

Prevalence and Associated Factors of Overweight and Obesity among School Teachers in an Urban Area of Bangladesh

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Abstract -- Obesity is a major public health problem in the world. This study was aimed to determine the prevalence and determinants of overweight and obesity among school teachers in Dhaka city. In this cross sectional study, total 250 school teachers were included using cluster random sampling technique. Data on socio-demographic profile, different risk factors, comorbidities, weight, height and blood pressure were recorded. Body mass index was calculated to define the overweight and obesity. Factors associated with overweight and obesity analyzed by Chi-square test (χ^2). The prevalence of overweight and obesity among school teachers was 48.4% and 15.2% respectively. The mean \pm SD age of the participants was 46.1 \pm 8.2 years. About 69.6% teachers belonged to the age group of 41 to 59 years. Majority (66%) participants were female. They were more obese compared to male (20% vs 5.9%), this association was statistically significant ($p=0.001$). Prevalence of hypertension, diabetes and dyslipidaemia was 52.8%, 32.8% and 22.8% respectively. Female teachers were more hypertensive and diabetic compared to male (54.5% vs 49.4%) and (33.3% vs 31.8%) respectively. High proportion of overweight and obesity observed among the non smoker and alcohol consumers having daily low amount of fresh vegetables and fruits, taking coffee daily and performing less physical activity (64.2%, 72.7%, 70.8%, 68.4%, 83.3% and 65% respectively). Teachers having mixed diet were found to be more overweight/obese when compared with vegetarians and this association was statistically significant ($p=0.047$). Building awareness by promoting healthy life style and behaviors can reduce the burden of overweight and obesity.

Keywords --- Overweight, Obesity, Prevalence, Body mass index, School teachers, Bangladesh

I. INTRODUCTION

Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health [1]. Obesity results from an imbalance between food intake and energy output leading to excessive fat accumulation [2]. Obesity is a global epidemic and has been identified as an important cause of current morbidity and mortality [1,3].

According to World Health Organization (WHO), 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 in 2016 [1]. Prevalence rates are as high as 21-24% for overweight and 16-18% for obesity among adolescents in the USA [4,5]. In India, prevalence rates of 14% and 11% for overweight and obesity respectively have been documented [6], while values reported in Nigerian adolescents are in the range of 3.3% for overweight and 1.4-4.2% for obesity [7,8]. According to Bangladesh Demographic and Health Survey 2011, prevalence of overweight and obesity among Bangladeshi adult populations were 18.9% and 4.6% respectively [9].

Globally it has been experiencing epidemiological transition from communicable diseases to non-communicable diseases (NCDs). Overweight and obesity are considered as serious public health problems and they are important risk factors for developing NCDs such as hypertension (HTN), diabetes mellitus (DM), dyslipidaemia, renal disease, other cardiovascular diseases and certain cancers; all of which reduce life expectancy [1,10,11]. Understanding that overweight/obesity has a multifactorial origin, different genetic,



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

Changes in the working conditions of many professional categories, particularly teachers, have contributed to the development of lifestyle related diseases, including overweight and obesity [15,16]. The teaching profession is highly stressful occupation due to enhanced 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 [17]. School teachers in urban area are experiencing sedentary urban life style such as vehicle use for transport, environmental pollution, high calorie diet, lack of physical exercise etc [18]. They play a vital role in learning process of the students that are very essential to build a prosperous nation and they must have a sound health status for this purpose.

Considering the health consequences of overweight/obesity [1], the increase in the prevalence of obesity among Bangladeshi adult population and the lack of studies on this topic involving the teachers, surveys identifying modifiable factors that influence nutritional status in this group are needed. So, this present study was aimed to determine the prevalence of overweight/obesity and to identify associated risk factors among school teachers in Dhaka city.

II. MATERIALS AND METHODS

This cross sectional study was carried out in the department of Public Health in University of South Asia, Banani, Dhaka from May 2017 to October 2017. 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 agreeing 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.

Sample size was calculated using the formula, $N = Z^2pq/d^2$ and considering the prevalence of overweight among Bangladeshi adult of 18.9% [9], acceptable limit of precision as 5% and Z value of 1.96, the expected sample size comes to be 236. By adding 10% non response rate, sample size was calculated as 260. The participants were enrolled using cluster random sampling technique. Mohammadpur area was divided into five zones. First School from each zone was selected randomly using the random number table 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 Institutional Ethics Committee of University of South Asia, Dhaka approved the study protocol. Official permission was obtained in advance from the Principal/Head of schools during study period. Before collecting the data, informed consent was taken from all study participants. They were assured that their given information should be kept confidential and they preserved the right to withdraw him/her from the study at any time without any threat or disadvantages. Any participants with any type of NCDs such as HTN, DM etc referred to appropriate facilities.

A pre-tested and predesigned structured questionnaire was used to collect data using modified WHO STEPS protocol [19]. Information on socio-demographic variables and behavioral risk factors (tobacco use, alcohol use, physical activity, dietary habit etc) were 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, $BMI = \text{body weight (kg)}/\text{height (m)}^2$. 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) [1].

BP measurements was followed a common protocol adapted from WHO Stepwise approach [19]. 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 and individuals with SBP ≤ 120 or DBP <80 mmHg was considered as normotensive or non-HTN [20].

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 (χ^2). $p < 0.05$ was considered as statistically significant.

Expected outcomes: The expected outcome variable was having overweight/obesity. For analytical purposes, the BMI data were dichotomized: overweight/obesity (BMI \geq 25 kg/m²) and low/normal weight (BMI < 25 kg/m²).

III. RESULTS

A total of 250 school teachers aged 25 to 59 years participated in this study. 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 with female to male ratio of 1.94:1. 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 about 58% had service duration more than fifteen years (Table 1).

The prevalence of overweight and obesity among school teachers was 48.4% and 15.2% respectively (Table 2). 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). Prevalence of HTN, DM and dyslipidaemia was 52.8%, 32.8% and 22.8% respectively. Female teachers were more hypertensive and diabetic compared to male (54.5% vs 49.4%) and (33.3% vs 31.8%) respectively. The distribution of HTN, DM and dyslipidaemia as per gender was not statistically significant (p=0.441, 0.802 and 0.844 respectively) (Table 3).

The proportion of overweight/obesity was more among Muslim teachers (62%), masters degree holders (69.8%) and teachers earning higher income (64.6%) and the association was not significant (p=0.095, p=0.078 and p=0.654 respectively). Teachers having mixed diet were found to be more overweight/obese when compared with vegetarians and this association was statistically significant (p=0.047) (Table 4). High proportion of overweight/obesity observed among the non smoker and alcohol consumers having daily low amount of fresh vegetables and fruits, taking coffee daily and performing less physical activity (64.2%, 72.7%, 70.8%, 68.4%, 83.3% and 65% respectively). But the association was not statistically significant (p=0.627, p=0.751, p=0.163, p=0.295, p=0.074 and 0.887 respectively) (Table 4).

Table 1: Sociodemographic characteristics of the study participants (N=250).

| Variables | Frequency (%) |
|------------------------------------|---------------|
| Age categories (years) | |
| 25-30 | 8 (3.2) |
| 31-40 | 68 (27.2) |
| 41-50 | 83 (33.2) |
| 51-59 | 91 (36.4) |
| Gender | |
| Male | 85 (34) |
| Female | 165 (66) |
| Religion | |
| Muslim | 234 (93.6) |
| Hindu | 11 (4.4) |
| Christian | 5 (2.0) |
| Marital status | |
| Single | 4(1.6) |
| Married | 231 (92.4) |
| Widowed | 15 (6.0) |
| Education | |
| SSC | 1 (0.4) |
| HSC | 14 (5.6) |
| Graduate | 96 (38.4) |
| Masters | 134 (55.6) |
| Monthly family income (BDT) | |
| Low <20000 | 10 (4.0) |
| Middle 20000-50000 | 141 (56.4) |
| Higher >50000 | 99 (39.6) |
| Service durations (years) | |
| <1 | 1 (0.4) |
| 1-5 | 11 (4.4) |
| 5-10 | 37 (14.8) |
| 10-15 | 56 (22.4) |
| >15 | 145 (58.0) |

Table 2: Distribution of respondents as per Body mass Index (BMI) (N=250).

| Variable | Frequency (n) | Percentage (%) |
|-------------------------------|---------------|----------------|
| BMI (Kg/m²) | | |
| Underweight <18.5 | 4 | 1.6 |
| Normal weight 18.5-24.9 | 87 | 34.8 |
| Overweight 25-29.9 | 121 | 48.4 |
| Obesity ≥30 | 38 | 15.2 |
| Total | 250 | 100 |

Table 3: Gender wise distribution of overweight/obesity and its associated disorder among school teachers in Dhaka city, Bangladesh.

| Variables | Male and Female (250) n (%) | Male (85) n (%) | Female (165) n (%) | p-value |
|--------------------------|-----------------------------|-----------------|--------------------|---------|
| Overweight | 121 (48.4) | 41 (48.2) | 80 (48.5) | 0.001* |
| Obesity | 38 (15.2) | 5 (5.9) | 33 (20) | |
| Hypertension | 132 (52.8) | 42 (49.4) | 90 (54.5) | 0.441 |
| Diabetes Mellitus | 82 (32.8) | 27 (31.8) | 55 (33.3) | 0.802 |
| Dyslipidaemia | 57 (22.8) | 20 (23.5) | 37 (22.4) | 0.844 |

N.B: * Indicates significant result.

Table 4: Determinants of overweight/obesity among school teachers in Dhaka city, Bangladesh.

| Variables | Overweight/obesity | | p-value |
|---|--------------------|------------------|---------|
| | Yes (159) n (%) | No (91) n (%) | |
| Religion | | | |
| Muslim | 145 (62) | 89 (38) | 0.095 |
| Hindu | 9 (81.8) | 2 (18.2) | |
| Christian | 5 (100) | 0 (0) | |
| Education | | | |
| SSC | 0 (0) | 1 (100) | 0.078 |
| HSC | 7 (50) | 7 (50) | |
| Graduate | 55 (57.3) | 41 (42.7) | |
| Masters | 97 (69.8) | 42 (30.2) | |
| Monthly family income (BDT) | | | |
| Low <20000 | 5 (50) | 5 (50) | 0.654 |
| Middle 20000-50000 | 90 (63.8) | 51 (36.2) | |
| Higher >50000 | 94 (65.3) | 35 (35.4) | |
| Dietary habit | | | |
| Vegetarian | 0 (0) | 3 (100) | 0.047* |
| Mixed diet | 159 (63.6) | 91 (36.4) | |
| Daily intake of fresh vegetables | | | |
| Low <2.5 cups/day | 46 (70.8) | 19 (29.2) | 0.163 |
| Normal >2.5 cups/day | 113 (61.1) | 72 (38.9) | |
| Daily intake of fruits | | | |
| Low <2 cups/day | 52 (68.4) | 24 (31.6) | 0.295 |
| Normal >2 cups/day | 107 (61.5) | 67 (38.5) | |
| Coffee intake | | | |
| Daily | 20 (83.3) | 4 (16.7) | 0.074 |
| Occasionally | 125 (62.5) | 75 (37.5) | |
| Never | 14 (53.8) | 12 (46.2) | |
| Smoking | | | |
| Non smoker | 129 (64.2) | 72 (35.8) | 0.627 |
| Smoker | 24 (58.5) | 17 (41.5) | |
| Alcohol consumption | | | |
| Non alcoholic | 151 (63.2) | 88 (36.8) | 0.751 |
| Current alcoholic | 8 (72.7) | 3 (27.3) | |
| Daily exercise | | | |

| | | | |
|-------------------|-----------|-----------|-------|
| Non exerciser | 80 (65) | 43 (35) | 0.887 |
| Ex exerciser | 34 (63) | 20 (37) | |
| Current exerciser | 45 (61.6) | 28 (38.4) | |

N.B: * Indicates significant result.

IV. DISCUSSIONS

This study showed that the prevalence of overweight and obesity among school teachers was 48.4% and 15.2% respectively (Table 2). These study findings were higher than the previous study results estimated a prevalence rate of overweight and obesity (18.9% and 4.6% respectively) among Bangladeshi adult population [9]. This was also higher compared with the different studies done in India and Nigeria, which showed the prevalence rate of overweight and obesity among adult of 14% vs 11% and 3.3% vs 1.4-4.2% respectively [6-8]. It was also a bit higher than the overall estimated global prevalence of overweight and obesity observed by WHO (39% and 13% respectively) [1]. The study finding was lower than that found in adults regarding obesity (16-18%) observed in USA [4,5]. These differences may be due to urban residence, sedentary lifestyle of school teachers and lacking of large scale national survey of overweight and obesity among them.

About 69.6% teachers belonged to the age group of 41 to 59 years. This study showed that female teachers were more obese compared to male (20% vs 5.9%) (Table 1). This 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 [21]. 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 [22]-[24].

Prevalence of HTN, DM and dyslipidaemia was 52.8%, 32.8% and 22.8% respectively. Female teachers were more hypertensive and diabetic compared to male (54.5% vs 49.4%) and (33.3% vs 31.8%) respectively (Table 3). The study finding was lower than that found in adults (62.8%) in Nigeria [25] 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 [26,27]. This is also a bit higher than the previous study results estimated a prevalence rate of HTN among Bangladeshi adult ranging from 16-34% [28]. These differences 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 [29].

Teachers having mixed diet were found to be more overweight/obese when compared with vegetarians and this association was statistically significant ($p=0.047$) (Table 4). High proportion of overweight/obesity observed among the non smoker and alcohol consumers having daily low amount of fresh vegetables and fruits and taking coffee daily (64.2%, 72.7%, 70.8%, 68.4% and 83.3% respectively). Fruits and vegetables comprise the food group that most contributes to weight control and the prevention of diseases. These results highlight the importance of the implementation and maintenance of adequate eating behaviors for teachers, as well as of knowledge about dietary profiles. The latter should contribute to a better understanding of the overweight/obesity epidemic in adults and to the planning of obesity prevention policies.

The present study results agreed with the findings observed in a study by Shukla et al which showed smokers had less chance of developing obesity when compared with nonsmokers (OR = 0.77) [30]. In addition, Thankappan et al in their study in Keralaof India, found similar results as tobacco users had less chance to develop obesity (OR = 0.65) [31]. Thankappan et al in also found that alcohol users have more risk to develop obesity compared with nondrinkers (OR = 1.26) which was consistent to the present study results [31]. Majority teachers (65%) performing less physical activity had high prevalence of overweight/obesity (Table 4). It may be due to fact that when the age advances, the frequency of doing exercise is also reduced.

V. CONCLUSIONS

The prevalence of overweight and obesity among school teachers in Dhaka city was higher than the national as well as global context. So, it can be concluded that school teachers are at greater risk for developing overweight and obesity due to exposure of different types of risk factors. By increasing awareness and implementing strategies through behavior change communication, the burden of overweight/obesity among them can be reduced. The cross-sectional study design limits the drawing of causal inferences. Sample size was small and data were collected from schools of an urban area only not from any rural area resulting in difficulty in generalizing the study results.



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