

*Review Article*

Predictors of Childhood Obesity

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ABSTRACT

India is currently facing a dual burden of undernutrition and overnutrition. There has been a lot of emphasis on undernutrition, but the other end of the spectrum, overnutrition has not been well investigated, especially among children. Childhood obesity has emerged as a problem of public health concern, especially among those belonging to affluent background. The existing evidence highlights a significant link between factors like dietary behaviour, physical inactivity and obesity among children. Numerous factors like rapid urbanization, increasing purchasing power, increased Television viewing and easy access to technological devices like computers have resulted in more sedentary activity, consequently leading to obesity among children. Moreover, having an obese parent also contributes significantly to obesity among children. Thus, based on the existing evidence, several risk factors are known to influence obesity among children. Awareness programmes to sensitize children regarding these risk factors is imperative to alleviate obesity-related chronic diseases, in adulthood. Schools offer a far-reaching opening to implement preventive strategies for childhood obesity and thus, should be optimally utilized as a platform to impart nutritional health education, stimulate physical activity and facilitate promotion of healthy behaviours for a healthy lifestyle.

Key Words: Predictor, Childhood obesity.

INTRODUCTION

Obesity is a disorder of energy balance, characterized by excess body fat. It is defined as an abnormal growth of the adipose tissue due to an enlargement of fat cell size (hypertrophic obesity) or an increase in fat cell number (hyperplastic obesity).^[1] It is considered to be a global epidemic and is also on the rise among children.^[2] Globally the prevalence of childhood obesity varies from over 30% in the United States of America (USA) to less than 2% in Sub-Saharan Africa. However, National representative data for childhood obesity in India is not available.^[3]

Moreover; overweight and obese children are exposed to double odds of becoming obese adults than normal children.^[2] Furthermore, and obesity in childhood also shows an association with diseases like diabetes, coronary artery disease and hypertension.^[2] Obesity is harder to treat in adults than in children. Thus, effective prevention of obesity in adulthood will require the prevention and management of childhood obesity. The World Health Organization (WHO) has also emphasized on the urgent need of understanding the trend, factors contributing and developing strategies for effective intervention.^[3] In this

context, this review article was written to provide an insight regarding the factors associated with obesity among children.

Factors associated with obesity among children:

Diet: Diet has been known for many years to play a key role as a risk factor for chronic diseases. Over a period of time, major changes have swept the entire world, inducing considerable alterations in diet, firstly in the developed countries and more recently in the developing countries. Traditional, largely plant based diets have been substituted by high-fat, energy-dense diets with a sizeable content of animal based foods. [4] Additionally, weight gain is also known to occur as a consequence of a decrease in energy expenditure, an increase in energy intake, or both. Numerous studies report that overweight persons consume similar amounts of food as do their normal-weight counterparts. In addition, several studies indicate that obesity is associated with a consumption of high-fat diets. Although these conclusions are vital, only the effects of meal patterns were studied, while the effects of factors like levels of activity, mood, hunger, and social facilitation were not investigated. [5] Obesity is caused by an imbalance in energy input versus output, resulting in a positive energy balance. The positive energy balance needed for obesity to develop is so small that individuals usually do not notice while consuming food. A mere 10 Calories per day in excess of what the body requires for weight maintenance will produce a weight gain of 2 Kilograms over a year. Fast food consumption is another leading suspect in the childhood obesity epidemic. Fast food typically includes all of the things that nutritionists warn against: saturated and trans-fats, high Glycaemic Index as well as high energy density foods, and large portion sizes. A large fast food meal can contain about 2,200 Calories, which at a burn rate of

85-100 Calories per mile would require something near a full marathon to expend. Moreover, sweetened soft drinks contain empty calories and contribute to the total caloric intake, which is an important contributing factor to the rise in childhood obesity. [6]

Research has shown links between parents' feeding practices and children's eating and weight status, but causality has remained an issue; experimental research indicates that restriction can cause overeating and is associated with overweight and obesity among children. Although children can self-regulate energy intake by responding to internal signals about the energy content of the foods that they consume, they are also susceptible to environmental cues such as portion size and the presence of palatable foods. Of particular concern, given our current obesogenic eating environment, is whether restrictive feeding practices may inadvertently teach children to ignore their own hunger and fullness when placed in eating environments where palatable, previously restricted foods are readily available. [7]

Physical inactivity: Physical inactivity, now recognized as an increasingly important determinant of health, is the result of a progressive shift of lifestyle towards more sedentary patterns, in developing countries as much as in the industrialized ones. Recent data from Sao Paulo, Brazil, for example, indicate that 70-80% of the populations are remarkably inactive. [4] Negative associations between objectively measured physical activity and fatness in children have been shown. [8] As with the adult studies, a review in the year 2000 suggested that, of seven studies in children, four reported that physical activity was associated with less weight gain in children, whereas the other studies did not observe an association. [9] Child weight is influenced by multiple

factors, including accessibility of high energy density food and increased time engaged in sedentary activities such as watching Television (TV) and playing video games. In addition, allocating attention to stimuli such as TV, radio and social interactions leads to increases in meal energy intake. It has been reported that children and adults increase their intake of high-energy-density foods while watching TV. Current estimates suggest that 20–25% of the daily energy intake is consumed in front of the TV. [2,8] Physical activity is a multidimensional human behavior. Because of its complex nature, physical activity is difficult to assess precisely under free-living conditions. As a result, no single method is available to quantify all dimensions of physical activity. [10] With the availability of cars, the increase in electrical home appliances and more involvement in office work, life has become more sedentary, and the pattern of practicing exercise has diminished steeply in most countries. [11]

Controversy exists, however, about the best way to express physical activity. When expressed as energy expended in movement, heavier children seem to be engaging in relatively large amounts of physical activity because they use more energy than lighter adolescents do to move their bodies a given amount. However, when physical activity is expressed as movement, heavier adolescents will appear to engage in less physical activity than their lighter peers. The time spent in activities of various intensities seems more pertinent for the purpose of making exercise recommendations. [8] However; more recent research has suggested that genetic, physiological, and behavioral factors also play a significant role in the etiology of obesity. In summary, the data that exist seem to indicate a secular decline in the overall physical activity that occurred at the same time or possibly before the temporal

increase in obesity. [9] Evaluating children for all of these risk factors may provide a strategy for identifying those at risk and offering intervention when evidence of early obesity occurs. These results suggest that recommendations of higher levels of physical activity (energy expenditure of 2500 Kilo Calories per week) promote long-term weight loss better than the conventional recommendations. [12] In order to develop effective strategies for obesity prevention, it is critical to determine the relative importance of specific obesity-related risk factors. Patterns of physical activity as well as sedentary living appear to play an important role in long term weight regulation. Despite some studies addressing the question, the relationship between activity levels and obesity in children remains unclear. It has been difficult to demonstrate convincingly that physical activity plays a significant role in the development of excess body fat during childhood. [3,2] Moreover, data from several sources suggest that considerably higher exercise targets may be achievable by many overweight people and may be more beneficial for long-term weight loss. [12] A recent study in USA indicated that although much of the debate on obesity has focused on diet, evidence suggests that physical activity plays a significant role in obesity in adolescents. [13] The importance of physical activity in successful intervention programs for weight control has been recognized for many years. Randomized trials showed that weight-loss interventions incorporating strong exercise components are more effective in promoting long-term weight loss in overweight persons than the interventions that rely on dietary instructions alone. [12]

TV viewing: Time spent engaged in sedentary behaviors, such as TV viewing, is thought to be one of the factors underlying the increasing prevalence of overweight and obesity observed in many populations

around the world. Positive associations between TV viewing and adiposity are consistently observed, with several large well-conducted studies having found that men and women watching the most TV have a 2-4-fold increased risk of obesity compared with those watching the least TV. [14] One way in which watching TV may contribute to excess eating is by disrupting habituation to food cues. Habituation to food cues is a well-established phenomenon that is ubiquitous across species and is regulated by integrated signals from sensory systems, neuronal systems, and the digestive system. Habituation can be modified by providing food-related and nonfood-related stimuli that require allocation of attention from the habituating stimulus. [15] Cleland VJ et al., conducted the first ever study to examine the relation between food and beverage consumption during TV viewing and abdominal overweight and obesity in a young adult population in Australia from 2004 to 2006. Their findings suggested that, although food and beverage consumption during TV viewing was associated with having an elevated waist circumference, it only partly explained the association between TV viewing and abdominal obesity in young adults. An alternate hypothesis for the association between TV viewing and obesity is that TV viewing displaces physical activity that might otherwise have taken place in that time, resulting in an overall decrease in the energy expenditure. [16] Children who spend more time watching TV have a higher body mass index (BMI) and a higher percentage of body fat and are less physically active. Watching TV can decrease the amount of time spent on performing physical activities and has also been associated with increased food consumption either during viewing or as a result of food advertisements. This leads to an increase in dietary energy intake combined with decreased energy

expenditure, which in turn contributes to weight gain. [17]

Familial factors: Family history of obesity is a major determinant of obesity. Various researchers have established the role of obesity among parents in obesity among their children. [18,19] The risk of obesity among children rises in proportion to parental obesity. It is least when neither parent is obese, higher when one of the parents is obese and highest when both parents are obese. Furthermore, there are other familial factors which may lead to obesity in adolescents like single parent status and parental education. However, there are many critical gaps that remain in the understanding of familial factors among adolescents. [20]

Socio-economic status: High socio-economic status (SES) is another critical predictor of obesity. Several studies have established evidences regarding the role of the same. [21,22] A study conducted by Laxmiah et al., in the year 2006 in Hyderabad, showed that the prevalence of obesity was significantly higher among those adolescents who belonged to high SES. [21] Another study by Singh S et al., in 2012 in Lucknow showed that the prevalence of obesity among school children of low SES is much lesser than malnutrition. [23] Many factors have contributed to an increase in obesity among children belonging to high SES. Important among them are consumption of junk food, lack of physical activity which are remarkably higher in children belonging to high SES. [24]

CONCLUSION

The results of this review show that consumption of a high energy diet and fast food, physical inactivity and TV viewing are the critical determinants of obesity among children. Moreover, existing evidence indicates that obesity was significantly higher among children with factors like

parental history of obesity and those belonging to an affluent background. Thus, in order to halt the global epidemic of childhood obesity, a preventive strategy addressing the predictors needs to be implemented. Public health programmes are to increase the awareness of obesity-related risk among children, to reduce the future burden of obesity-associated chronic diseases, are the need of the hour. Schools can play a crucial role by establishing a safe and supportive environment with policies and practices that support healthy behaviors. Health and nutritional education programmes to inculcate healthy lifestyles and incorporating outdoor activities in the school curriculum are essential. A policy has to be made to inculcate physical activity and healthy dietary habits compulsorily, in addition to academic excellence.

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