

# Overweight and Obesity among Children in India

Aijaz Fatima

Department of Home Science, Aligarh Muslim University, Aligarh

## ABSTRACT

The dramatic rise in frequency of childhood overweight and obesity has become a major concern and is becoming increasingly clear due to its higher prevalence and incidence. The risk factors responsible for childhood overweight and obesity are inadequate levels of physical activity and improper dietary habits. This review aims to investigate the prevalence of childhood overweight and obesity and its associated risk factors. All articles published between 2000 and 2018 were reviewed carefully. A varied prevalence of overweight and obesity was observed among different regions of India. The reviewed studies showed a tremendous increase in the problem of overweight and obesity.

**Key words:** Prevalence, Overweight, Obesity, Dietary habits

## INTRODUCTION

In India, undernutrition is attracting health workers, as childhood obesity was rarely seen before. But over the past few decades, childhood obesity is increasingly being observed with the changing lifestyle of families with increased purchasing power, increasing hours of inactivity due to televisions, video games and computers that have replaced outdoor games and minimised their social interactions. <sup>[1]</sup> “The majority of overweight or obese children live in developing countries, having an increased rate of more than 30% which is higher than that of developed countries”. <sup>[2]</sup> “A calculated global prevalence of overweight and obesity in school children aged 5-17 years is estimated by the World Health Organisation (WHO), International Obesity Task Force (IOTF) to be approximately 10%”. <sup>[3]</sup> The childhood obesity emerging as one of the global health concern with 200 million school aged children worldwide categorizing as being overweight and obese, of which 40-50 million are obese. <sup>[4]</sup> If current trends continue, “there is a possibility of increase in the number of

overweight or obese infants and young children to 70 million by 2025”. <sup>[2]</sup> The problem of obesity and overweight is becoming an increasingly prevalent nutritional disorder among children and adolescents in the world. <sup>[5,20]</sup> Estimates of early childhood overweight and obesity during school years helps in preventing disease which can be progressed into adulthood. The estimated rate of progression of childhood obesity which may continue as obese adults is approximately 50% - 80%. <sup>[6]</sup> Overweight and obesity during childhood may contribute to major health risks associated with health disorders as diabetes, hypertension and cardiovascular diseases during childhood as well as in early adulthood.

### Significance of Study

This review article aims to throw an insight on the prevalence of overweight and obesity in school going children by reviewing published data. This study helps in identifying the risk factors that contribute to the overweight and obesity. Understanding these risk factors and prevalence of overweight and obesity may

provide an initial contribution to the implementation of the appropriate preventive strategies to combat overweight and obesity epidemic.

## METHODS

A thorough review of journals, original articles, and research papers with highest relevance to topic was conducted to investigate the purpose of the study. Literature searching included scientific domains such as Google scholar, PubMed etc. using keywords such as childhood overweight and obesity in India. (Finally, 13 studies were selected relating to the topic, age groups studied presented as childhood obesity in India. The prevalence of overweight and obese children was taken from the study and no calculations were

made. Period of data collection was followed carefully and where the studies did not report survey period, the year of publication was used. Almost all of the studies included were cross-sectional studies.

*Table 1 shows the number of retrieved articles according to author, year of publication, total sample age group, and sex included in each study.*

*Table 2 represents the summary of all the studies reviewed including their date of data collection, standards used and their major findings. The reviewed studies show an increasing prevalence of childhood overweight and obesity in different parts of India.*

Study	Year	Location	N	Age group	Sex
Bharati DR et al	2006	Wardha city	2555	10 – 17 years	M + F
Mohanty B	2007 – 08	Pondicherry	2067	8 – 13 years	M + F
Goyal RK et al	2008	Ahmedabad, West India	5664	12 – 18 years	M + F
Parekh A et al	2009	Surat	389	14 – 16 years	M + F
Thakre SB et al	2009 – 11	Nagpur	1524	5 – 16 years	M + F
Mahajan PB et al	2009	Puducherry	2940	6 – 12 years	M + F
Jain G et al	2011	Bhilai Nagar, Chattisgarh	500	13 – 17 years	M + F
Jagadesan S et al	2012 – 13	Chennai	18955	6 – 11 years	M + F
Hota S et al	2014	Bhubaneshwar City	537	9 – 15 years	M + F
Shanmugan K et al	2015 – 15	Coimbatore	890	5 – 15 years	M + F
Bhattacharya PK et al	2015	Guwahati	600	10 – 19 years	M + F

## PREVALENCE OF OVERWEIGHT AND OBESITY AMONG CHILDREN

A study conducted by Bharati D et al in 2006 in Wardha city. The participants of the study were children comprising the age group of 10-17 years from middle and high schools of Wardha city. BMI for children's age was the tool for assessment of childhood obesity. They found "43% (95% CI:3.6-5.2) of the children were overweight/obese". "There was a higher proportion of (5%) overweight/obese in late adolescence ( $\geq 15$  years of age) than in early adolescence ( $\leq 15$  years of age) with no significant difference". A proportion of overweight and obesity was there with 4.4 and 4.3 percent in boys and girls respectively. [7]

Mohanty B carried out a study in Pondicherry to find out the "prevalence of

overweight/obesity in school children from urban public schools and rural government schools". This study included children in the age group of 8 to 13 years. He found "overweight and obesity prevalence in urban boys and urban girls' population 5.5% and 5.9% respectively according to WHO, IOTF criteria". Biswajit found abdominal obesity among girls of both urban and rural schools was higher as compared to boys. The study suggested that the rates of under nutrition remained high in both urban children and rural children. [8]

Goyal RK et al in one study in Indian western parts found prevalence of overweight to be 14.3% among boys and 9.2% among girls and of obesity was 2.9% in boys and 1.5% in girls. The underweight, overweight and obesity were identified by

S.N.	Study	Year of publication	Location	Year of data	Age	Reference	Results	
							Overweight%	Obesity%
1.	Bharati DR et al	2006	Wardha City	2005 – 06	10 – 17 years.	BMI range for age	3.1%	1.2%
2.	Mohanty B	2008	Pondicherry	2007 – 08	8 – 13 years.	WHO Singapore declaration on Asian population 2005	5.5% in urban and 5.9% in rural areas	
3.	Goyal RK et al	2008	Ahmedabad West India	2008	12 – 18 years.	Updated BMI reference	14.3% in boys and 9.2% girls	2.9% in boys and 1.5% in girls
4.	Parekh A et al	2012	Surat	2009	14 – 16 years.	BMI, age, gender	14.6% in urban and 12.8% in rural	
5.	Thakre SB et al	2011	Nagpur	2009 – 11	5 – 16 years	BMI (WHO)	90%	5.5%
6.	Mahajan PB et al	2009	Puducherry	2008 – 09	6 – 12 years	BMI (CDC)	4.41%	2.12%
7.	Jain G et al	2012	Bhilai Nagar Chhattisgarh	2009 – 10	13 – 17 years	BMI	23.8%	8.4%
8.	Jagadesan S et al	2014	Chennai	2014	6 – 17 years	BMI (IOTF) for children Khadilkar's criteria for adolescents IDF for hypertension	21.4% (private schools) and 3.6% (government schools) (IOTF)/ 26.4% in private schools and 4.6% (government schools) (Khadilkar's criteria)/ 20.4% is the rate of prevalence of hypertension for overweight/obese and 5.2% for non-overweight/obese.	
9.	HotaSoumyashree et al	2015	Bhubaneswar City	2014	9 – 15 years	BMI (WHO, 2004)	18.4%	16.4%
10.	Mandal PK et al	2012	Howrah M. C. Area West Bengal	2011	10 – 19 years	BMI (WHO)	20.5%	
11.	Chaitali G	2014	Karnataka	2013	3 – 17 years	IOTF Agarwal classification with Asia Pacific & IOTF	27.1%	13.7%
12.	Bhattacharya PK et al	2015	Guwahati	2015	10 – 19 years	BMI (WHO) & Agarwal BMI chart	13.3% & 6.7% respectively	1.7% & 10% respectively
13.	ShanmuganK et al	2016	Coimbatore	2015	5 – 15 years	WHO growth reference	8.32%	4.72%

calculating Body Mass Index (BMI Kg/metre square).<sup>[9]</sup>

Alok P et al in a cross-sectional study among school children (14-16 years of age) from government schools in year 2009 found the prevalence of obesity with a significant increase from 12.8% in rural to 14.6% in urban, whereas underweight decreased from 13.6%-4.6%.<sup>[10]</sup>

Thakre SB et al conducted another study in Nagpur city to find out the "prevalence of overweight and obesity among school children" and found the prevalence of overweight 9.0% and 5.5% obesity in children respectively with a total prevalence of overweight and obesity was 14.5%.<sup>[11]</sup>

Mahajan PM et al in another cross-sectional study conducted in 2009 in school

children of 6-12 years of age. Anthropometric data (BMI) was analysed by using CDC growth charts. They found "that the prevalence of obesity ( $\geq 95^{\text{th}}$  percentile) was 2.12% and prevalence of overweight ( $\geq 85^{\text{th}}$  percentile) was 4.4% among children".<sup>[12]</sup>

Jain G et al in their study in 2011 among students of 13-17 years of age found out prevalence for overweight and obesity as defined by CDC growth chart in Bhilai Nagar, Chattisgarh. Their study concluded (23.8%) rate of overweight and (8.4%) rate of obesity being very high and a state which is alarming for both the sex.<sup>[13]</sup>

Jagadesan S conducted a cross-sectional study among school children in

Chennai. Children (aged 6-11years) and adolescents (age 12-17years) from private and government schools were participated in the study. The overweight and obesity as classified by (IOTF 2000) International Obesity Task Force and Khadilkar's criteria (2012) and Hypertension by the IDF criteria (in children  $\geq 10$  years and adolescents). They found that overweight and obesity was significantly higher in private schools compared to government schools by the IOTF criteria (Private schools: 21.4% Government schools: 3.6%) and by Khadilkar criteria (Private schools: 26.4% Government schools: 4.6%). [14]

Hota Set al found in their cross-sectional study conducted in 2014 among children 9-15 years of age in Bhubaneswar city, 16.4% children were obese and 18.4% were overweight. The overweight and obesity was assessed by calculating (BMI kg/metre square). [15]

Mandal PK et al in 2012 conducted an observational cross-sectional study among adolescents in urban community of West Bengal. They found prevalence of overweight/obesity among the study subjects was 20.5%. [16]

Chaitali G et al in 2013 conducted a cross-sectional study among school children 3-17 years of age in an urban school in Bangalore, Karnatka. They found 27.1% children were overweight and 13.7% were obese according to Agarwal classification. [17]

Bhattacharya PK et al in 2015 conducted a cross-sectional study among adolescent students 10-19 years of age in Guwahati city. They found "the prevalence rate of 13.3% overweight and 1.7% obesity using the WHO criteria and 6.7% and 10% using Agarwal BMI growth chart". [18]

Shanmugan K et al conducted a cross-sectional study among children of 15-19 years of age in Coimbatore. In their study prevalence rate of overweight 8.32% and obesity 4.72% and defined overweight and obesity using WHO reference for age 5-19 years. [19]

## **PREVALENCE OF OVERWEIGHT AND OBESITY BY AGE AMONG CHILDREN AND ADOLESCENTS**

Most of the studies found higher prevalence of overweight and obesity among adolescents than children in the age group of 5-12 yrs. Studies reviewed in paper reported prevalence of overweight and obesity increases as the age of children increases.

## **RISK FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY IN CHILDREN**

In two studies among the reviewed studies confirmed the significance of family history with overweight and obesity. [9,18] Six studies concluded that there was an association between the area of residence with the prevalence of overweight and obesity in children. [7,8,10,12,18,19] Two studies found the association of parents involved in business/service. [7,8] Lack of physical activity was studied in eight studies including both boys and girls. [7-9,13-16,18] Consumption of high fat and junk foods among children was found to be higher among children in almost all the studies and found to be directly linked with the overweight and obesity in children. [8,9,11,13,14,16,18] Three studies concluded the association of non-veg foods with the overweight and obesity in children. [11,13,15] The significance of English medium school was having an association with prevalence of overweight and obesity in children in one study. [7] Two studies found motorized transportation having an association with the prevalence of overweight and obesity in children. [11,14] Higher socio-economic status was also an associated risk factor for the occurrence of childhood overweight and obesity in most of the studies. [8-14,16] It was found in one study that habit of sleeping in afternoon is also a risk factor associated with overweight and obesity in children. [9] Some studies found prevalence of overweight and obesity in children watching television for more than 2 hours. [8,11,13,15,16,18] In one study it was found that

sleeping less than 7 hours, a determinant of overweight and obesity in children. [11] Nuclear family was also found to be associated in two cross-sectional studies. [16,18] Two studies found higher prevalence rates of overweight and obesity in children of private school. [14,18]

## DISCUSSION

This review article highlights the severity of overweight and obesity among school going children in India. India, becoming fast-growing economy has recently undergone in epidemiological, nutritional and demographic transitions. [21] Recent reviews focused on childhood overweight and obesity prevalent in India shows a trend that is rapidly increasing thus making childhood overweight and obesity in India, a concerning public health problem. [22] Overweight children can grow as overweight adults and being overweight adult is a health risk. [23]

## CONCLUSION

The present review article represents that childhood overweight and obesity has an increasing prevalence in India that has become a public health concern worldwide. Thus, an urgent need of collective approach that can implement preventive strategies combating the problem of overweight and obesity in children is required.

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