

## Original Research Article

# Prevalence and risk factors associated with overweight and obesity in age group between 8 to 19 years in North India, a school based cross-sectional study

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### ABSTRACT

**Background:** The objective of this study was to observe association of demographic, lifestyle factors and Socio cultural and economic factors among children's and adolescents with overweight and obesity.

**Methods:** Our study was cross sectional study, carried out in age group between 8 to 19 years of age from June to October 2019 in nine schools of district Baramulla, Jammu and Kashmir, North India. Body mass index (weight in kg/height in m<sup>2</sup>) was assessed to identify participants with (overweight/obese), CDC sex and age specific growth charts were used for assessment. Structured questionnaire was used to collect information regarding socio-demographics and respondent's exposure to various risk factors.

**Results:** In our study, among 354 participants study showed that 44.1% were boys and 55.9% were girls. Among these 15.5% were overweight and 5.9% were obese in females, while as 7.9% were overweight and 2.5% were obese in males, thus showing female preponderance. Besides this physical activity, consumption of junk/fast foods along with watching TV and video games along with mother education and occupation were significantly associated with overweight and obesity in children's and adolescents.

**Conclusions:** Having overweight parents along with limited exercise and Sedentary activities along with physical inactivity compounded by erratic eating habits with overweight parents are main risk factors leading to overweight and obesity in school going children's and adolescents in north Kashmir, India.

**Keywords:** Overweight, Obesity, Risk factors, Adolescents, School children, Sedentary life style

### INTRODUCTION

Nowadays, overweight and obesity are one of the major risk factors of various non-communicable diseases. Adolescence being critical phase for development of overweight/ obesity because of various environmental and biological changes, besides this childhood obesity and overweight prevalence is now on higher rise in developing countries than developed ones.<sup>1-3</sup>

Moreover data from low and high income countries suggest that lack of sedentary life style like playing video games and watching television, erratic eating habits, and

family history of obesity are risk factors for childhood overweight and obesity.<sup>4,5</sup> Overweight (OW) and Obesity (OB) during adolescence may manifest in adulthood also.<sup>6</sup> Childhood and adolescent obesity is also a risk factor for various chronic conditions like cardiovascular diseases, chronic liver diseases and diabetes mellitus (type 1) during adulthood.<sup>7</sup>

Moreover, OB and OW affect self-respect of children and result in poor psychosocial development.<sup>8</sup> Besides this, various studies have reported that schools are principal sites to target adolescent and child population for obesity control and prevention, therefore to reduce

the future burden of obesity and overweight among young population in India determinants associated with overweight and obesity in school children should be identified so that proper health interventions are designed. Also, high meat consumption by children and adolescence is also reported to be associated with childhood overweight and obesity, also seen in children of north Kashmir, India.<sup>10</sup> Other associated factors include diabetes and obesity in parent, lack of parental attachment, environmental and genetic factors.

## METHODS

### Study design

We carried out this study in nine schools located in vicinity of sub-district hospital Sopore, North India (Saint Joseph, Welkin, MET, Public school, Hanfia, Netherfield, DPS, JK Apex school and Arifeen school) from June to October 2019, these schools were selected these schools based on the basis of 4 various criteria like (a) location in vicinity to our hospital; (b) good reputation in terms of academics and extra circular activities, all the eight schools included in our study were private and English medium. Our study was designed as cross-sectional study, 354 participants in the age group between 8 to 19 years mainly children's and adolescents. Participants were identified using meaningful sampling method, cases and controls were selected with initial help of teachers of concerned schools by visual assessment and primarily completed by authors of present study using anthropometric measurements mainly Body mass index (BMI).

Age and sex-specific growth chart approved by CDC to identify participants were used.<sup>11</sup> Informed verbal consent was taken before interview from principals of respective schools as well as from parents of participants. We used EPI Info version 3.1 to calculate sample size for our study and to determine association between risk factors with overweight/obesity, we took a confidence level of 95%, power of 80%, the ratio of participants i.e.; cases (with risk factors) to unexposed participants i.e.; controls (without risk factors).

### Inclusion criteria

The inclusion criteria was- (a) age group between 8 to 19 years; and (b) participants willing to participate and cooperate.

### Exclusion criteria

The exclusion criteria was underweight students unwilling students; and age <8 years and age >19 years.

### Data collection

A questionnaire was utilised to collect data on socio-demographic variables, information related to exposures

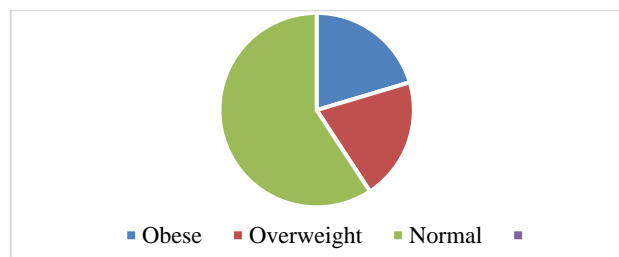
of interest i.e. duration of sedentary activities including daily physical activities and dietary habits, use of video games, computer, television watching and duration of sleep/day of each study participant. Participants (cases) were asked about their athletic ability at school and in home and rated themselves as: excellent, good, satisfactory or poor. Physical activity questionnaire was adapted from the Youth Physical Activity Survey questionnaire of the School Health Action, Planning and Evaluation System (SHAPES) study.<sup>12</sup> The questionnaire was translated into the local language to principal and participants and was simplified and pretested. To determine the risk factors of overweight and obesity among the participants weight (kg) and height (cm) were measured using calibrated electronic scales and a height meter respectively. WHO age and sex-specific growth reference charts were used as cut-off points and  $\geq 85$ th and  $\geq 95$ th percentile [BMI i.e.; Wt (kg)/height (m<sup>2</sup>)] was considered equivalent to overweight and obesity respectively. Assessment of the quantity and type of foods taken on routine basis, adult food frequency questionnaire was adapted for children and adolescents, while respondents were asked to recall their dietary food intake in previous week, frequency of consumption of vegetables, fruits, fiber diet and dairy foods of every week was calculated. To judge the participant response regarding weight status and efforts to control weight, it was scored as trying to lose weight or trying gain weight or doing nothing regarding weight.

### Data analysis

To determine the distribution of demographic information including age, sex, education level, sleeping time, mother's education and BMI among participants, we used descriptive statistics Data analysis was done using SPSS, version 16.

## RESULTS

Prevalence of over weight and obesity in our study was 23.4% & 8.4 % respectively with significant p value of < 0.001, as depicted in Table 3. Also, in our study overweight and obesity in children and adolescents of urban areas was higher as compared to children and adolescents of rural areas as depicted in Table 2. Also in our study overweight and obesity was more prevalent in children and adolescents with less physical activity and erratic food habits and depicted in Table 7 to 9.



**Figure 1: BMI.**

**Table 1: Age and sex distribution of study group.**

Parameters	Frequency (N)	Percentage (%)	P value
<b>Age in (years)</b>			
8 to 13	142	40.11	<0.001
14 to 19	212	59.89	
Total	354	100	
<b>Gender distribution</b>			
Male	198	55.93	0.025
Female	156	44.07	
Total	354	100	

**Table 2: Area of living and socio-economic status.**

Variables	Frequency (N)	Percentage (%)	P value
<b>Area of living</b>			
Urban areas	207	58.47	0.001
Rural areas	147	41.53	
Total	354	100	
<b>Socio-economic status</b>			
Upper class	101	28.53	<0.001
Middle class	183	51.70	
Lower class	70	19.77	
Total	354	100	

**Table 3: BMI of study group.**

BMI	Frequency (N)	Percentage (%)	P value
Normal	241	68.08	<0.001
Overweight	83	23.45	
Obese	30	8.47	
Total	354	100	

**Table 4: Gender wise BMI values.**

BMI	Males (%)	Females (%)	Total (%)	P value
Normal	122 (34.4)	119 (33.6)	241 (68)	0.846
Overweight	55 (15.5)	28 (7.9)	83 (23.4)	0.003
Obese	21 (5.9)	9 (2.5)	30 (8.4)	0.028
Total	198 (55.9)	156 (44)	354 (100)	0.026

**Table 5: BMI status across different age groups.**

BMI	8-13 years (%)	14-19 years (%)	Total (%)	P value
Normal	51 (14.4)	190 (53.6)	241 (68)	0.001
Overweight	12 (3.3)	71 (20)	83 (23.4)	<0.001
Obese	4 (1.1)	26 (7.3)	30 (8.4)	<0.001
Total	67	287	354 (100)	<0.001

**Table 6: Frequency of watching TV (in hours).**

Time (hr/day)	Frequency	Percentage (%)	P value
<3	249	70.3	<0.001
>3	105	29.6	
Total	354	100	

**Table 7: Frequency of playing and physical activity per week.**

Time (days/week)	Frequency	Percentage (%)	P value
<2	245	69.2	<0.001
2-5	79	22.3	
Daily 7	30	8.4	
Total	354	100	

**Table 8: Frequency of overweight and obesity in participants with physical activity less than 2 days per week (n=245).**

Cases	Frequency	Percentage (%)	P value
Overweight (OW)	171	69.7	0.317
Obesity (OB)	153	62.4	

**Table 9: Frequency of eating junk food/fast food outside per week.**

Time (days/week)	Frequency	Percentage (%)	P value
<3	258	72.8	<0.001
3-5	65	18.3	
Every	31	8.0	

**Table 10: Frequency of overweight and obese cases in highly educated/working and less educated and non-working mothers.**

Mothers	Overweight (%)	Obese (%)	P value
Highly educated	53 (63.8)	18 (60)	<0.001
Under matric	26 (36.2)	12 (40)	0.023
Total	83	30	
Working	49 (59)	17 (56.6)	<0.001
Non-working	34 (41)	13 (43.4)	0.002
Total	83	30	

**DISCUSSION**

Identification of risk factors associated with overweight and obesity in children’s and adolescents is important for developing countries especially India. It can guide development of evidence-based strategies to tackle the increasing public health problem of adolescent overweight and obesity in a society undergoing a nutritional transition. In our study prevalence of overweight and obesity was 23.4% and 8.4% respectively which is consistent as reported by other studies, as study in urban school children( North India) also showed that prevalence of overweight and obesity, based on International obesity task force (IOTF) standards, were 24 and 8% respectively in 2008.<sup>13</sup> Another population-based cross-sectional study conducted in Pakistan among school children in 2011 reported that 17% of the children were overweight and 7.5% were obese.<sup>14</sup> In our study, OW and OB in children’s and adolescents of urban areas was 66.3% and 69.1% respectively, while as OW and OB in rural areas was 33.7% and 30.9% respectively thus indicating that children’s and adolescents of urban areas are more likely to be overweight and obese than those in rural areas in many countries including high- and low/middle- income countries.<sup>15</sup>

Prevalence of overweight and obesity was significantly higher among females i.e.; 15.5% were OW and 5.9 % were obese, while as 7.9% were overweight and 2.5% were obese in males, in the present study, which is consistent as reported in Oyher et al studies for other developing countries.<sup>16,17</sup>

Children of mothers with higher education have higher prevalence of OW and OB i.e.; 63.8% and 60% respectively than mothers having below high school education i.e. 36.2% and 40% respectively, which is consistent as reported by other studies like in India.<sup>18</sup> Educated mothers have a higher chance of employment resulting in lesser time to monitor their children’s physical activities or sedentary behaviours like watching TV, also working mothers offer junk foods to their children’s, offer more energy dense fast foods all these factors significantly increase their BMI thus resulting in OB and OW.<sup>19</sup>

Mothers being the caretaker of the children usually, lacking time due to their occupation lag to have close look at their children’s food consumption behaviour, physical activity, and sedentary behaviours might attribute to the fact that their children are OW/OB.<sup>20</sup>

In our study, fast food /junk food is also major influencing factor in developing overweight/obesity among children and adolescents, which is consistent as reported in other studies.<sup>21</sup>

In our study 69.2% participants had physical activity <2 days per week, out of which 69.7% had overweight 62.4% had obesity respectively, which is consistent as seen in other studies, showing significant association between physical activity and childhood OW/OB.<sup>22,23</sup>

Besides this, in our study 29.6% participants watch TV more than 3 hours per day which is also seen in other studies.<sup>24</sup>

### Limitation

The main limitation in our study was small sample size which in future can be improved so that our research in current study can be strengthened.

### CONCLUSION

Combined diet and physical activity intervention conducted in the community with a school component is more effective at preventing overweight or obesity. Besides this, if parents enforce a healthier lifestyle at home, many overweight and obesity problems could be avoided. Hence overweight and obesity intervention programs should involve school involvement in the development of curriculum and school policies and family involvement in food storage and parenting style with the final target to foster a healthy lifestyle for children at the early stage of their life, thereby benefit from a sustainable lifestyle for their whole life.

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