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Prevalence of obesity among school going children in Srinagar district of Jammu and Kashmir state: A cross-sectional study

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Abstract
Childhood obesity is an emerging global challenge in the contemporary times. The state of Jammu and Kashmir which lies in northern part of India has been also showing increasing prevalence of child obesity in the recent years. The present study, therefore, intends to find out the prevalence of obesity among school going children in the age group of 10-16 years in urban district of Srinagar of Kashmir province of Jammu and Kashmir.
Methodology: The study is population based cross-sectional study conducted in the selected co-ed government and private schools of the Srinagar district. The data was collected for a period of one year from May 2016 to April 2017. A total of 30 schools were selected for the study including approximately 21 subject respondents per school. Selection of the study unit was done using multiple sampling method.
Results: Prevalence of obesity in this study came out to be as 9.15%.

Keywords: children, Kashmir, obesity, overweight, prevalence, Srinagar

1. Introduction
Obesity has been defined as a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired [1]. Overweight and obesity are important determinants of health which lead to adverse metabolic changes and increase the risk of non-communicable diseases. Obesity is not an immediate lethal disease itself, but it is a significant risk factor associated with a range of serious non-communicable diseases and conditions like increased risk of coronary heart disease, hypertension, diabetes mellitus, gallstones etc.
Globally, obesity has attained the epidemic proportions. More than 1 billion adults are overweight, and at least 300 million of them are clinically obese [2]. Following the increase in adult obesity, the proportions of children and adolescents who are overweight and obese have also been increasing. Globally, an estimated 10 per cent of school-aged children, between 5 and 17 years of age, are overweight or obese [3]. Pertinently, obesity is increasing rapidly in developing countries undergoing rapid nutrition and lifestyle transition and often, coexists with under nutrition. As compared to other ethnic groups, children with ancestral origin in South Asia manifest adiposity, insulin resistance and metabolic perturbations earlier in life and these derangements are of higher magnitude than white Caucasian children. The rising prevalence of obesity in developing countries is largely due to rapid urbanization and mechanization which has led to reduction in the energy expenditure along with an increase in energy intake due to increased purchasing power and availability of high fat, energy-dense fast foods.
Studies on urban Indian school children from selected regions report a high prevalence of obese and overweight children. In addition, studies on Indian school children have also demonstrated that the prevalence of hypertension in overweight children is significantly higher than that among normal children. The overall prevalence of overweight/obesity in urban children in New Delhi has shown an increase from 16% in 2002 to about 24% in 2006-2007.Recent data show that the prevalence among adolescent children was 29% in private schools and 11.3% in government schools. Between the late 1970's and 2000, the percentage of school-age children, ages 6-11, that are overweight have more than doubled. The percentage of overweight adolescents ages 12-19 tripled from 5.0% to 15.5% during the same time margin [4]. At least 2.8 million people die each year as a result of being overweight or obese. Risks of heart disease, strokes and diabetes increase steadily with increasing body mass index (BMI). Raised BMI also increases the risk of certain cancers. The prevalence of overweight is highest in upper-middle-income countries but very high levels are also reported from some lower-middle income countries. In the WHO European Region, the Eastern Mediterranean Region and the Region of the Americas, over 50% of women are overweight. The highest prevalence of overweight among infants and young children is in upper-middle-income populations, while the fastest rise in overweight is in the lower-middle-income group.

2. Increasing prevalence of Obesity: WHO response
Adopted by the World Health Assembly in 2004, the WHO Global Strategy on Diet, Physical Activity and Health describes the actions needed to support healthy diets and regular physical activity. The Strategy calls upon all three stakeholders to take action at global, regional and local levels to improve diets and physical activity patterns at the population level. WHO has developed the 2008-2013 Action-plan for the global strategy for the prevention and control of non-communicable diseases to help the millions who are already affected cope with these lifelong illnesses and prevent secondary complications. This action-plan aims to build on the WHO Framework Convention on Tobacco Control and the WHO Global Strategy on Diet, Physical

Activity and Health. The action plan provides a roadmap to establish and strengthen initiatives for the surveillance, prevention and management of NCDs.

The Political Declaration of the High Level Meeting of the United Nations General Assembly on the Prevention and Control of Non-communicable Diseases of September 2011 recognizes the critical importance of reducing the level of exposure of individuals and populations to unhealthy diet and physical inactivity. The political declaration commits to advance the implementation of the WHO Global Strategy on Diet, Physical Activity and Health, where appropriate, through the introduction of policies and actions aimed at promoting healthy diets and increasing physical activity in the entire population. In terms of attributable deaths, the leading behavioral and physiological risk factors globally are raised blood pressure (13%), followed by tobacco use (9%), raised blood glucose (6%), physical inactivity (6%) and being overweight or obese (5%).

In this backdrop and given the paucity of data on the prevalence of childhood obesity in the state of Jammu and Kashmir particularly Kashmir division, the present study studies the prevalence of obesity among school going children in the age group of 10-16 years in the capital District Srinagar of Kashmir.

3. Materials and methods

The study was a population based cross-sectional study conducted in the selected government and private schools of the Srinagar district. The data collection was done for a period of one year from May 2016 to April 2017 after obtaining the permission from the directorate of school education of Jammu & Kashmir. A total of 30 clusters were taken for the study and approximately 21 subjects including both male and female were included per cluster. A total of 634 respondents were selected on the basis of formula as shown under heading 5 named equations. Selection of the study unit was done in two stages.

Stage 1: In the first stage the schools were line listed and divided into whether they are private or government schools. A weighed proportion of schools (22 private schools and 8 government schools) from both the strata were purposively selected depending on the relative proportion of students in the private and government schools (Refer table 1).

Stage II: In the second phase, appropriate number of children was selected randomly from each selected school after obtaining list of students studying in class fifth to tenth from school principal/headmaster. Equal number of males and females were selected from each school.

For measuring Body Metabolic Index (BMI), the measurements of weight and height in the study subjects was taken in the presence of class teacher or the school attendant. The detailed information on socio-demographic profile, dietary intake, physical activity, type of school, distance from home etc. was elicited from the subjects with the help of a predesigned questionnaire. The parents of the respondent students were also consulted, wherever it was difficult to secure the appropriate information from the students. Weight was measured using commercial" Krups weighing scale". Respondents were weighed barefooted and with minimal clothes. Standing body height was measured with the use of commercial stadiometer with the shoulder in relaxed position and arms hanging freely and without shoes. Waist and hip circumferences were measured by inch-tape. Subject body mass index was compared with WHO growth charts for the age group and was labeled as overweight or obese as per the growth charts. Subjects were classified as overweight if their BMI was >=+1 SD to < +2 SD. Subjects were classified as Obese if their BMI was >= +2 SD. The subjects whose BMI lies between <=-2SD to>-3SD is classified as "Thin". And <= -3SD as "Severely Thin".

The data was entered in Excel. The continuous variables were summarized by mean and standard deviation as shown in table 2.

4. Tables

Table 1: Type of School

Type of School	Frequency (N)	Percent (%)
Private	22	73.33
Government	8	26.67
Total	30	100.00

Table 2: Category Wise Distribution of Study Population

OBESE	Frequency (N)	Percent (%)
YES	58	9.15
NO	576	90.9
Total	634	100
OBESITY STATUS	Frequency	Percent
Severely Thin (≤-3 S.D)	41	6.47
Thin (>-3 SD to <-2SD)	70	11.04
Normal (-2SD to -3SD)	377	59.46
Overweight (≥1SD to<2SD)	88	13.88
Obese (≥2SD)	58	9.15
Total	634	100

Table 3: Gender wise BMI

Gender	Severely Thin		Thin		Normal		Overweight		Obese		Total
	N	%	N	%	N	%	N	%	N	%	N
Boys	21	51.21	36	51.42	187	49.60	42	47.72	30	51.72	316
Girls	20	48.78	34	48.57	190	50.39	46	52.27	28	48.27	318
Total	41	6.47	70	11.04	377	59.46	88	13.88	58	9.15	634

Table 4: School wise distribution of Obese

School	Total Respondents		Obese	
	N	%	N	%
Government Schools	466	73.5%	26	44.83
Private Schools	168	26.5%	32	55.17
Total	634	100.00	58	9.15

5. Equations

The sample size was calculated using the following formula:

$$n = z^2pqd/l^2$$

Where

l = maximum error allowed (3%)
p = Proportion of the factor under investigation.
q = 1- p
z = Z score (1.96 at 95% Confidence interval)
d = Design effect

Based on an anticipated prevalence of 10%, 95% confidence level, and an absolute error of 3%, and non-response rate of 10% and a design effect of 1.5, the sample size (n) came out to be 634.

6. Results & Discussion

To find out the prevalence of obesity among school going children-a cross-sectional study was conducted in 30 schools in district Srinagar which included 22 private and 8 government schools. Prevalence of obesity in this study came out to be as 9.15% with no significant difference between boys and girls (see table 3). In our study, it was found that 377 (59.46%) children in the study were normal for BMI for age. 41(6.47%) came out to be severely thin, 70(11.04%) as thin, 88(13.88%) as overweight and 58 (9.15%) as obese. With regard to the gender, statistically, no significant difference was found among the mentioned variables. As shown in the table 3, among the very thin respondents, 51.21% were boys while as 48.78% were girls. Almost same trend was noticed among respondents who were found thin with 51.42% boys and 48.57% girls. For normal weight, 49.60% were boys while as 50.39% were girls. More or less same trend was noticed for other variables of overweight (47.72 % boys & 52.27% girls) and obesity (51.72% boys & 48.27% girls) as well. The prevalence of obesity among the students of private schools was found to be comparatively higher than that of government schools (see table 4). From the foregoing table, it can be inferred that, statistically, there is a significant difference in the prevalence of obesity between the students of government (44.83%) and private schools (55.17%). In India the prevalence of obesity as studied by Dr. Biswajit Mohanty *et al*. from the Department of Biochemistry of Aarupadai Veedu Medical college & Hospital Pondicherry, D.D Bharti *et al*. of School of Public Health of Mahatma Gandhi Institute of Medical Sciences, Sewagram, Sumitra *et al*. of Institute of Medical Sciences & SUM Hospital Bhubaneshwar, Dr. Naheed Vaida, Senior associate professor Institute of Home Science, University of Kashmir ranged between 4.3% to 19.3%. These studies more or less have also shown the same trend of obesity with few exceptions.

7. Conclusion

The present study has shown a prevalence of 9.15% obesity among the urban school going children aged 10-16 years of district Srinagar of Kashmir division of Jammu and Kashmir. The findings show that the trend of obesity among the school children is fast catching up in district Srinagar of Kashmir. Though findings of this study are in line with the findings from most of the studies conducted in India, however, there are few contrasts as well. Dr. Nazeem Siddiqui in his study in 2012 found that the overall prevalence of obesity to be 14.97% (6.817% Boys 8.16% Girls) which is in contrast to this study. In this study, the overall prevalence of obesity was higher in girls. It may be due to use of different cut off criteria of obesity. However, our study conforms to the findings of the study carried out by Keerthankumar M. *et al*. who has found the prevalence of obesity and overweight to be higher in males. The findings of the study also consolidates the fact that the prevalence of obesity is higher among children studying in private schools as compared to government schools as shown by majority of the similar studies in India.
Conclusively, it can be said that obesity is emerging as one of the major global threats which claims a major share of morbidity and mortality among non-communicable diseases as also pointed out by World Health Organization (WHO). In order to curb the increasing prevalence of Obesity, there is a dire need to introduce a special mechanism in the school curriculum so as to institutionalize the preventive care among the students right from the early age.

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