Risk Factors for Overweight and Obesity among Children and Adolescents in Bangladesh: A Hospital Based Study

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Abstract

Background: *Childhood obesity is becoming an epidemic globally as well as in Bangladesh. Although several risk factors are identified for overweight or obesity, limited studies have been done in our country. The objective of this study was to identify the risk factors of overweight and obesity in children and adolescents in Bangladesh.*

Methodology: *It was a cross sectional study done in children, aged 5 to 16 years, attending the Paediatric Endocrine Clinic and Paediatric Outpatient Department, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka over a period of 18 months. Overweight and obese children as well as normal weight children were selected after considering inclusion and exclusion criteria. They were classified as case (overweight/obese) and control (normal weight) according to the Center's' for Disease Control and Prevention age and sex specific growth chart. Among a total of 150 children 100 were cases and 50 were controls.*

Results: *Majority of children in both the groups were male. Among cases 77% were obese and 23% were overweight. Analyzing the risk factors, it was found that first issue had 2.66 times, watching TV >3 hr had 4.47 times, breast feeding <6 month had 4.16 times, daily more caloric intake (approx.) had 17.36 times and maternal BMI >24.9 had 2.70 times increased risk to develop obesity.*

Conclusion: *The first issue, excess television watching, lack of exclusive breast feeding, excess calorie intake and having overweight/obese mother had higher risk to develop overweight or obesity in children and adolescents.*

Keywords: *Overweight, Obesity, Risk factors*

Introduction

Childhood overweight and obesity is a rapidly increasing public health problem in both the developed and developing countries.[1] It is now an emerging health problem in Bangladesh as well and increasing steadily, particularly in affluent society.[2] The worldwide prevalence of childhood overweight and obesity is increased from 4.2% in 1990 to 6.7% in 2010 and this tendency is anticipated to reach 9.1% by 2020.[3] In developing countries the prevalence of obesity among children and adolescent was found to be as 22.1% in Brazil, 41.8% in Mexico, 19.3% in Argentina and 22% in India.[4] In a countrywide epidemiological study showed that the prevalence of childhood overweight and obesity in Bangladesh was 9.5% and 3.5% respectively.[5] Childhood obesity can profoundly affect children's physical health, social, and emotional well-being and self esteem. Many co-morbid conditions like metabolic, cardiovascular, orthopedic, neurological, hepatic and pulmonary disorders are also seen in association with childhood obesity.[6] A systemic review showed that childhood and adolescent overweight and obesity has undesirable consequences on premature mortality and morbidity in adulthood.[7] Identification of risk factors is crucial to prevent childhood obesity. Several

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studies of different countries suggest that the risk factors of obesity are multi factorial like food habit, physical activity, excess television watching, playing video games, family history of obesity, socioeconomic condition and parental education etc.[8,9] The risk factors usually are not present in isolation but in combination like genetic, physical, psychological and social factors that predict the future outcomes.[10] The aim of this study was to identify the risk factors of childhood overweight and obesity in a hospital setting of Bangladesh.

Materials and Methodology:
It was a cross sectional study conducted in Paediatric Endocrine Clinic and Paediatric Outpatient Department, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from February, 2016 to July, 2017. Children aged 5 to 16 years attending the Paediatric Endocrine clinic and Paediatric Outpatient Department of BSMMU, Dhaka for overweight and obesity were enrolled in the study. A total of 100 children were included as cases. Children who were taking systemic steroid for any cause or any other drugs that can cause obesity and children suffering from genetic, endocrine or any neurological disease that may cause obesity were excluded from the study. In order to explore the risk factors age and sex matched normal weight children in a ratio of 2:1 were included in the study as control. They came with acute illness like viral fever, common cold or growing pain etc. other than overweight and obesity in Paediatric OPD. Ethical clearance was taken from Institutional Review Board, BSMMU. Informed written consent was obtained from their guardians after explaining to them the study objectives and the method of the study. A structured questionnaire was used to collect data regarding socio-demographic status like position of index case, family structure, family income level and educational status of parents etc. History of duration of outdoor play or other physical activities, availability of playground, time spend with television, computer or other electronic devices were also recorded. History of duration of breast feeding and dietary habit including main meals and snacks were taken. Standard measuring cup and spoon were used to document the approximate amount of food consumed in last 24 hours. The weight was measured by using electronic weighing machine to a nearest 100gm and height was recorded using locally made height board where two horizontal flat wooden boards, one for head-end another for foot-end, was attached with a long vertical scale to nearest 0.5cm. After measuring height and weight BMI was calculated and categorized as non-obese or normal weight, overweight and obese according to Centre for Disease Control and Prevention criteria.[11] Children having BMI for age and sex 5th to <85th percentile of reference population were classified as normal weight, children having BMI for age and sex ≥85th and < 95th percentile of reference population were classified as overweight and children having BMI for age and sex ≥95th percentile as obese. The mothers' BMI was also calculated. Statistical analysis was performed by using SPSS. Qualitative data were analyzed by Chi square test and descriptive data by proportion test or frequency distribution Table. P value ≤0.05 with 95% confidence interval was considered as the level of statistical significance.

Result:
In this study majority of the cases (53.0%) belonged to the age group 10 to 16 years and controls (60.0%) belonged to 5 to 10 years. Regarding sex of the children, majority were male in both the groups (Table I). Seventy seven percent of cases were obese

Table I
Age and Sex distribution of the respondents (n=100+50)

	Case(n=100)		Control(n=50)		p value
	n	%	n	%	
Age (years)					
5-10	47	47.0	30	60.0	0.133
>10-16	53	53.0	20	40.0	
Sex					
Male	62	62.0	31	62.0	1.000
Female	38	38.0	19	38.0	

and 23% were overweight (Table II). While analyzing the risk factors for overweight and obesity, it was found that first issue had 2.66 times, watching TV >3 hr had 4.47 times, breast feeding <6 month had 4.16 times, excess caloric intake (approx.) had 17.36 times and maternal BMI >24.9 had 2.70 times increased risk to develop obesity. In our study watching television less than three hours (OR: 0.22,

95% CI 0.09-0.56), breast feeding six months or more (OR: 0.24, 95% CI 0.05-0.91), less calorie intake (OR: 0.06, 95% CI 0.02-0.15) and normal maternal BMI (OR: 0.37, 95% CI 0.17-0.79) had negative influence for developing overweight and obesity. No significant association was found regarding family income, family structure, mother's education level, and playing electronic or outdoor game (Table III).

Table II
Distribution of the cases by body mass index (n=100)

Body mass index (kg/m^2)	Number of patients	Percentage
≥85th-<95 percentile (Overweight)	23	23.0
≥95th percentile (Obese)	77	77.0

Table III
Risk factors for development of overweight and obesity (100+50)

Risk factors		Casen (%)	Controln (%)	Odds Ratio(95% CI)	p value
1st issue		62 (62%)	19 (38%)	2.66 (1.25-5.70)	0.005^s
Family income (Tk)	10000-50000	82 (82%)	43 (86%)	0.74 (0.26-2.07)	0.535
	>50000	18 (18%)	07 (14%)	1.35 (0.48-3.88)	0.535
Structure of family	Nuclear	86 (86%)	41 (82%)	1.35 (0.49-3.67)	0.521
	Joint	14 (14%)	09 (18%)	0.74 (0.27-2.04)	0.521
Mother's education level	≤HSC	88 (88%)	45 (90%)	0.81 (0.23-2.70)	0.715
	≥Graduation	12 (12%)	05 (10%)	1.23 (0.37-4.29)	0.715
Watching TV	≤3 hr	54 (54%)	42 (84%)	0.22 (0.09-0.56)	0.001^s
	>3 hr	46 (46%)	08 (16%)	4.47(1.79-11.53)	0.001^s
Outdoor game	≤2 hr	98 (98%)	48 (96%)	2.04(0.20-21.07)	0.407
	>2 hr	02 (02%)	02 (04%)	0.49 (0.05-5.05)	0.407
Availability of playground	At school	63 (63%)	33 (66%)	0.88 (0.40-1.89)	0.718
	At or near home	56 (56%)	23 (46%)	1.49 (0.71-3.13)	0.247
Breast feeding	<6 month	21 (21%)	03 (06%)	4.16(1.09-18.60)	0.018^s
	≥6 month	79(79%)	47 (94%)	0.24 (0.05-0.91)	0.018^s
Total daily caloric intake (approx.)	Less	11 (11%)	34 (68%)	0.06 (0.02-0.15)	0.001^s
	Normal	47 (47%)	14 (28%)	2.28 (1.04-5.07)	0.025^s
	Excess	42 (42%)	02 (04%)	17.38(3.82-100.0)	0.001^s
Mother BMI (kg/m2)	≤24.9	32 (32%)	28 (56%)	0.37 (0.17-0.79)	0.005^s
	>24.9	68 (68%)	22 (44%)	2.70 (1.27-5.79)	0.005^s

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Discussion:

Worldwide obesity and overweight is reported to be higher among adolescents specially among boys.[12] In the present study majority of cases belonged to age group of 10-16 years and was male. Geckil et al. in their study included children of 5-15 years of age, among them 54.8% children were 10 years old or younger and 51.2% of them were male.[13] While analyzing the risk factors, the present study found that first issue, watching television >3 hours per day, breastfeeding less than six month of age, taking more calorie than recommended and high maternal BMI had increased risk to develop obesity.

Hajian-Tilaki and Heidary[14] showed that, most participants in their study (67.3%) were of first birth order and only 3.3% were of birth order of 3 or higher. Our result is also consistent with this finding. Agha et al.[15] found children were more likely to be obese if they belonged to families with low income, compared to families with high income. Study done in India by Tharkar and Viswanathan[16] found that children and adolescents from upper socio economic status had 3.4 times higher chances of being overweight compared to those from lower socio economic status. On the other hand a Korean study reported that socioeconomic status might not be an important risk factor of obesity in children.[17] However our study did not find any significant relationship between obesity and overweight with family income. Hajian-Tilaki and Heidari[14] in their study found that higher maternal education at university level decreased the risk of obesity. It is to be mentioned here that most of our mothers' education were below graduation level among both the groups.

Hajian-Tilaki and Heidari[14] also observed that spending >2 hours per day for TV watching and >1 hour for playing with computer games tended to increase the chances of overweight/obesity. Another study by Dennison et al.[18] done in USA showed that 40% of children having a TV set in their bedroom were more prone to be overweight. The present study also found watching TV >3 hours as a significant risk factor for overweight or obesity. Sedentary behavior develops due to lack of outdoor games. In our study it is observed that most of the schools had small playgrounds but children were not allowed to play for long time. Fan and Jin in their study found that neighborhood parks or playground may make children more fit as they decrease BMI as well as risk of being overweight and obese[19]. Their result also showed that neighborhood park or playground decrease the probability of overweight and obesity by 9% and 25% for males and 17% and 28% for females but the present study did not show any significant association between availability of playground and developing obesity.

A meta-analysis showed that duration of breast feeding was inversely associated with the risk of overweight and obesity and there is 4% decrease in the risk for one month of breast feeding (OR = 0.96/ month of breast feeding).[20] We also found similar result where breast feeding < 6 months had 4.16 times more risk for developing obesity.

Gillis et al.[21] in their study done in, Canada, found that obese children consumed significantly more calorie and total fat than non-obese. The present study also found 17.34 times increased risk of obesity due to excess calorie intake. Consuming large amount of food in addition to frequent snacking of high calorie food, contribute to an excess calorie intake. Intake of high sugar containing drink is another factor that has been found as possible causal factor for development of obesity.[22] In this present study incidentally we found that taking normal calorie daily was also significantly associated with development of overweight/obesity. We thought it might be due to sedentary behavior, family history of obesity or any other predisposing factors.

There is a wide evidence based support regarding association of parental obesity and childhood overweight.[23] Mcloone and Morrison observed that 58% of obese children had an obese parent and the population attributable to risk percentage of child obesity associated with parental obesity was 32.5% [24]. Lee et al.[17] in their study found that maternal overweight and obesity significantly increased the risk of childhood obesity and the present study also found similar depiction where overweight/obese mother had 2.7 times increased risk to have an obese children.

Conclusion:

The study concludes that first issue, excessive sedentary activities like watching television, lack of exclusive breast feeding, excess calorie intake and having overweight/obese mother lead to overweight or obesity in children. However further study with large sample size is needed to confirm the findings.

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