

# Original Article



## Obesity and Its Co-Morbidities among School Teachers in Dhaka City

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### Abstract

**Background:** Obesity is an important cause for human morbidity and mortality.

**Objective:** This study was aimed to determine the prevalence of obesity and its co-morbidities among school teachers in Dhaka city.

**Materials and Methods:** This cross sectional study was carried out from May 2017 to October of 2017. Total 250 school teachers aged between 25-59 years were enrolled using cluster random sampling technique. Data on socio-demographic profile, co-morbidities, weight, height and blood pressure were recorded.

**Results:** The prevalence of obesity among school teachers was 15.2%. The mean age of the participants was 46.1±8.2 years. Female teachers were more obese compared to male (20% vs 5.9%), this association was statistically significant ( $p=0.001$ ). Majority obese participants belonging to the age group of 41-59 years with higher prevalence among female compared to male (25.2% vs 5.8%), this was statistically significant ( $p=0.030$ ). About 53% obese teachers had hypertension (HTN). On the other hand, Pre-HTN was observed more among obese participants (42.1%) compared to overweight (14.8%). About one third of overweight and obese participants were diabetic (30.6% and 34.2% respectively) and dyslipidaemic (21.5% and 23.7% respectively).

**Conclusion:** The prevalence of obesity and its co-morbidities such as HTN, diabetes mellitus (DM), dyslipidaemia etc was high among the study participants. By promoting healthy life style and behaviors can reduce the burden of obesity and its co-morbidities.

**Keywords:** Obesity, Overweight, Prevalence, School teachers, Bangladesh.

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### Introduction

Obesity is a global epidemic and has been identified as an important cause of current morbidity and mortality.<sup>1</sup> It is defined as an abnormal growth of the adipose tissue because of an enlargement of fat cell (hypertrophic obesity) or an increase in number of fat cells (hyperplastic obesity) or a combination of both.<sup>2</sup> It results from an imbalance between food intake and energy output leading to excessive fat accumulation.<sup>3</sup>

Globally, in 2016, more than 1.9 billion adults were overweight and of these over 650 million people were obese and overall prevalence of overweight and obesity among adult populations were 39% and 13% respectively.<sup>1</sup> Once considered a problem of developed country, overweight and obesity are now on the rise even in the developing countries, particularly in urban settings. Prevalence rates are as high as 21-24% for

overweight and 16-18% for obesity among adolescents in the USA<sup>4,5</sup> In India, prevalence rates of 14% and 11% for overweight and obesity respectively have been documented,<sup>6</sup> while values reported in Nigerian adolescents are in the range of 3.3% for overweight and 1.4-4.2% for obesity.<sup>7,8</sup> According to Bangladesh Demographic and Health Survey 2011, prevalence of overweight and obesity among Bangladeshi adult populations were 18.9% and 4.6% respectively.<sup>9</sup>

Non-communicable diseases (NCDs) are increasing around the globe day by day. Overweight and obesity are considered as serious public health problems and they are important risk factors for developing NCDs such as (HTN), (DM), dyslipidaemia, renal disease, other cardiovascular diseases and certain cancers.<sup>1,10,11</sup> Understanding that obesity has a multifactorial origin, different genetic,

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metabolic, behavioral (especially eating habits and physical activity), environmental, cultural and socioeconomic factors have contributed to its occurrence.<sup>12-14</sup>

The changes in the working conditions of many professional categories, particularly teachers, have contributed to the development of lifestyle related diseases, including overweight and obesity.<sup>15,16</sup> Teachers always face high psychosocial stress at the work place. The major sources of stress are colleagues, curriculum, parents, pupils, school authority, society, supervision/ teaching, teaching environment and income.<sup>17</sup> Moreover, urban school teachers experience sedentary urban life style such as vehicle use for transport, environmental pollution, high calorie diet, lack of physical exercise etc.<sup>18</sup> So, they are at great risk to develop different NCDs.

Considering the health consequences of overweight/obesity<sup>1</sup>, the increase in the prevalence of obesity among Bangladeshi adult population and the lack of studies on this topic involving the teachers, this present study was conducted to determine the prevalence of obesity and to identify the association between obesity and its co-morbidities such as HTN, DM etc among school teachers in Dhaka city.

## Materials and Methods

This cross sectional study was conducted between May 2017-October 2017 in University of South Asia, Banani, Dhaka. Mohammadpur area of Dhaka city was the study area and the school teachers of that study area were the study population. All the teachers of selected schools aged between 25-59 years agreed to participate in this study were included. Teachers who had serious mental illness, pregnancy at any age group and not willing to provide written informed consent were excluded from the study.

The study participants included using cluster random sampling method. Mohammadpur area was divided into five zones. First School from each zone was selected randomly and all the teachers were enrolled as defined criteria. 52 school teachers from each zone and total 260 teachers from five zones were intended to be enrolled. In case of inadequate sample from first institute, next institute(s) was selected randomly as described above. Due to some missing data and withdrawal from the study, total 250 participants were enrolled finally.

The study protocol approved by the Institutional Ethics Committee of University of South Asia, Dhaka. During study period, prior permission was obtained from the Principal or Head of schools. Before collecting the data, informed consent was taken from all the participants. They were assured that all informations should be kept confidential and they preserved the right to withdraw him/her from the study at any time without any threat or disadvantages.

A pre-tested and predesigned structured questionnaire was used to collect data using modified WHO STEPS protocol.<sup>19</sup> Information on socio-demographic variables and behavioral risk factors (tobacco/alcohol use, physical activity, dietary

habit etc) was collected. The interview included questions related to personal and family history, fresh vegetables, fruits and excess salt intake habits. Body weight, height and blood pressure (BP) were measured accordingly.

Body weight was measured to the nearest 0.1 kilogram (kg) using a digital weight scale (Seca 803, Germany), which was calibrated weekly by using an object with known weight. Height was recorded to the nearest 0.1 cm in the standing position using a portable stadiometer. Body mass index (BMI) calculated using the formula [BMI = body weight (kg)/height (m<sup>2</sup>)]. In this present study, the BMI of the study participants was classified according to WHO classification: a) underweight (BMI <18.5), b) normal weight (BMI 18.5-24.9), c) overweight (BMI 25-29.9) and obesity (BMI >30).<sup>1</sup>

BP measurements was followed a common protocol adapted from WHO Stepwise approach.<sup>19</sup> Aneroid sphygmomanometer (ALPK2, Tanaka Sangyo Co. Ltd, Tokyo, Japan) with appropriately sized cuffs was used. HTN was recorded as an average systolic blood pressure (SBP) >140 mmHg and/or average diastolic blood pressure (DBP) >90 mmHg and/or self-reported current treatment for HTN in the previous 2 weeks. Pre-HTN was defined by SBP >120 but <140 mmHg and/or DBP <80 but <90 mmHg and/or not taking anti-hypertensive medications and individuals with SBP >120 or DBP <80 mmHg was considered as normotensive or non-HTN.<sup>20</sup>

All collected data were edited, checked and cleared manually, then interpreted by using computer based SPSS (Statistical Package for Social Science) software version 16.0 (Chicago, Illinois, USA) and Microsoft Excel 2007 version. Quantitative data were expressed as mean  $\pm$  standard deviation (SD) and dichotomous data represented as percentage. Categorical variables were compared through Chi-square test (X<sup>2</sup>).  $p < 0.05$  was considered as statistically significant.

## Results

This present study was based on the observations of total 250 school teachers aged 25 to 59 years. The mean  $\pm$  SD age of the participants was 46.1 $\pm$ 8.2 years. About 36.4% teachers were in the age group of 51-59 years while 33.2% of 41-50 years. Majority (66%) participants were female (Table I). About 94% teachers were Muslim, 92.4% married and 55.6% were highly educated as holding masters degree. Majority teachers (56.4%) were in the middle income category earning between 20,000 and 50,000 Bangladeshi Taka per month and 58% had service duration more than fifteen years. Gender wise distribution of age groups, marital status and monthly family income was statistically significant ( $p=0.001$ ,  $0.004$  and  $p=0.002$  respectively (Table I).

In the present study, overall prevalence of obesity and overweight among school teachers was 15.2% and 48.4% respectively (Table II). Female teachers were more obese compared to male (20% vs 5.9%). Gender wise distribution of overweight and obesity was statistically significant ( $p=0.001$ ). Out of total overweight and obese participants of both the

sexes, majority were belonging to the age group of 51-59 years with prevalence of obesity among males 22 (38%) and 36 (62%) among females, this was statistically significant (p=0.030) (Table III).

The prevalence of HTN was higher among overweight participants compared to obese (57.9% vs 52.6%). On the other hand, Pre-HTN was observed more among obese participants (42.1%) compared to overweight (14.8%). But this association was not statistically significant (p=0.164) (Table IV). About one third of overweight and obese participants were diabetic (30.6% and 34.2% respectively) and dyslipidaemic (21.5% and 23.7% respectively). There was no significant difference between overweight/obesity and DM and dyslipidaemia (p=0.866 and p=0.654 respectively) (Table V).

**Table I:** Socio-demographic characteristics among the study participants (N=250).

Variables	Male and Female (250) n (%)	Male (85) n (%)	Female (165) n (%)	p-value
<b>Age categories (years)</b>				
25-30	8 (3.2)	6 (7.1)	2 (1.2)	0.001*
31-40	68 (27.2)	12 (14.0)	56 (33.9)	
41-50	83 (33.2)	27 (31.8)	56 (33.9)	
51-59	91 (36.4)	40 (47.1)	51 (31.0)	
<b>Religion</b>				
Muslim	234 (93.6)	81 (95.3)	153 (92.7)	0.705
Hindu	11 (4.4)	3 (3.5)	8 (4.8)	
Christian	5 (2.0)	1 (1.2)	4 (2.4)	
<b>Marital status</b>				
Single	4 (1.6)	3 (3.5)	1 (0.6)	0.004*
Married	231 (92.4)	82 (96.5)	149 (90.3)	
Widowed	15 (6.0)	0 (0)	15 (9.1)	
<b>Education</b>				
SSC	1 (0.4)	1 (1.2)	0 (0)	0.090
HSC	14 (5.6)	6 (7.0)	8 (4.8)	
Graduate	96 (38.4)	39 (45.9)	57 (34.5)	
Masters	139 (55.6)	39 (45.9)	100 (60.7)	
<b>Monthly family income (BDT)</b>				
Low <20000	10 (4.0)	7 (8.2)	3 (1.8)	0.002*
Middle 20000-50000	141 (56.4)	37 (43.5)	104 (63.0)	
Higher >50000	99 (39.6)	41 (48.2)	58 (35.2)	
<b>Service durations (years)</b>				
<1	1 (0.4)	0 (0)	1 (0.6)	0.171
1-5	11 (4.4)	6 (7.1)	5 (3.0)	
5-10	37 (14.8)	10 (11.8)	27 (16.4)	
10-15	56 (22.4)	14 (16.5)	42 (25.5)	
>15	145 (58.0)	55 (64.6)	90 (54.5)	

N.B: \* Indicates significant result.

**Table II:** The status of Body mass index (BMI) among school teachers in Dhaka city.

Variable	Male and Female (250) n (%)	Male (85) n (%)	Female (165) n (%)	p-value
<b>Body mass index (BMI) (Kg/m<sup>2</sup>)</b>				
Underweight <18.5	4 (1.6)	4 (4.7)	0 (0)	0.001*
Normal weight 18.5-24.9	87 (34.8)	35 (41.2)	52 (31.5)	
Overweight 25-29.9	121 (48.4)	41 (48.2)	80 (48.5)	
Obesity >30	38 (15.2)	5 (5.9)	33 (20.0)	

N.B: \* Indicates significant result.

**Table III:** The Body mass index status among school teachers in relation to age and gender.

Age (Years)	Underweight		Normal weight		Overweight		Obesity		p-value
	M n (%)	F n (%)	M n (%)	F n (%)	M n (%)	F n (%)	M n (%)	F n (%)	
25-30	0 (0)	0 (0)	3 (37.5)	0 (0)	3 (37.5)	2 (25)	0 (0)	0 (0)	0.206
31-40 (n=68)	0 (0)	0 (0)	6 (8.8)	18 (26.5)	6 (8.8)	27 (39.7)	0 (0)	11 (16.2)	0.196
41-50 (n=83)	0 (0)	0 (0)	12 (14.5)	19 (22.8)	12 (14.5)	25 (30.1)	3 (3.6)	12 (14.5)	0.447
51-59 (n=91)	4 (4.4)	0 (0)	14 (15.4)	15 (16.5)	20 (21.9)	26 (28.6)	2 (2.2)	10 (11.0)	0.030*
Total (n=250)	4 (1.6)	0 (0)	35 (14.0)	52 (20.8)	41 (16.4)	80 (32.0)	5 (2.0)	33 (13.2)	

N.B: M= Male, F= Female. \* Indicates significant result.

**Table IV:** Distribution of different body mass index (BMI) categories and blood pressure measurement among school teachers in Dhaka city.

BMI categories	Normal BP n (%)	Pre-HTN n (%)	HTN n (%)	p-value
Underweight (n=4)	1 (25)	0 (0)	3 (75)	0.164
Normal weight (n=87)	14 (16.1)	34 (39.1)	39 (44.8)	
Overweight (n=121)	18 (14.8)	33 (27.3)	70 (57.9)	
Obesity (n=38)	2 (5.3)	16 (42.1)	20 (52.6)	

N.B: BP- Blood pressure, HTN- Hypertension.

\* Indicates significant result.

## Discussion

This present study showed that the prevalence of obesity among school teachers was 15.2%. The study findings were higher than the previous study results estimated a prevalence rate obesity 4.6% among Bangladeshi adult population.<sup>9</sup>

**Table V:** Prevalence of Diabetes mellitus (DM) and dyslipidaemia in different categories of body mass index (BMI) among school teachers in Dhaka city.

BMI categories	Suffered from DM			Suffered from dyslipidaemia		
	Yes n (%)	No n (%)	p-value	Yes n (%)	No n (%)	p-value
Underweight (n=4)	1 (25)	3 (75)		0 (0)	4 (100)	
Normal weight (n=87)	31 (35.6)	56 (64.4)	0.866	22 (25.3)	65 (74.7)	0.654
Overweight (n=121)	37 (30.6)	84 (69.4)		26 (21.5)	95 (78.5)	
Obesity (n=38)	13 (34.2)	25 (65.8)		9 (23.7)	29 (76.3)	

This was also higher compared with the different studies done in India and Nigeria, which showed the prevalence rate of obesity among adult of 11% and 1.4-4.2% respectively.<sup>6-8</sup> It was also a bit higher than the overall estimated global prevalence of obesity (13%) observed by WHO.<sup>1</sup> This high prevalence of obesity found in this study may be due to urban residence, sedentary lifestyle of school teachers and lacking of large scale national survey of overweight and obesity among them. The study finding was lower than that found in adults regarding obesity (16-18%) observed in USA.<sup>4,5</sup>

Out of total 250 teachers, 69.6% belonged to the age group of 41 to 59 years. Majority teachers (56.4%) were in the middle income category earning between 20,000 and 50,000 Bangladeshi Taka per month and 58% had service duration more than fifteen years. Gender wise distribution of age groups and monthly family income was statistically significant ( $p=0.001$  and  $p=0.002$  respectively). This finding indicates that in the context of the developing country having a higher income is not necessarily protective of health probably due to their lifestyle. These groups may use this income to provide more resources that may be used mostly for purchasing calorie-dense foods and in some instances it is a cause of sedentary lifestyles which are the underlying risk factors for overweight/obesity and their co-morbidities.

This study showed that female teachers were more obese compared to male (20% vs 5.9%). This was statistically significant ( $p=0.001$ ). This finding was lower compared to the results were observed in a study by Singh et al in Delhi in 2004 among elderly people, which showed the prevalence of overweight/obesity to be 34% in men and 40.3% in women.<sup>21</sup> The study findings disagreed to the findings of different studies conducted in Brazil and in other countries such as Greece and Spain identified a higher prevalence of overweight/obesity in the male population.<sup>22-24</sup>

Out of total overweight and obese participants of both the sexes, majority were belonging to the age group of 51-59 years with prevalence of obesity among males 22 (38%) and 36 (62%) among females. This high prevalence of obesity among elderly female teachers may be due to fact that in advanced age, reduced physical exercise and sedentary life style contribute a lot for developing this morbid condition. The prevalence of HTN was higher among overweight participants

compared to obese (57.9% vs 52.6%). On the other hand, Pre-HTN was observed more among obese participants (42.1%) compared to overweight (14.8%). The study finding was lower than that found in adults (62.8%) in Nigeria<sup>25</sup> and higher compared with the studies conducted by Ibrahim NKR et al and Greiw AS et al which showed 25.2% and 15.1% prevalence of HTN among school teachers respectively.<sup>26,27</sup> This is also a bit higher than the previous study results estimated a prevalence rate of HTN among Bangladeshi adult ranging from 16-34%.<sup>28</sup> It may be due to urban residence, sedentary lifestyle of school teachers. This study findings disagreed with that recorded in India by Sania et al, the prevalence of HTN was higher (64%) among male teachers.<sup>29</sup> About one third of overweight and obese participants were diabetic (30.6% and 34.2% respectively) and dyslipidaemic (21.5% and 23.7% respectively). Shiju et al. have already showed positive association between increase in BMI and diabetes.<sup>30</sup>

## Conclusion

The prevalence of obesity among study participants was higher than the national as well as global context. They are at greater risk to develop different non communicable diseases related to obesity. To reduce the prevalence of obesity and its related co-morbidities, proper awareness program should be promoted among school teachers and right strategies through behavior change communication should be made and implemented.

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