Food Behaviour and Nutritional Status of Urban Primary School Children in Rajshahi Metropoliton City

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ABSTRACT

Background & objective: Healthy dietary habits during childhood promote optimal physical, mental, emotional, and cognitive well-being of a child, and may contribute to the prevention of infectious and chronic diseases later in their life. Nevertheless, many factors prevent children from adopting healthy food behaviour and leading an active life. This study was undertaken to determine the nutritional status of the urban primary school children in Rajshahi Metropolitan City.

Methods: The study was a descriptive cross-sectional study conducted in the Department of Community Medicine, Rajshahi Medical College, Rajshahi, over a period of one year between January to December 2019. The data collected from the PN Govt. Girls' High School, and Rajshahi Collegiate School, Rajshahi, are both located in the Metropolitan area. A total of 270 primary school children of both sexes, aged 7-12 years who voluntarily consented through their school authority were included in the study. The nutritional status of the children was measured using BMI (calculated from their weight and height data). While the nutritional status of the children was the outcome variable, the age, sex, socioeconomic status, foods & dietary behaviour, exercise/activity, leisure-time activity and behaviours that adversely affect their health and nutritional status were the exposure variables.

Result: The mean age of the children was 9.7 ± 1.2 years (range: 7-12 years). The boy-girl ratio was 6:4. The prevalence of overweight and obesity was 14.8 and 7.8% respectively. Approximately 58% of the students were maintaining a healthy weight for their age and sex. The prevalence of underweight and severely underweight were no less (14.1 and 5.6% respectively). While obesity among boys was somewhat higher (9.5%) than among girls (6.7%), severe underweight was more in girls (6.1%) than that in boys (4.8%). The majority (91.9%) of the students used to take three major meals a day. Most (83%) of the major meals contained rice, meat or fish, vegetables, and pulses. Over three-quarters (77.8%) reported taking vegetables and fruits every day with 77.4% having one serving of fruits daily. Over half (53.7%) of the students used to take soft drinks at least once a day and over 60% took fast-food 1-3 times a week. Students generally practiced some form of physical activity or sports with more than half (56.7%) taking exercise up to 30 minutes a day. Over three-quarters (75.2%) of students preferred outdoor games and the rest indoor games.

Conclusion: Nearly two-fifths of the primary school children had healthy weights for their age and sex, one-fifth was underweight and another one-fifth were overweight or obese. Almost all the students practice some form of physical activity or sports. However, their food behavior is not as good as their exercise behaviour.

Key words: Food behaviour, nutritional status, primary school children etc.

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INTRODUCTION:

Obesity or overweight in children has become a major public health concern worldwide, as their prevalence is increasing at an alarming rate.[1] The burden of obesity is of great concern because it leads to several immediate and long-term health problems such as insulin resistance, type 2 diabetes mellitus, dyslipidemia, fatty liver, hypertension, cardiovascular diseases, and so on. Healthy dietary habits during childhood promote optimal physical, mental, social, and cognitive development of the child, and may contribute to the prevention of infectious and chronic diseases later in their life.[2] But numerous factors may influence dietary behaviour of the children predisposing them to compromised nutritional status which needs to be investigated.

Worldwide, among 155 million school-going children, over 22 million under five children are overweight. This implies that one in seven children is overweight.[3] A study conducted among Chinese children and adolescents indicated that the modern dietary pattern (fast food) is associated with an increased risk of obesity.[4] Another Chinese study recently reported the association between modern dietary patterns (fast food) and the risk of overweight and obesity in children and adolescents aged 7–17 years. Foods chosen by young adults are generally deficient in fruits and vegetables. They mainly prefer international flavors and food formats, convenient foods, and frequent snacking. The selection of healthy foods is not based on perceptions of what is healthy. A Chinese study reported that consumption of foods and beverages outside of three main meals was more popular in boys than in girls, while girls prefer fried food and soft drinks. The report stated that overweight and obese were found among those who did not eat breakfast at home, rather bought food from outside markets and also those who consume soft drinks more often. Consumption of soft drinks (carbonated and noncarbonated) seems to be a major contributor to the risk of being overweight and obese.[5] Another unpublished study conducted in Dhaka City schools revealed that a substantial proportion of the girls did not take milk or dark green leafy vegetables but preferred to eat meat and fish at least four times a week. Conclusively, they reported that the diets of the girls were inadequate in both micronutrients and macronutrients..

Nutrition is the backbone of health. Nevertheless, there is a high prevalence of malnutrition and poor eating habits among children, which exposes them to the risk of infectious and chronic diseases. Both under-consumption & over-consumption of calories tend to result in malnutrition. Primary school age is a dynamic period of physical growth as well as mental development of the child. However, people in our country, particularly mothers are not aware of proper childhood nutrition which is a leading cause of nutritional problems in society. Intervention programs in schools have shown variable results in many studies, with better impacts when multiple aspects are involved with the inclusion of the entire educational community. These days physical inactivity has become a pandemic. The wave of widespread inactivity coupled with unhealthy food behavior has added an impetus to non-communicable diseases. Shaping healthy lifestyle practices should, therefore be initiated during the period of childhood. However, lack of knowledge of healthy food guidelines for children and reluctance towards physical education at school potentially hinder healthy living. The present study was, therefore designed to evaluate the food and exercise behaviour and nutritional status of the urban primary school children from Rajshahi Metropolitan City.

METHODS:

This descriptive cross-sectional study was conducted in the Department of Community Medicine, Rajshahi Medical College, Rajshahi, over a period of one year between January to December 2019 after due permission from the Ethical Review Committee, Rajshahi Medical College, Rajshahi. The data were collected from the PN Govt. Girls' High School, and Rajshahi Collegiate School, Rajshahi, both located in the Metropolitan area. A total of 270 primary school children (of both sexes) aged 7-12 years who voluntarily consented through their school authority (Headmaster) formed the sample. However, students with known chronic diseases like valvular heart

disease or any other systemic diseases that may affect their nutritional status were excluded from the study. The purpose of the study was explained to the school authority to get their all-out cooperation in collecting data from the participating children. Students absent on the day of the interview and who refused to participate were excluded.
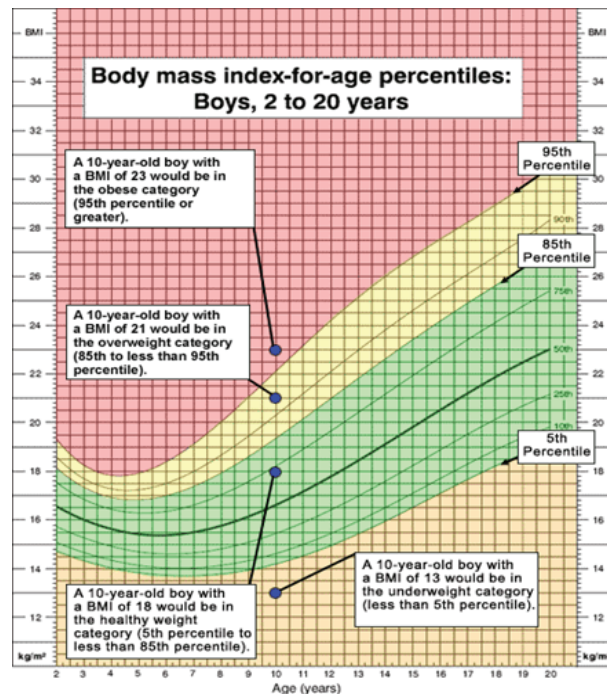

Fig. 1: Nutritional status based on BMI-for-age percentiles (Source: CDC, Atlanta)

Table I. Nutritional status of the respondents based on BMI percentiles for age and sex

Percentile status	Nutritional status
< 5th percentile	Underweight
5th to < 85th percentile	Normal weight
85th to < 95th percentile	Overweight
≥ 95 percentiles	Obese

Having obtained permission from the school authority, the data were collected from the respondents through face-to-face interviews. The demographic characteristics (age, sex, & socioeconomic status) of the respondents, which among others, included height, weight, and grade in the school were assessed first. Height was measured without shoes to the nearest centimeter using a ruler attached to the wall, while weight was measured to the nearest 0.1 kg on a manually-adjusted scale with the subjects wearing school dresses and no shoes. Using weight and height data, body mass index (BMI) was calculated using the formula BMI = (weight in kg)/(height in sq-meter). Nutritional status was determined based on body mass index. As the BMI of children and adolescents is age- and sex-specific, calculated BMI was plotted on a growth chart [developed and recommended by Centre for Disease Control, Atlanta] to find the percentile (Fig.1). The nutritional status of the individual respondents was then assessed with their percentile status as underweight, normal, overweight and obese as follows (Figure 1 & Table I).

Data were collected on physical activity/exercise & lifestyle, dietary behaviour, leisure time activities, reasons for reluctance to exercise or to lead an active life, and awareness about nutrition and diet. The dietary behaviour of the students was considered healthy when their daily diet was composed of a proportionately healthy mix of protein, carbohydrates, and fats along with adequate vegetables, 3 or > 3 servings of fruits, and low to medium calorie snacks. Any deviation from the proximate principles of food was considered unhealthy such as high carbohydrates and fat particularly animal fat or inadequate fruits (<3 servings a day) and fewer vegetables or if the diet was composed of high-calorie snacks as is found in fast-foods. The respondents were considered leading an active life if they played any outdoor games or engaged in formal exercise at least five days a week, with each session lasting at least 30 minutes. The respondents were considered inactive if they didn't play any outdoor games or did not perform a formal exercise at least five days a week, with each session lasting at least 30 minutes. Collected data were processed and analyzed using SPSS (Statistical Package for Social Sciences), version 20. The test statistics used to analyze the data were descriptive statistics, such as mean and standard deviation or frequency and corresponding percetanges.

RESULTS:

The participating students were predominantly 9-10 years old (58%) with mean age of students being 9.7±1.2 years. More than 60% of the participants were girls and the rest (38.9%) were boys.

Approximately 55% of the students were studying in grade IV, 26.3% in grade III and 18.9% in Grade-V level. Almost all the students were Metropolitan resident and the majority (95.6%) of them was Muslim (Table II). More than three-quarters (78%) of the fathers and 57% of the mothers were graduates and higher level educated. Nearly one-quarter (23.3%) of the mothers & 7.8% of the fathers were secondary-level educated. Over 55% of the fathers were service-holders, 25.3% businessmen, 11.5% farmers, and the rest were engaged in other occupations. Mothers were primarily housewives (59.3%) followed by service-holder (38.5%) and other occupants (2.2%). Approximately 70% of the respondents belonged to the nuclear family. More than 40% had a monthly family income of above Taka 50000, 23% had an income between Taka 40000-50000, 12.2% between 30000-40000, and 16.7% Taka ≤ 20000 (Table III). The majority (91.9%) of the students were used to taking three major meals a day and approximately 90% always took breakfast. Breakfasts were mainly comprised of bread (94.8%), eggs (96.7%), milk (83.7%), khichuri (64.1%), and vegetables (79.6) (Table IV).

More than 95% of the students used to take lunch regularly. The respondents reported taking eggs, meat, fish and milk daily were 43.3, 39.3, 40.4 and 50.4% respectively. Over three-quarters (77.8%) reported taking vegetables every day and 92.6% have had fruits every day with 77.4% having one serving of fruits daily. Most (83%) of the major meals contained rice, meat or fish, vegetables and pulses (Table V). Probing into the pattern of taking snacks revealed that over half (53.7%) of the students used to take soft drinks at least once a day and 7.7% twice or > 2 times a day. The respondents were generally accustomed to taking biscuits/crackers/bread/chips (68.5%) as snacks. Some 18% of the respondents reported taking fruits/milk/yogurt daily as snack items. The rate of taking sweet-meat/ice-cream/chocolate and fried-chicken/burger/grill/pizza were 9.6 and 3.7% respectively. About one-third (31.5%) of the respondents informed that they did not take any fast foods in the week preceding the interview week. Over 60% took fast food 1-3 times a week (Table VI).

Almost all the students practiced some form of physical activity or sports. More than 60% of the students did it in the evening and 37.3% in the morning. Over three-quarters (75.2%) of students preferred outdoor games and the rest indoor games. More than half (56.7%) of the students used to take exercise up to 30 minutes a day, 35.2% performed 30-60 minutes a day, and only 8.1% > 60 minutes a day (Table VII). Watching TV was the main leisure-time activity (95.7%) followed by mobile or computer use (71.1%) and listening to music (53.7%). Nearly one-third (30.7%) of the students spent 30 minutes or less, 46.9% spent 30 minutes to 1 hour and 22.4% more than 1 hour daily on mobile or computer (Table VIII).

Students stratified by age- and sex-specific BMI demonstrated that 57.8% were maintaining a healthy weight for their age and sex, 14.8% were overweight and 7.8% were obese. Some 14.1% were underweight and 5.6% were severely underweight (Fig. 2). A cross-tab analysis between nutritional status and gender did not reveal any difference between boys and girls concerning BMI (Fig.3). The chart below explained that healthy weight for boys and girls were almost same. While obesity among boys was somewhat higher (9.5%) than among girls (6.7%), severely underweight was more in girls (6.1%) than in boys (4.8%).

Table II. Socio-demographic characteristics of the participants (n = 270)

Socio-demographic characteristics	Frequency	Percentage
Age (years)		
6-8	54	20.0
9-10	156	58.0
≥ 11	60	22.0
Sex		
Boy	105	38.9
Girl	165	61.1
Education		
Grade-III	71	26.3
Grade-IV	148	54.8
Grade-V	51	18.9
Resident		
Metropolitan	269	99.6
Rural	1	0.4
Religion		
Muslim	258	95.6
Hinduism	12	4.4

Table III. **Socio-demographic characteristics of the parents (n = 270)**

Socio-demographic characteristics	Frequency	Percentage
Fathers' education		
Class I-V	37	13.7
Class VI-XII	21	7.8
Graduate and above	212	78.5
Mothers' education		
Illiterate	2	0.7
Class I-V	51	18.9
Class VI-XII	63	23.3
Graduate and above	154	57.0
Fathers' occupation		
Farmer	31	11.5
Service	149	55.1
Business	68	25.3
Others	22	8.1
Mothers' occupation		
Housewife	160	59.3
Service	104	38.5
Others	6	2.2
Type of family		
Nuclear Family	187	69.3
Joint family	83	30.7
Monthly family income (Taka)		
≤ 30000	64	23.7
30001- 40000	33	12.2
40001- 50000	62	23.0
> 50000	111	41.1

Table IV. **Distribution of respondents by their dietary and breakfast habit (n = 270)**

Dietary habit	Frequency	Percentage
Number of major meals taken daily		
Two times	5	1.9
Three times	248	91.9
Four times	17	6.2
Breakfast-taking habit		
Always	242	89.6
Often	24	8.9
Sometimes	4	1.5
Breakfast menus		
Bread	256	94.8
Rice	173	41.5
Khichuri	247	64.1
Vegetables	215	79.6
Egg	261	96.7
Milk	226	83.7
Yogurt	44	16.3

Table V. **Lunch habit and lunch composition of the respondents (n = 270)**

Lunch habit	Frequency	Percentage
Lunch pattern		
Regular	260	96.0
Irregular	10	4.0
Lunch composition		
Eggs		
Daily	117	43.3
Every alternative day	35	13.0
Occasionally	115	42.6
Never	3	1.1
Meat		
Daily	106	39.3
Every alternative day	86	31.9
Occasionally	78	28.9
Fish		
Daily	25	40.4
Every alternative day	109	48.5
Occasionally	131	9.3
Never	5	1.9
Milk		
Daily	136	50.4
Every alternative day	26	8.9
Occasionally	97	35.9
Never	13	4.8
Have plenty of vegetables every day	210	77.8
Have fruits every day	250	92.6
No. of servings of fruits/day (n = 250)		
Once	209	77.4
Twice	33	12.2
3 times a day	8	3.0

Table VI. **Distribution of respondents by the pattern of taking snacks**

Snacks-taking habit	Frequency	Percentage
Soft drinks		
Not taking any soft drinks	104	38.6
Once a day	145	53.7
Twice or more than twice a day	21	7.7
Snacks		
Fruits/milk/yogurt	49	18.1
Biscuits/crackers/bread/chips	185	68.5
Fried chicken/burger/grill/pizza	10	3.7
Sweet-meat/ice-cream/juice/chocolate	26	9.6
Frequency of taking fast-food in a week		
Never	85	31.5
1 - 3 times	168	62.2
> 4 times	17	6.3

Table VII. Distribution of respondents by their physical activities and sports (n = 270)

Physical exercise and sports	Frequency	Percentage
Do you take physical exercise/sports	268	99.3
Time of taking physical exercise		
Morning	100	37.3
Evening	166	61.9
Night	2	0.7
Types of taking physical exercise		
Indoor games	67	24.8
Outdoor games	203	75.2
Total time of taking exercise/ day		
Up to 30 mints	153	56.7
30 to 60 mints	95	35.2
More than 60 mints	22	8.1

Table VIII. Leisure-time activities of the students (n = 270)

Leisure-time Activities	Frequency	Percentage
Watch TV	257	95.7
Use mobile or computer	192	71.1
Listen to music	145	53.7
Time spent using mobile/computer every day (n = 192)		
30 minutes or less	59	30.7
30 minutes to 1 hour	90	46.9
More than 1 hour	43	22.4
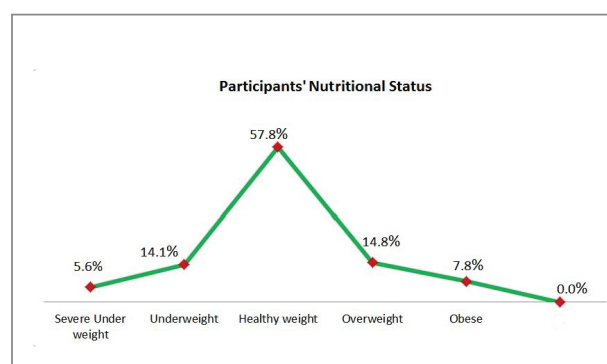
Fig-2: Students' Nutritional Status (According to WHO guidelines)
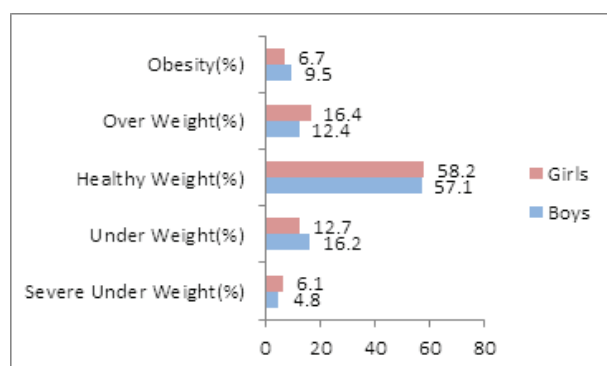
Figure-3: Sex-wise distribution of nutritional status

DISCUSSION:

Obesity & overweight among children have become a serious public health problem in recent years and its health consequences may influence adulthood health and nutritional outcomes. In this study, the boy-girl ratio was 6:4 and the age-limit was 7–12 years. The respondents were predominantly Muslim (95%). The prevalence of overweight and obesity were 14.8 and 7.8% respectively. The prevalence of underweight and severe underweight were no less (14.1 and 5.6% respectively). Different studies have shown that developing countries have a relatively low prevalence of obesity coexisting with a high prevalence of underweight.[6,7] The present study, however, shown a higher prevalence of overweight/ obesity (22.6%) than the prevalence of underweight (19.6%). The changing trend in pattern of malnutrition in primary school children might be a reflection of improvement of socioeconomic economic condition, for the present study was done almost a decade after the above referenced studies. A study conducted by Sultana and associates[8] in Dhaka city reported overweight and obesity to be 13.2 and 17.8% respectively among 6-13 years school going children, while another study by 10. Ferdousi and colleagues[9] showed frequency of overweight to be 18.3% among 6-10 years children. The present study demonstrated that underweight was more likely in girls than in boys, whereas obesity was more frequent in boys than in girls. These findings are consistent with the study of Siddiqui et al[10].

As expected, the present study found a higher frequency of obese and overweight in the high and upper middle class and a higher frequency of underweight in the low- and middle-class families, which bear consistency with the findings of several other studies.[10,11] As students' lunch items were considered, overweight children used to take rice, meat or fish, vegetables and pulses daily indicating daily major meal compositions as the predictor of nutritional status primary school children. The study also demonstrated that number of major meals also act as a determinant of the nutritional status of the children with intake of twice or more major meals daily is more likely to be associated with overweight

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in primary school children. This finding is consistent with the study of Ramesh et al[11.]

Results from different studies shows that consumption of fast food has a strong association with students' weight gain. Over one-quarter (26%) of the overweight or obese primary school children used to consume fast foods 1-3 times in a week. Over 70% of the overweight children reported having fast food up to five times each week. Niemeier and associates[12] reported similar findings in their study. It is said that sports and exercise burn extra calorie and helps to build a muscular body devoid of redundant fat. It is indeed so, for those who were taking adequate physical exercise were rarely overweight. Consistent with this finding, Mozaffari et al[13] and Eugelers et al[14] showed increasing physical exercise decreases the frequency of weight gain in children.

Advances in communication technology like electronic devices, smart phones, tab and computer games and some television programs have probably contributed to adopt a lifestyle that involves less physical activity & more sedentary lifestyle.[15] A study conducted in Iran reported an association between watching television & being overweight.[16] The study demonstrated that watching television decreased the amount of time spent on playing outdoor games which might have resulted in gaining extra weight. Another study conducted in the US reported that watching television or playing videos games for > 2 hours a day increased the risk of being overweight in children.[17] Although, in the present study, we did not study any association of mobile or computer use with overweight or obesity. Before concluding the findings of the study, the limitations of the study deserve mention.

Limitations of the study:

As our participants were primary school children, it was tough to manage time for individual interview during class time. And in many cases, we had to finish interview hurriedly. Another important concern is that the study was conducted in urban primary school children. So, the findings derived from the study cannot be generalized to the primary school children irrespective of the residential status.

CONCLUSION:

The study concluded that almost two-fifth of the primary school children maintain healthy weights for their age and sex, one-fifth were underweight and another one-fifth were overweight or obese. Almost all the students practice some form of physical activity or sports. However, their food behavior is not as good as exercise behaviour. Nearly two-fifth of the primary school children maintain healthy food behaviour. Increasing awareness against the emergence of risk factors of chronic diseases in children is of utmost importance. Concerted efforts, both at school and home, are required to reduce the burden of malnutrition in urban primary school children.

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