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Original Article

Proportion of Obesity and Presence of Risk Factors in Obese Children in Primary Schools in Rajshahi City

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Abstract

Background: The highest prevalence rates of childhood obesity have been observed in developed countries, however, its prevalence is increasing in developing countries as well. Early detection of obesity and identification of risk factors are the key to successful prevention of obesity.

Objectives: This study was conducted to determine the proportion of obesity and presence of risk factors in obese children in primary schools of Rajshahi city.

Methodology: This cross sectional study included total 225 children chosen from different primary schools of Rajshahi city during the school year 2016-2017. Data collection tool used for the study was an interview schedule and this predesigned questionnaire. The main outcome measures were obesity and risk factors prevalent in the obese school children. Data were analyzed by SPSS version 20 and 'Chi square' test was applied for the test of significance.

Result: Among the total 225 respondent, 121 (53.8%) were male, while 104 (46.2%) were females, with a mean age of 7.9 ±1.1 years. The mean and standard deviation of anthropometric measurement were weight 22.7±5.3 kg, height 120±8.1 cm and BMI 15.5±2.1 kg/m. Out of 225 participants, 2.7% (total 6) were overweight, 5.3% (total 12 students) were obese, 83.6% (total 188 students) were normal weight and 8.4% (total 19 students) were underweight. The rate of obesity was highest at the age of 8-9 years (10.7%) and overweight were highest at the age of 9-10 years (5.5%). Playing, biking regularly was strongly associated with fewer incidence of overweight and obesity (p value -.001). Faulty dietary habit, having more fast food, chocolate, sugary juice lead to a higher BMI and more fresh fruit and vegetables had lower BMI (p value .001).

Conclusion: This study shows that childhood obesity is on rise in our country. Addressing the problem at its earliest could be achieved through identifying high risk groups and planning early intervention. Effective interventions and preventive strategies should be instituted at local and national level to reduce the incidence and comorbidities associated with obesity.

Key words: Obesity, Primary school children, Risk factors for obesity

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Introduction

Obesity is an important pediatric public health problem associated with risk of complications in childhood and increased morbidity and mortality throughout adult life.[1] The prevalence of childhood obesity has increased and the World

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Health Organization has warned of the escalating epidemic of obesity that could put the population in many countries at risk of non-communicable diseases. The prevention and treatment of obesity has emerged as an important focus of pediatric research and clinical care.[2]

The prevalence of overweight and obesity in children has trebled in last 20 years and the increase is not only in industrialized but also in resource limited coutries.[3] Dietary patterns in conjunction with changing life style of families, increasing hours of inactivity due to television, computer replacing outdoor games result in sharp increase in childhood obesity.[4]

Obesity is often defined simply as a condition of abnormal or excessive accumulation of adipose tissue, to the extent that health may be impaired.[5] Over the last 4 decades, food habit has changed dramatically. These changes include increase consumption of high carbohydrate beverages, fruit punch and juice, fast food and increased snacking between meals. For children, pressure of academic performance, poor neighborhood safety leads children to stay indoors and lower level of physical activity. Moreover, the advent of television, computer and video games has resulted in sedentary activities resulting in obesity.[6]

Pediatric weight problems are increasing in frequency and sometimes undiagnosed.[7] ICDDR,B conducted a study in ICCDR,B's Dhaka hospital and Matlab field site between 1993 and 2012 and found that there is large decline in undernutrition and striking increase in childhood obesity in Bangladesh. Another study of ICDDR, B in 2013 shows ten out of 100 children in urban areas are overweight in Bangladesh.[8]

This study focuses on proportion of obesity and risk factors present in obese primary school children in Rajshahi city. It will identify at risk children and will provide an opportunity for early intervention to prevent obesity related disorder in later life.

Materials and Methods

The present study was a cross sectional study. At first, a list of primary schools of Rajshahi City Corporation was prepared. Four schools were selected randomly. Selection criteria for the study population were 6 to 10 years old children of selected primary schools during the school year 2016-2017. Operational definition used in our study were as below:

1. Body mass index: Weight in kg divided by the square of height in meter.
2. Obesity: BMI for age more than 95th percentile compared to BMI for age percentile developed by the United States Centers for Disease Control and prevention (CDC) 2000 growth charts.
3. Overweight: BMI for age >85th & <95th centile.
4. Normal weight: BMI for age <85th & >5th centile.
5. Under weight: BMI for age <5th centile.

Exclusion criteria were

1. Children with chronic illness ,
2. Those on corticosteroid therapy and
3. Children with chromosomal disorder.

Children were selected from the attendance register by simple random sampling with equal representation of each class.

Written consents were obtained from both the parent and the principal of the schools. A structured questionnaire was used. It had two sections: First section included personal information like age, gender, grade, date of birth and second section was concerned about eating fast food, activity level etc. Data were recorded by personal interview by the principal investigator. It was followed by weight and height measurement. Sex and age in years and months were collected and rounded to the nearest half year. Children were asked to take off their shoes for the height measure and to take off any over clothing for weight measure. Direct measures of weight were collected using a Miako weighing scale. A stadiometer (cm) was used to measure height. Two measures were taken and the average recorded. After collection of results, these were observed, analyzed and interpreted. Information from data

collecting sheet were analyzed and interpreted by SPSS version 20. To test the statistical significance 'Chi Square' test was applied. Clearance from ethical committee of Rajshahi Medical College was taken prior to study.

Results

Total 225 children responded to the questionnaire and were enrolled in the study. 24.9 % (56) students were between 6-7 years; 25.8% (58) were 7-8 years; 24.9% (56) were 8-9 years and 24.4% (55) were between 9.1 -10 years. Sex distribution of study population is shown in Figure 1. Anthropometric measurements were shown as Mean ± SD in Table 1.

Among 225 participants, 2.7 % were overweight, 5.3 % (12 students) were obese, 83.6% (188 students) were normal weight and 8.4% (19 students) represented underweight children. The frequency of obesity and overweight among male and female children is shown in figure 2. It shows that frequency of obesity is higher in female and frequency of overweight is higher in male. The rate of obesity is highest at the age of 8-9 years and lowest at the age group of 6-7, while rate of overweight is highest at the age of 9-10 years and lowest at the age group of 8-9 years. Table 3 shows playing, biking regularly is strongly associated with fewer incidence of overweight and obesity (p value -.001). Moreover, absolute breast feeding in first 6 months of life is related to fewer incidence of obesity (p value 0.05).

Figure 1: Distribution of study population by sex

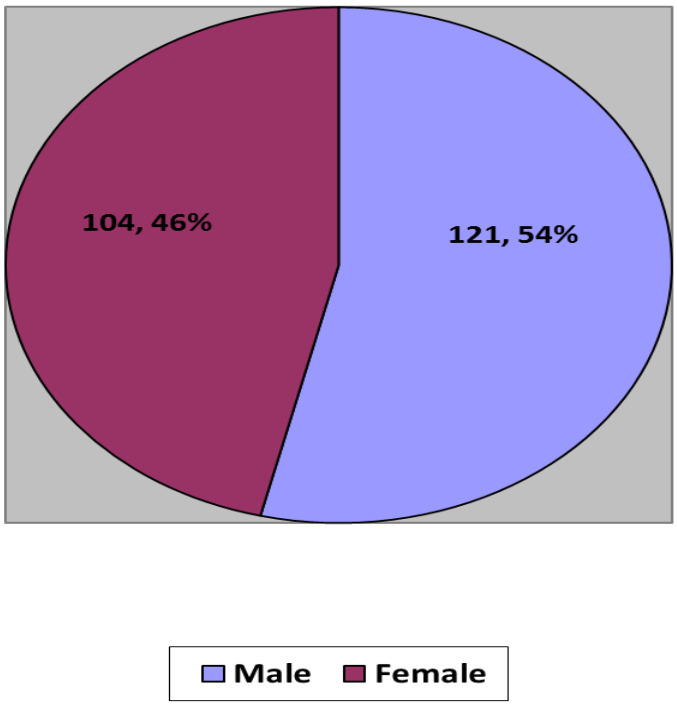

Figure 1 shows distribution of study population by sex. Out of 225 students, 53.8% (total 121) were male and 46.2% (total 104) were female.

Table 1: Data on height, weight and BMI of study population.

Index	Minimum	Maximum	Mean ±SD
Height (cm)	92	136	120±8.11
Weight (kg)	13	40	22±5.39
BMI (kg/m)	11.5	22.4	15.5±2.1

Table 1 shows mean and standard deviation of anthropometric measurement. Mean height were 120±8.1 cm; mean weight were 22.7±5.3 kg and mean BMI were 15.5±2.1 kg/m^2.

Figure 2: Nutritional status of study population

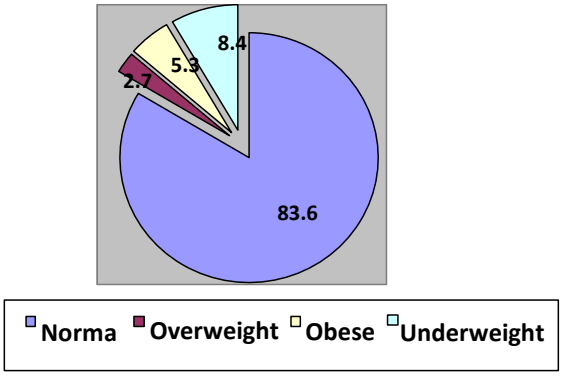

Figure 2 shows nutritional status of study population

According to the pie graph, 2.7 percent of children were obese; 5.3 percent were overweight; 8.4 percent underweight and 83.6 percent were normal weight.

Table 2.: Nutritional status of study population.

BMI for age	Number of children assessed		
	Boys	Girls	Total
Underweight	13(5.8%)	6(2.7%)	19(8.4%)
Normal	99(44.0%)	89 (39.6%)	188(83.6%)
Overweight	4(1.8%)	2(0.9%)	6(2.7%)
Obese	5(2.2%)	7(3.1%)	12 (5.3%)

Table 2 shows the frequency of obesity among male was 2.2% (total 5 out of 121 students), among female, it was 3.1% (7 out of 104 students). The frequency of overweight among male was 1.8% (total 4 out of 121 students) and among female it was 0.9% (2 out of 104 students).

Figure 3 Estimated percentage of overweight and obesity by sex.

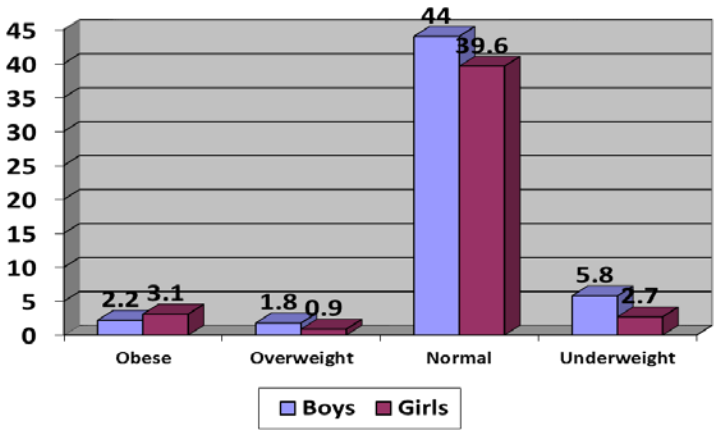

Figure 3: Estimated percentage of overweight and obesity by sex. According to the bar graph, 2.2 percent boys and 3.1 percent girls were obese; 1.8 percent boys are overweight and 0.9 percent girls were overweight. It is also estimated that 5.8% boys and 2.7% girls are underweight.

Table- 3: Risk factors for overweight and obesity: Individual characteristics

Risk factor	Frequency	Obese No	Overweight No	Normal & Underweight No	P-value
Sports	>1 hour per day	2	0	196	.001
	< 1 hour per day	9	6	3	
Transportation to school	Walking	0	0	16	0.001
	Biking	0	0	22	
	Common transportation	11	4	167	
	Private car	1	2	2	
Time consumed watching TV	Less than 1 hour/day	82	4	2	0.001
	1-2 hour/day	109	2	3	
	More than 2 hour/day	16	0	7	
Weekly fresh fruit and vegetables	Occasional	8	4	101	
	Once/week	2	1	62	0.001
	Twice/week	1	1	28	
	More than twice/week	1	0	16	
Feeding in the first 6 months of life	Breast fed	7	3	187	
	Bottle feed	11	2	9	.05
	Mixed feeding	5	1	11	
Fast food meals, candy and chocolates and sugary juice	Do not eat	0	1	34	
	Occasional	7	4	170	.001
	Once/week	5	1	3	

Table 3 shows playing, biking regularly is strongly associated with fewer incidence of overweight and obesity (p value 0.001). Data also shows that faulty dietary habit, having more fast food, chocolate, sugary juice lead to overweight and obesity and more fresh fruit and vegetables lead to normal weight (p value 0.001).

Discussion

Childhood obesity is a public health problem and a number of studies report an increasing prevalence of obesity in the developed countries. In USA, according to NHANES, 2009-2010 (National Health & Nutrition Examination Survey, USA), among children and adolescents ages 6 to 19 years, almost 33.2% are considered to be overweight and 18.2% are considered to be obese.[6] If trends are not reversed, increasing rates of childhood overweight and obesity will have enormous implications not only for future health care expenditures but also for the overall development of nations.[9]

In this study, the main objective was to describe the level of childhood overweight and obesity to assess the present situation. We found the overall prevalence of obesity among children aging from 6-10 years was 2.7% and prevalence of overweight was 5.3%.

Mohsin F et al, carried out a study among 468 children and adolescents aged 3-18 years in a private school in Dhaka city. The prevalence of obesity was found to be 17.9% and that of overweight was 23.6%, obesity was more common in boys (19.9%) than in girls (15.3%).[10]

No previous studies were carried out in Rajshahi City in Bangladesh which make it difficult to compare. A previous study conducted by Khurshidul et al, was carried out to find-out the obesity and overweight problems in children (7-12 yrs). One fourth (25%) of the students were found to be obese and 21.8 % were overweight according to their BMI percentile. Among boys 31.43% were obese and for the girls it was 7.69%. Among boys 18.57% are overweight and for the girls it was 30.76%. Male students were both obese and overweight than the female.[11]

The prevalence of obesity and overweight in the present study was lower than values described by Khurshidul et al. This variation might be partially attributed to the difference in standard curves used for defining obesity and overweight as Khurshidul et al, used WHO standard curve while in our study we used CDC standard curve and the variation in the socioeconomic classes of children of the two studies.

A study made in Kolkata city of India showed that the prevalence of obesity and overweight among preadolescent children were 22.57% and 17.12% respectively.[12] A study made in Puducherry, India among school children aged 6-12 years showed that the prevalence of obesity and overweight were 3.8% and 7.9% respectively.[13] This finding is higher than findings of our study. The reason behind this may be that children belonging to relatively higher socioeconomic strata who are likely to study in private school and reside in urban areas, are at higher risk of obesity, most likely due to associated lifestyle, inappropriate diet and low level of physical activity.

In the present study there was a significant association (p value <0.001) between breast feeding during 1st 6 months of life and BMI. That agreed with Scholtens et al [14] wherein they reported in their cohort study on Dutch children that breastfed children had a significantly lower risk of overweight. Another study conducted by Fallahzadeh et al [15] showed a markedly lower overweight prevalence among breastfed than non-breastfed children in Iran. Children breastfed for at least 24 months were substantially less likely to be overweight than children breastfed for less than 12 months. In contrast to our study results, a study conducted in Kuwait reported that neither breastfeeding nor duration of breastfeeding was associated with childhood obesity at 3– 6 years when potential confounders were controlled.[16]

The present study also shows playing, biking regularly is strongly associated with fewer incidence of overweight and obesity (p value -.001). Data also shows that faulty dietary habit, having more fast food, chocolate, sugary juice lead to a higher BMI and more fresh fruit and vegetables had lower BMI (p value -.001). The finding is similar to a study conducted in Lucknow city by Razaat et al where a total of 407 children of 5th to 12th standard participated in the study. Of them, 34.64% were normal, 60.44% were undernourished, 4.17% were overweight, and 0.73% were obese. On applying odds ratio, risk of

overweight/obesity was significantly higher in children who played outdoor games for <30 min and those who consumed fast foods.[4]

Limitation of the study:

The study was based on a small sample size of two hundred twenty five children. So the study does not accurately represent the whole children of Rajshahi city and also does not reflect the real picture of the whole country. Application of international reference standards of BMI in settings of Bangladesh may have limitations.

Conclusion

Our study provides an overview of burden of childhood obesity among primary school children in Rajshahi city for the first time and can prove to be a benchmark for future comparison by public health personnel and decision makers. It also indicate the need to devise control measures, both at home and at schools, further research on risk factors for childhood obesity and to monitor the trend in near future. Addressing the problem at its earliest could be achieved through identifying high risk groups and designing sustainable interventions which could be implemented on a larger scale to prevent further rise in overweight and obesity.

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