any Other Factor, Such As Genetic And Sedentary Lifestyle. BMI Increases In Lower-Income Families Where There Is No Knowledge Of A Healthy Diet. Parents' Attitudes Toward Food And Physical Activity Are Overly Negative, Especially Among Parents With Little Education And Those From Poorer Socioeconomic Backgrounds.<sup>[22-24]</sup> In Rural Locations, The Difficulty Of Travelling To The Major Grocery Store Or Purchasing Fruits And Vegetables Has An Impact On Childhood Obesity. Alternatively, In Urban Regions, Increased Distance From Parks, Grounds, And The Apartment Culture Has Reduced The Habits Of Playing On The Ground, As Well As Parents' Fear Of Strangers, Resulting In Children Becoming Less Social Connections.<sup>[15]</sup>
8. Other Risk Factors Include A) Sleep: Lack Of Sleep Is Another Side Effect Of Prolonged Screen Usage. Non-Ionizing Radiation From

Mobile Phones Reduces The Release Of Melatonin From The Pineal Gland, Resulting In Less Sleep. Weight Gain Is Induced By Increased Daytime Sleep After Lunch. Obesity In Preschool-Aged Children Shows A Strong Inverse Link With Getting Enough Sleep.<sup>[15]</sup>

B) Stress: Many Of The School-Going Children Are Now Stressed Due To Their Academics Which Affect Their Health. On The Contrary, Many Students Are Involved In Extracurricular Activities. Thus, Their Daily Activities Result In Childhood Obesity. Most Of The Mothers Are Working Nowadays. Hence, They Are Not Conscious About Their Child's Eating Habits. They Encourage Their Young Ones To Take Plenty Of Fast Foods And Packed Food Items Which Result In Easy Weight Gain. Eating Habits In The Family Also Contribute To Childhood Obesity. Some Studies Suggest That Parents Eating Behaviour Results In Overeating Behaviour Of Their Young Ones Right From Their Childhood.<sup>[25][26]</sup>

#### **Effect Of Schooling On Childhood Obesity:**

Physical inactivity, which results in gaining weight and obesity, is facilitated by removing physical education lessons from the curriculum. A study was done among school-aged youngsters, primarily those between the ages of 12 and 14, because they are at risk of becoming obese.<sup>[13]</sup> (Table 1)

Conducting competitions & encouraging participation in extracurricular activities would aid in both the physical and mental health of the child. Equal importance is to be given to both academic and athletic activities.<sup>[27]</sup> Goyal RK et al did a study on school-aged children(12-18 years old) in the western areas of India and discovered that obesity among boys and girls was 2.9 per cent and 1.5 per cent, respectively, and overweight among them was 14.3 per cent and 9.2 per cent.<sup>[28]</sup>

#### **Effect Of Poor Parent-Child Interaction:**

Nowadays poor parent-child interaction is a major problem in childhood obesity. In-Home where both parents are working have no time in taking care of their children's they are not aware of their child's nutritional intake. Securely attached toddlers explore and play when they are close to their

parent/caregiver, thereby those children are not at risk of developing obesity.<sup>[29–31]</sup>

### **The Impact Of Early Solid Food Introduction In Infants:**

Infants who were given solid meals before the prescribed six-month period were more likely to acquire childhood obesity. As a first weaning food, different countries use different foods. For example, in China, gruel boiled with pork bones is preferred, whereas, in the United States and Australia, infant cereals with pureed fruits and vegetables are preferred. As a result, the sort of food we introduce to the baby will have a significant impact on their weight increase.<sup>[32]</sup>

### **Consequences Of Obesity:**

Hypertension, dyslipidemia, insulin resistance, and obesity are all symptoms of metabolic syndrome, which can lead to cardiovascular disease and type 2 diabetes mellitus.<sup>[7,33,34]</sup> Obesity causes structural and hemodynamic alterations in the heart, such as increased ventricular mass, hypertension, and carotid artery intima medial thickening. Cardiovascular diseases (CVD) are on the rise in tandem with the growth in childhood obesity. More than 1 lakh extra cardiovascular events are estimated to occur by 2035 as a result of obesity.<sup>[35]</sup> Increased insulin resistance causes type 2 diabetes, which causes retinal and renal problems. There will be an increase in triglycerides and a decrease in HDL in Non-Alcoholic Fatty Liver Disease (NAFLD). NAFLD affects 3 to 12 per cent of healthy people, but 70 to 90 per cent of people with obesity.<sup>[36]</sup>

According to certain research, obstructive sleep apnea is more common in adolescents with a higher BMI. Lower immunity status is predominant among obese youngsters which result in more prone to respiratory tract infections like asthma. Obesity causes increased insulin resistance and disruption of the HPO (Hypothalamic-Pituitary Ovarian) axis resulting in polycystic ovarian syndrome ((the leading cause of infertility in young women). Blount's disease (tibia vara), Slipped Capital Femoral Epiphysis (SCFE) are all examples of orthopaedic problems and psychiatric disorder-related stress in school-aged children. (Figure 3)<sup>[25] [37–40]</sup>

### **Prevention:**

### **Role of school:**

Schools have the power to shape a child's nutritional and weight-control beliefs and attitudes. Teachers should inculcate ideas about self-regulation into young minds. Self-Regulation includes attention, inhibitory control, emotion regulation, cognitive flexibility and planning, which individuals use to control and manage their attention and arousal to engage in goal-directed behaviour. Easy access to lavish cafeterias for kids with snack bars and vending machines selling high-fat, high-sugar items.<sup>[41–46]</sup>

School health services are being provided in India mainly focusing on nutritional services which include a) Mid-day meal scheme: Saturated and total fat contents of meals provided by most schools exceed the limits required. Training of food preparation staff may effectively address this problem without decreasing student participation rate, b) Applied nutrient programs: UNICEF is assisting in the implementation of nutritional services for school children, c) Specific nutrients.<sup>[47]</sup>

### **Role of the family:**

Adopting healthy habits can help people overcome their hereditary susceptibility to fat. The low-calorie and nutritious meals are readily available at home. The low nutritional value foods cause increased weight gain. So, these foods should be substituted for these nutrient-dense snacks such as fruits, vegetables, raw nuts and seeds, whole-grain crackers, and cookies. Eating meals prepared at home is a healthy and weight-loss choice. When families eat together at home, the risk of childhood obesity is reduced.<sup>[17] [48]</sup>

Replace "screen time" with "outdoor time": Parents should encourage the children to play /ride a cycle in the backyard promotes the necessity of being active. Parents should set an example for their children's food and physical activity habits. Bring high-calorie foods home as little as possible. Start eating dinner at the table rather than in front of the screen. After supper, go for a walk together.<sup>[19] [41,42]</sup>

### **Role of primary care provider:**

Primary care providers have a unique role since they are seeing the same families regularly, from infancy. As a result, they can provide proactive advice and counselling that can influence the family's physical activity and diet. Paediatricians screen for obesity by



measuring weight and height and calculating BMI, which provides a cut-off value for determining whether a child is overweight or obese. <sup>[15][49]</sup>

### Programs And Initiatives For Obesity Prevention In Children

The Global Action Plan on Physical Activity 2018-2030 is a programme aimed at improving the population's food and physical activity patterns. Obesity is seen as a key barrier to long-term development. As a result, several national governments have opted to develop more policies to reduce one-third of noncommunicable disease-related early mortality. <sup>[50]</sup>

New Delhi's Children's Health Education through Nutrition and Health Awareness Program (CHETNA) is one of the initiatives. Medical Education for Children/Adolescents for Realistic Prevention of Obesity and Diabetes and Healthy Aging (MARG) a programme that reached almost 700,000 children in 15 cities across North India. Children are given nutritious diets and instructed about physical activity through lectures, brochures, discussions, and skits in these programmes. <sup>[47]</sup>

### Conclusion:

Unfortunately, the harmful evolution of food and activities has increased the danger of obesity and weight-related issues among children. Prevention of obesity begins from the home. Parents should provide their children with a balanced nutritional diet. Schools encourage children to promote a healthy diet and encourage physical activity. Early care and education (ECE) help pupils learn what they should eat and how to build a healthy foundation for life. Salad bars in schools are another technique for decreasing childhood obesity.

BMI reduction can be aided by short-term comprehensive therapy that includes moderate to strenuous physical exercise, a well-balanced healthy diet, and behavioural counselling. As a result, paediatrician, school, government, and family intervention has been successful in preventing childhood obesity.

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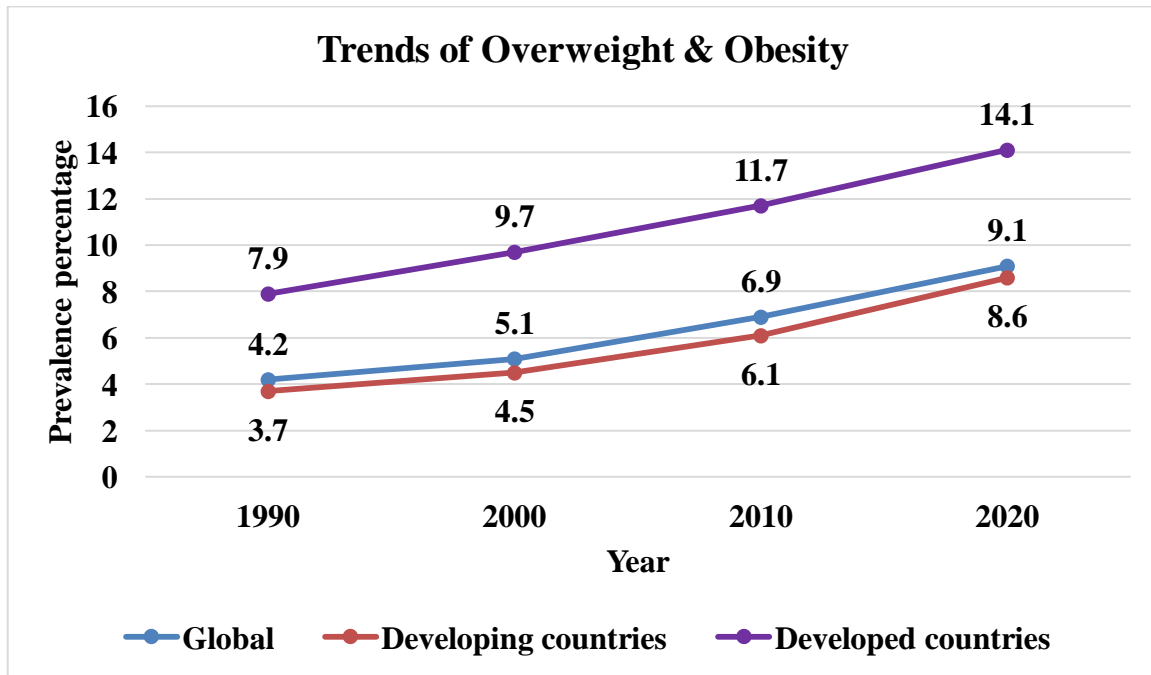
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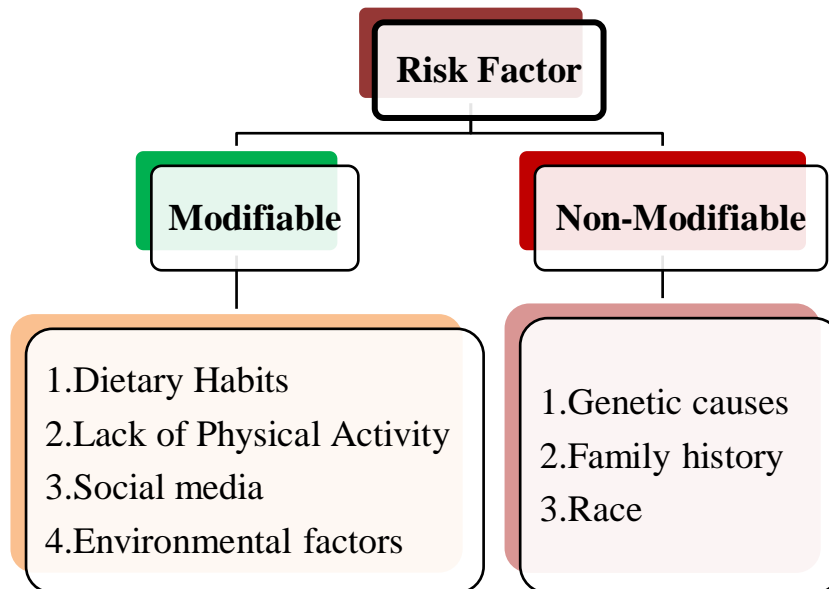
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**Figure 1: Trends of Overweight and Obesity among preschoolers**

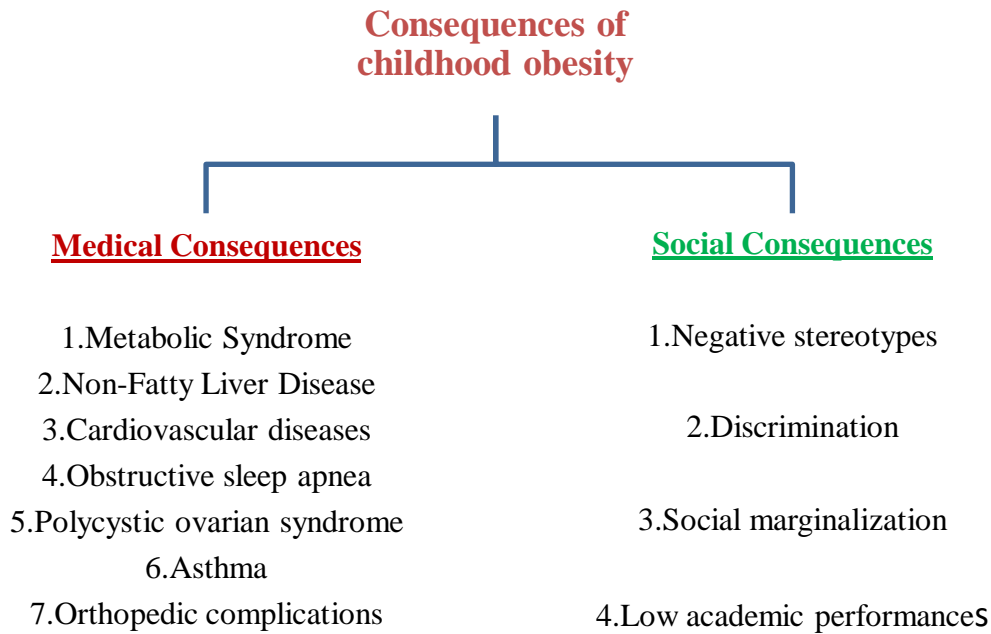


**Figure 2: A risk factor for childhood obesity**





**Figure 3: Consequences of childhood obesity**



**Table 1: Risk of obesity in school-going children in India (12-14 years old)**

Age	Underweight	Normal	Overweight	Obese
12 years	33%	60%	5%	3%
13 years	30.7%	61.4%	4.9%	2.9%
14 years	7.4%	71.8%	12%	8%