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Original Article

Needs Assessment for Reducing Childhood Overweight and Obesity in a Selected School of Dhaka City

Rahman MA[1], Billah MM[2], Rahman M[3], Bashar F[4], Akhter N[5]

Abstract

Background: Global prevalence of childhood overweight and obesity increased in past 33 years. In Bangladesh, prevalence of childhood overweight and obesity increased five times in last two decades. ***Objective:*** To assess and identify different socio-demographic and behavioral factors of childhood overweight and obesity among 5-10 years old children in a school of Dhaka City, Bangladesh. **Methods:** This was a cross sectional survey followed by a case control study carried out in Institute of Epidemiology Disease Control and Research (IEDCR) during July 2017 to June 2018. We randomly recruited 146 overweight and obese children and 151 normal weight children aged 5-10 years old. Their mothers were interviewed face-to-face using a pretested semi-structured questionnaire. Portable stadiometre and bathroom scales were used for anthropometric measurement. Odds ratios and 95% confidence intervals were calculated for risk factors. **Results:** The proportion of overweight and obese children was 23% and 22% respectively. The proportion of overweight (24%vs 22%) and obese (25%vs 18%) children were higher among boys than girls (50% vs 40%). The children who ate fast food (OR=3.75; 95% CI: 1.50-10.63), ate snacks more than three times a day (OR=3.3; 95% CI: 1.4-8.7), didn't participate in sports, fitness or recreational activities at school (OR=2.4; 95% CI: 1.3-4.4) or at home (OR=4.1; 95% CI: 2.1-8.5), and spent daily >2 hours on sedentary activities (OR=1.7; 95% CI: 1.0-2.8) had a higher risk of being overweight or obese. **Conclusions:** The proportions of overweight and obese children were high among school children. The school authority and the parents should promote more a healthy lifestyle by raising awareness of the benefits of physical activities, games and sports and eating healthy foods at home or school to reduce the burden of childhood overweight and obesity.

Keywords: *Children, obesity, overweight, risk factors, Bangladesh*

1. Dr. Mohammad Afzalur Rahman, OSD-DGHS, Attached to Planning and Research, DGHS, Mohakhali, Dhaka.
2. Prof. Dr. Mahmudur Rahman, Former Director, Institute of Epidemiology Disease Control and Research (IEDCR), Dhaka.
3. Dr. Farhana Bashar, Assistant Professor, Department of Anatomy, Mugdha Medical College, Dhaka.
4. Dr. Najnin Akhter, Assistant Professor, Department of Anatomy, Bangladesh Medical University, Shahbagh, Dhaka. Orchid Id: https://orcid.org/0000-0002-5560-849X.

Address of correspondence: Dr. Mohammad Afzalur Rahman, OSD-DGHS, Attached to Planning and Research, DGHS, Mohakhali, Dhaka. Mobile Number: +8801731884496
Email: drafzalur1981@gmail.com

Introduction

Childhood overweight and obesity are notable public health concern due to wider global magnitude and escalating prevelance[1-3]. Over the last three decades, the prevalence of overweight and obese

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children increased nearly half and globally boys were more suffering than girls[3]. Low and middle-income countries also showed an increased prevalence of overweight and obese children in 2013 (12.9 % in boys and 13.4% in girls)[3-4]. The rising prevalence of childhood obesity in many countries is being termed as global "epidemic"[5]. Due to overweight and obesity, globally 3.4 million deaths occurred, 3.9% of years of life lost and 3.8% disability adjusted life years (DALYs) in the world[3]. In Bangladesh, the prevalence of overweight and obesity among affluent school children in Dhaka is 23.6% and 17.9% respectively[6]. Additionally, overweight and obese adults are at increased risk of developing non-communicable diseases[7]. Obesity associated chronic diseases include type 2 diabetes, hypertension, coronary heart disease, metabolic syndrome, respiratory disease, musculoskeletal disorders, nonalcoholic fatty liver disease, polycystic ovarian syndrome and cancers affects obese and overweight adults more than normal weight adults[7]. Furthermore, childhood overweight obesity hinders their cognitive and social development[2].

Numerous studies revealed that parental education level, family income, occupation of parents, parental BMI, parental physical activity, family type, parenting style, parental control over feeding, parental pressure/restriction in feeding, parental encouraging and modeling of health behaviors have association with childhood obesity[1,2,8-13]. Moreover, history of breast feeding, duration of breast feeding, family meal frequency, amount of television viewing during family meal, family emotional closeness/connection, family weight teasing, number of siblings and sibling weight teasing have association with childhood obesity[8-19]. In addition to these familial factors, other socio-demographic and individual behavioral factors like lack of physical activity, increased sedentary activities, sleep deprivation, increased frequency of eating, unhealthy diet, consumption of outside food, meal-skipping habit are potential risk factors for childhood over weight and obesity[9, 12, 14, 16].

Prevention of overweight and obesity is an important component of National Nutrition service (NNS) program of the Bangladesh Government. Time to time, NNS conducts needs assessments and surveys in schools to identify interventions that can be taken to reduce childhood overweight and obesity in students. From these assessments, NNS develops interventions to reduce childhood overweight and obesity that are tailored to the schools that are assessed. We conducted this study to estimate the prevalence of childhood overweight and obesity in

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children attending school in Dhaka City and to identify factors associated with it.

Methodology

This cross-sectional survey was done with analytical case control portion from July 2017 to June 2018 after getting ethical approval was obtained from the Institutional Review Board (IRB) of Institute of Epidemiology Disease Control and Research (IEDCR). Official permission for data collection was taken from the principal of National Ideal School, Banasree, Dhaka. Our target population was 5-10 years old children of the school and lived in Dhaka City. All overweight and obese children were asked to participate as cases, and for each case, one control with normal weight that was matched by the same age in years and gender. A total of 297 participants were selected, among them 146 cases and 151 controls. Here included all children were from National Ideal School whose parents gave consent for their children to participate in the study and also for the mother's interview. Underweight children were excluded from this study.

Initially anthropometric measurements of all the children were taken and estimated the body mass index (BMI). Cases were selected through simple random sampling from obese children and overweight children. Controls were selected through same sampling methods from children having normal weight.

We recruited four professional data collectors and instructed them on how to obtain written informed consent, interview study subjects and anthropometric measurements. After obtaining permission from the school authority and the child's parents, the data collectors obtained all the students' name, age, sex, class, section, roll no, height, and weight. The data collectors then calculated the BMI of each student and classified them as normal weight, overweight or obese using the gender specific growth reference. After preparing a sampling frame for overweight and obese children and a sampling frame for normal weight children then chose potential study subjects by simple random sampling until the sample size was met. Cases were matched by age and gender with children with normal weight by simple random sampling.

The school authority sent invitation letters to the parents of all selected cases and controls informing them about the study and its objectives. Mothers of cases and controls were asked to come to the school premises for an interview. Informed written consent was obtained

from the mother of the child being recruited and was interviewed face-to-face. One data

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collector re-interviewed 5% of the study population to check data validity.

We calculated the frequency and percentage of obese, overweight and normal weight children by age, place and person. The mean and standard deviation or median and inter quartile range were also calculated. We used t-test or Wilcoxon-rank sum test to compare mean or medians. The Z-test was used to compare proportions between cases and controls. Association between categorical variables was observed by chi-square test and odds ratios. These statistical tests were performed by STATA version 14.2. Furthermore, MS Word, MS Excel were used to record and analyze the data.

Results

Socio-demographic profile: The mean age of 297 study participants was 8.5 years (SD: 1.2) of which 50% (149/297) were male. There was no significant difference of age (p= 0.99) and gender (p= 0.77) between cases and controls due to age and gender matched case-control selection. There was no significant difference in parents' education, occupation, income between cases and controls. The average monthly family income of the children was 60144 BDT (SD: 43943). The median family members of the respondents were 4 (IQR: 4-5). There is no significant difference (p= 0.3) among the number of family members for the cases and controls (Table 1).

Table-1: Proportion of overweight, obese (Case) and normal weight (Control) children according to socio-demographic characteristics

Socio-demographic characteristic	Case (n=146) f (%)	Control (n=151) f (%)	Total (n=297) f (%)	χ^2 test	p value*
Child's Age				0.2	0.9
6 years	11 (48)	12 (52)	23 (8)		
7 years	20 (47)	23 (53)	43 (14)		
8 years	35 (50)	35 (50)	70 (24)		
9 years	48 (50)	48 (50)	96 (32)		
10 years	32 (49)	33 (51)	65 (22)		
Child's gender					
Male	72 (48)	77 (52)	149 (50)	0.1	0.7
Female	74 (50)	74 (50)	148 (50)		

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Child's Class					
Junior	15 (44)	19 (56)	34 (11)	0.4	0.9
Class 1	18 (49)	23 (51)	37 (12)		
Class 2	33 (50)	33 (50)	66 (22)		
Class 3	50 (50)	51 (51)	101 (34)		
Class 4	30 (51)	29 (49)	59 (20)		
Education Status of child's father					
SSC and below	18 (49)	19 (51)	37 (12)	0.5	0.9
HSC	17 (45)	21 (55)	38 (13)		
Graduate	37 (48)	40 (52)	77 (26)		
Masters and above	74 (51)	71 (49)	145 (49)		
Education Status of child's mother					
SSC and below	38 (48)	42 (52)	80 (27)	0.6	0.8
HSC	39 (49)	40 (51)	79 (27)		
Graduate	30 (47)	34 (53)	64 (22)		
Masters	39 (53)	35 (47)	74 (25)		
Occupation of child's father					
Service holder	80 (49)	83 (51)	163 (55)	2.2	0.3
Businessperson	52 (46)	60 (54)	112 (38)		
Others	14 (60)	8 (40)	22 (7)		
Occupation of child's mother					
Service Holder	19 (51)	18 (49)	37 (12)	0.1	0.8
Housewife	127 (49)	133 (51)	260 (88)		
Average monthly family income of the child					
0 – 30,000 taka	28 (64)	16 (36)	44 (15)	5.6	0.1
30,001 – 60,000 taka	75 (47)	94 (53)	169 (51)		
60,001 – 90,000 taka	23 (49)	24 (51)	47 (16)		
> 90,000 taka	20 (54)	17 (46)	96 (12)		
Number of total family members of the child					
3	13 (35)	24 (65)	37 (12)	3.7	0.3
4	78 (53)	70 (47)	148 (50)		
5	33 (50)	33 (50)	66 (22)		
>6	22 (48)	24 (52)	46 (15)		
Number of total siblings of the child					
0	17 (40)	26 (60)	43 (14)	3.0	0.2
1	87 (49)	92 (51)	179 (60)		
>2	42 (58)	33 (42)	75 (26)		
Child's birth order					
1st	82 (48)	88 (52)	170 (57)	5.5	0.1
2nd	51 (46)	59 (54)	110 (37)		
3rd or above	13 (76)	4 (24)	17 (6)		

* P≠ 0.05 was considered as the level of significance

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Body Mass Index: The mean BMI of respondents was 19.3 (SD: 5.8) with mean BMI of cases was 21.7 (SD: 2.5) and controls was 17.0 (SD: 7.0). Two-sample t-test revealed that, there was statistically significant difference (p=0.0001) between the BMI of cases and controls. Among the respondents 51% (152/297) were normal weight, 21% (64/297) were overweight and 28% (82/297) were obese.

Risk factors associated with childhood overweight and obesity: Children who ate fast food were four times more likely to be overweight or obese (OR=3.8; 95% CI: 1.5–10.6) than normal weight children. Moreover, children's habit of eating chocolates made the children three times more likely to be overweight or obese (OR=3.3; 95% CI: 1.4–8.7) than normal weight children. Children who ate snacks beyond school time for three or more times a day were three times higher to be overweight or obese (OR =3.1; 95% CI: 1.5–6.5) than those who ate snacks less than three times a day. Children who spent more than two hours per day on sedentary activities like watching TV, watching videos or playing games were nearly two times more likely to be overweight or obese (OR=1.7; 95% CI: 1.0¬–2.8) than those who spent less than two hours per day on sedentary activities (Table 2).

Table-2: Food and sleep related risk factors associated with overweight and obesity among schoolchildren in a selected school of Dhaka (n= 297)

Risk factors	Case f (%)	Control f (%)	Odds Ratio	95% CI
Risk factors related to Child's Food Habit				
Child's habit of eating Fast food				
Yes	139 (52)	127 (48)	3.8	1.5 - 10.6
No	7 (23)	24 (77)		
Child's habit of eating Chocolates				
Yes	138 (52)	127 (48)	3.3	1.4 - 8.7
No	8 (25)	24 (75)		
Child's number of snacking beyond school time				
≥3	35 (71)	14 (29)	3.1	1.5 - 6.5
<3	111 (45)	137 (55)		
Risk factors related to Child's Sedentary or Sleep habit				
Daily duration of child's watching tab, smart phone or TV in hour				

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> 2 hours	49 (58)	35 (42)	1.7	1.0 - 2.8
< 2 hours	97 (46)	116 (54)		
Child's sleep habit during day on weekends /school off days				
Yes	59 (43)	77 (57)	0.7	0.4 - 1.1
No	87 (54)	74 (46)		
Child's sleep habit during day on weekdays /school days				
Yes	48 (42)	65 (58)	0.6	0.4 -1.1
No	98 (53)	86 (47)		

Children who did not do vigorous intensity sports, fitness or recreational activities at home had four times higher chance to be overweight or obese (OR = 4.1; 95% CI: 2.1–8.5) than those who engaged in these activities. Children who did not do moderate intensity sports, fitness or recreational activities at home were two times more likely to be overweight or obese (OR = 2.2; 95% CI: 1.4–3.6) than those who did. In addition to that, those who did vigorous intensity sports, fitness or recreational activities at home for less than or equal 30 minutes per day were two times more likely to be overweight or obese (OR =1.9; 95% CI: 1.1–3.3) than those who did the same activity for more than 30 minutes per day. Furthermore, children who did sports, fitness or recreational activities at school for more than three days per week were about four times less likely to be overweight or obese (OR =3.6; 95% CI: 1.2–10.7) than those who did less than 3 days per week. Children who did not do sports, fitness or recreational activities at school were 2 times more likely to be overweight or obese (OR = 2.4; 95% CI: 1.3–4.4). (Table 3)

Table-3: Physical activities related risk factors associated with overweight and obesity among schoolchildren in a selected school of Dhaka (n= 297)

Risk factor	Case f (%)	Control f (%)	Odds Ratio	95% CI
At Home				
Vigorous intensity sports, fitness or recreational activities				
No	43 (75)	14 (25)	4.1	2.1 - 8.5
Yes	103 (43)	137 (57)		
Moderate intensity sports, fitness or recreational activities				
No	95 (58)	69 (42)	2.2	1.4 - 3.6
Yes	51 (38)	82 (62)		

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Daily duration of child's vigorous intensity sports/ fitness/ recreational activities				
≤ 30 minutes	49 (52)	45 (48)	1.9	1.1 - 3.3
> 30 minutes	54 (37)	92 (63)		
Weekly days of child's vigorous intensity sports/ fitness/ recreational activities				
≤3 days	31 (52)	30 (48)	1.5	0.8 - 2.9
>3 days	72 (40)	107 (60)		
Daily duration of child's moderate intensity sports/ fitness/ recreational activities				
≤ 30 minutes	32 (43)	42 (57)	1.6	0.7 - 3.5
> 30 minutes	19 (32)	40 (68)		
Weekly days of child's moderate intensity sports/ fitness/ recreational activities				
≤3 days	27 (35)	51 (65)	0.7	0.3 - 1.5
>3 days	24 (44)	31 (56)		
At School				
Weekly number of days of child's sports, fitness and recreational activities				
<3 days	14 (54)	12 (46)	3.6	1.2 - 10.7
>3 days	14 (25)	43 (75)		
Child performed sports, fitness or recreational activities				
No	76 (55)	62 (45)	2.4	1.3 - 4.4
Yes	28 (34)	55 (66)		

Discussion

This study found that the proportion of normal weight, overweight and obese among 5-10 years old children of the selected school were 40%, 23% and 22% respectively. In a study in 2011, among 6-10 years old children in Dhaka, Bangladesh reported 18% of the children were overweight[17]. A study in 2010 among 3-18 years old school children in Dhaka estimated the proportion of overweight and obese children as 24% and 18%, respectively[6]. Furthermore, among 6-13 years old children in urban setting of Bangladesh found that the proportion of overweight were 13% and obese 18%[18]. The urban children in Dhaka reported a five-fold increase in childhood overweight and obesity over past two decades[19].

According to our study, 5-10 years old children's physical activity for more than three days in a week and more than 30 minutes per day both has significant association with overweight and obese children. Children who participated in sports, fitness or recreational activities at school for more than three days per week were less likely to be overweight or obese than those who did less than 3 days per week. Other studies done in Bangladesh and other countries have similar findings[20]. There are limited facilities or opportunities

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for physical activities for children at schools and homes in Dhaka, Bangladesh. Due to rapid urbanization, the numbers of playgrounds are decreasing day by day. Moreover, teachers will ensure that all students are involved in any sorts of physical activities at school during that time. The school authorities can motivate the children and their parents to understand the importance of physical activities at home and to perform daily physical activities at home.

Our data demonstrated that, the children, who were engaged in moderate to vigorous intensity sports/fitness/recreational activities at home and school, were significantly less likely to be overweight and obese. Moreover, this study also found that, the children who were engaged in moderate to vigorous intensity sports/fitness/recreational activities at home for more than 30 minutes per day were less likely to be overweight and obese. These finding is consistent with a study done in Bangladesh among 5-15 years old school children[2, 20]. Furthermore, this study revealed that the children who did not do sports, fitness or recreational activities at school were more likely to be overweight or obese. There is comparatively lesser scope of physical activities for the children at schools and homes in urban than rural areas of Bangladesh. Every school authority should have facilities for physical activity (games/sports /recreational activities) and can allocate daily 30 minutes class/period for physical activity (games/sports /recreational activities).

The study found that, 5-10 years old children, who ate more fast food, were more likely to be overweight and obese than those who ate no fast food. This finding was similar with other studies done in Dhaka, Bangladesh and India[2, 21, 22]. The data also suggested that, the children who ate more chocolates were more prone to develop childhood overweight and obesity than those who did not eat chocolates. This study finding is similar to other studies carried out in our country as well as other countries[23].This is probably due to high calorie contents in fast foods and chocolates. Lack of awareness of the children, parents and school authorities regarding the fast foods, chocolate and other unhealthy food eating habit of 5-10 years old school children, which are potential factors for childhood overweight and obesity. Moreover, the study found that, increased number of snacking beyond school time is another potential risk factor

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for 5-10 years old school children for being overweight and obese. This study finding is similar to other studies conducted in our country as well as other countries[23].

This study found that, the school children who spent more time in sedentary activities like watching TV, playing games or watching videos in tab or smart phones were more likely to be overweight and obese than those who did not. The study also found those children's involvement in sedentary activities for less than two hours a day was potential risk factor for childhood overweight and obesity. Due to technological advances like hand-held electronic devices, computer games and television programs the children have adopted a lifestyle of less physical activities and more sedentary activities[22]. This study finding is consistent with other studies conducted in Bangladesh, Iran, Australia and USA[2, 20, 21]. Due to rapid urbanization, the open recreation places like playing fields and parks are decreasing leading to lessening of physical activities of children[2]. The school authority can give more attention to discourage the school children to be involved in sedentary activities (playing video games or watching videos in tab or smart phone or watching TV) at home. The parents can play a pivotal role to motivate and involve their children in different physical activities (games/sports/recreational activities) at home or outside home rather than to be involved in sedentary activities.

Our study revealed that, the children who slept during daytime during weekdays or weekends were less likely to develop childhood overweight and obesity than those children who didn't sleep during the day time though it was not statistically significant. In other studies, there is negative association between the duration of sleep at night and childhood overweight/obesity[16]. There is scarce evidence regarding the association of duration of sleep at day time and childhood overweight/obesity. In urban areas of Bangladesh, due to increased use of tab, smart phones and computers, the children are suffering from insomnia and other mental health issues. Further research in more schools should be done to replicate the findings obtained in this study. Further qualitative study can be conducted to draw more insights about the problem.

Conclusions:

The proportion of overweight and obese children was very high among 6-10 years old children. Boys had a higher proportion

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of childhood overweight and obesity than girls. The children who were more physically active at home or school were less likely to be overweight and obese. This study found that no or little involvement in moderate to vigorous intensity sports/fitness/recreational activities at home or school are potential risk factors for childhood overweight and obesity among 6-10 years old school children. Moreover, spending more time in sedentary activities like playing video games or watching videos in tablets or smart phone or watching TV was another probable risk factor for being overweight and obese. Additionally, eating fast food, chocolates and more number of snacking beyond school time were also plausible risk factors for childhood overweight and obesity.

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