

## Original Research Article

# Prevalence of hypertension and its risk factors among school teachers in Dhaka, Bangladesh

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## ABSTRACT

**Background:** School teachers in urban area are experiencing sedentary life style behaviors. This study was aimed to determine the prevalence and risk factors of hypertension (HTN) among school teachers in Dhaka city.

**Methods:** This cross-sectional study was carried out from May to October of 2017. Total 323 school teachers in Dhaka city aged between 25-59 years were enrolled using cluster random sampling technique. Data on socio-demographic profile, different risk factors, co-morbidities, family history and blood pressure (BP) were recorded. HTN was recorded according to pre-defined criteria. Factors associated with HTN analyzed by Chi-square test ( $\chi^2$ ).

**Results:** The prevalence of HTN among school teachers was 52%. The mean  $\pm$  SD age was  $46.5 \pm 7.8$  years. Majority teachers (52%) were earning between 20,000 and 50,000 Bangladeshi Taka per month and about 61.6% had service duration  $>15$  years. Development of HTN was significantly associated with age, monthly family income and service duration ( $p=0.001$ ). Majority participants were female (65.6%) and female to male ratio was 1.9:1. Female teachers were more hypertensive compared to male (68% vs 32%). Taking extra salt (OR 1.977, 95% CI 1.269-3.079), low intake of fresh vegetables (OR 2.048, 95% CI 1.228-3.416), higher waist circumference (OR 1.990, 95% CI 1.006-3.933) and mental distress (OR 1.724, 95% CI 1.045-2.844) were found to be significantly associated with HTN.

**Conclusions:** The prevalence of HTN was higher among the study participants. Building awareness by promoting healthy life style and behaviors for prevention and control of HTN should be given importance among teachers.

**Keywords:** Bangladesh, Hypertension, Prevalence, Risk factors, School teachers

## INTRODUCTION

Hypertension (HTN), one of the most important non-communicable diseases (NCDs) is the leading cause of premature deaths among adults throughout the world.<sup>1</sup> HTN refers to an average systolic blood pressure (SBP)  $\geq 140$ mmHg and/or average diastolic blood pressure (DBP)  $\geq 90$ mmHg and/or self-reported current treatment for HTN in the previous two weeks.<sup>2</sup> Pre-HTN is defined

by SBP  $\geq 120$  but  $<140$ mmHg and/or DBP  $\geq 80$  but  $<90$  mmHg and/or not taking anti-hypertensive medications and individuals with SBP  $\leq 120$  or DBP  $<80$ mmHg is considered as normal or non-HTN.<sup>2</sup>

The prevalence of HTN varies considerably by country: 20% in the USA and 25-50% in different regions in Europe.<sup>3</sup> In India, it is 25% in urban area.<sup>4</sup> The exact prevalence of HTN in Bangladesh is not known. One

meta-analysis and a population-based survey found the prevalence 11.3% and 18.6% respectively.<sup>5,6</sup> According to the Bangladesh non-communicable disease risk factor survey 2010, prevalence of HTN is 17.9% in general, 18.5% in men and 17.3% in women.<sup>7</sup> The prevalence of HTN is increasing globally and is predicted to affect more than 500 million people by 2025.<sup>8</sup>

Globally it has been experiencing epidemiological transition from communicable diseases to NCDs. HTN is the major cause for NCDs such as cardiovascular diseases (CVD), heart failure, stroke, cancer etc. and a leading risk factor for fetal and maternal deaths in pregnancy, dementia and renal failure.<sup>9</sup> It is a significant public health challenge and has a major impact on healthcare costs, contributing to around 10% of total healthcare spending globally.<sup>10</sup> It imposes a serious economic burden on individuals, households, healthcare systems and the entire nation as a whole.<sup>11</sup>

HTN is a silent killer, because people who have it are often symptom free or unaware of the disease. Once identified, elevated BP should be monitored at regular intervals because it is a lifelong disease. But being an asymptomatic disorder prior to the onset of cardiovascular complications, it is associated with a high degree of unawareness among its potential victims.<sup>12</sup> Management of HTN requires life-long medication with some lifestyle modifications. Most of the time hypertensive persons need multiple medicines which have different side effects. So, the only way to curb the problem of HTN is by its prevention.<sup>12</sup>

In more than 95% of cases, a specific underlying cause of HTN cannot be found. Such patients are said to have primary or essential HTN. The pathogenesis is not clearly understood. In about 5% of cases, HTN can be shown to be a consequence of a specific disease or abnormality leading to sodium retention and/or peripheral vasoconstriction. It is known as secondary HTN. The causes of secondary HTN are as follows: renal diseases, endocrine diseases, pregnancy etc.<sup>13</sup> Decreased physical activities, increased mental tension, overweight and obesity are supposed to be important contributors of HTN. They are commonly seen amongst sedentary professionals.<sup>14</sup>

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.<sup>15</sup> 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. Teacher's work overload has been the subject of intense research. The prevalence of HTN and related factors among teachers didn't addressed largely.<sup>16</sup> 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. HTN is one of the strongest modifiable risk factors of CVD. There are significant health and economic gains attached to early detection, adequate treatment and good control of HTN.<sup>17</sup>

So, this present study was aimed to determine the prevalence of HTN and its risk factors among school teachers of urban area so that they can be aware regarding early detection, proper treatment and adequate control of HTN.

## METHODS

This cross-sectional study was carried out for partial fulfillment of the requirements for the Master of Public Health (MPH) degree from 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 target 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.

By using the formula  $N = Z^2 pq/d^2$  and considering the prevalence of HTN in urban area 30%, acceptable limit of precision as 5% and Z value of 1.96, the expected sample size comes to be 323.<sup>18</sup> By adding 10% non response rate, sample size was calculated as 355. The participants were enrolled using cluster random sampling technique. Mohammadpur area of Dhaka city 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. Seventy-one school teachers from each zone and total 355 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 323 participants were enrolled finally.

The study protocol was approved by the Institutional Ethics Committee of University of South Asia, Dhaka. All the teachers interviewed with the permission from the Principal or In-charge/Head of the institute. 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 HTN or other disorders referred to appropriate facilities.

A structured questionnaire was used to collect data using modified WHO STEPS protocol.<sup>19</sup> Demographic data including age, gender, education, occupation and income etc were collected in pretested and predesigned questionnaire. The interview included questions related to

personal and family history, smoking, diet and salt intake habits. Body weight, height, waist circumference (WC), hip circumference (HC) and blood pressure (BP) were measured accordingly.

Body weight was measured to the nearest 0.1kg 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 0.1cm in the standing position using a portable stadiometer. Waist circumference (WC) was measured by placing a plastic tape horizontally midway between 12<sup>th</sup> rib and iliac crest on the midaxillary line. Similarly, hip circumference (HC) was measured by taking the extreme end posteriorly and the symphysis pubis anteriorly.

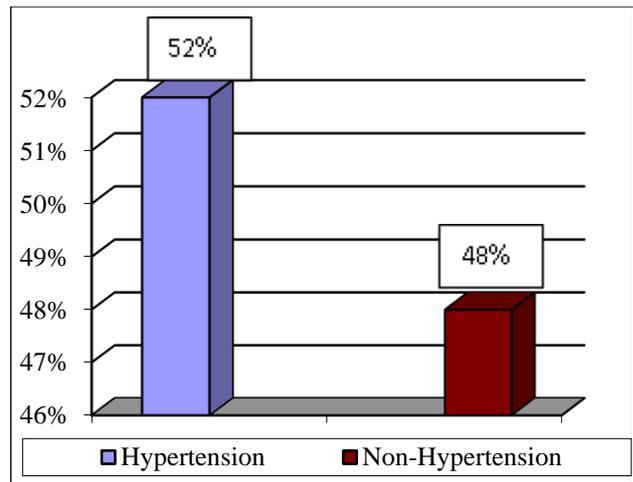
BP measurements was followed a common protocol adapted from WHO Stepwise approach.<sup>19</sup> Aneroid sphygmomanometer (ALPK2, Tanaka Sangyo Co. Ltd, Tokyo, Japan) with appropriately sized cuffs was used. BP was measured twice, five minute apart, with participants in a sitting position after five minutes of rest, in one visit. A third measurement was performed if the difference between the first two will be over 10mmHg for systolic or diastolic BP.

The average of the second and the third BP measurements was used for analyses. In addition, participants were advised to avoid smoking, taking coffee/tea and performing any exercise for at least 30 minutes before measuring their BP. The Aneroid BP machine was calibrated against a mercury BP machine weekly.

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 ( $\chi^2$ ).  $p < 0.05$  was considered as statistically significant. The expected outcome variable was having HTN. For analytical purposes, two groups (pre-HTN and non-HTN) were merged together to make the variable dichotomous (person with HTN versus non-HTN).

## RESULTS

The present study was based on the observations of total 323 school teachers. The overall prevalence of HTN was 52% (169/323) among them (Figure 1). The mean  $\pm$  SD age of the participants was  $46.5 \pm 7.8$  years and 36.8% was aged 51-59 years while 36.2% was aged 41-50 years. Statistical significant relation found between age and developing HTN ( $p = 0.001$ ). Majority participants were female (65.6%) and female to male ratio was 1.9:1. HTN was higher among female teachers (68%) compared to male teachers (32%) (Table 1).



**Figure 1: Distribution of the school teachers according to blood pressure measurement in Dhaka city, Bangladesh (N=323).**

About 95% teachers were muslim, 94% married and 60% were highly educated as holding masters degree but the relationship between HTN and religion, marital status and education level was not statistically significant ( $p > 0.05$ ). Majority teachers (52%) were in the middle income category earning between 20,000 and 50,000 Bangladeshi Taka per month and about 61.6% had service duration more than fifteen years. The statistically significant association found between developing HTN and monthly family income and service duration ( $p = 0.001$ ) (Table 1).

Regarding risk factors distribution among study participants, there were about 99% having mixed diet, followed by 52.3% taking extra salt, 26.6% and 33.1% taking lower amount of fresh vegetables and fruits respectively. About 16.7% smoker, 14.6% smokeless tobacco user, 4.3% current alcoholic and 48.6% physically inactive teachers were also found. Only 33% teachers were diabetic and 26% had dyslipidaemia (Table 2).

This study results also showed that, majority teachers (46.5%) were overweight while 34.7% had a normal body mass index (BMI). The prevalence of obesity was 17.3% and 1.5% teachers were underweight. About 87.6% and 70.3% of the study participants had high waist circumference (WC) and waist-hip ratio (WHR), respectively. Majority (77.1%) teachers were living in nuclear family, followed by 44.6% had less than six hours of sleep daily, 73.7% had mental distress and 89.8% had job satisfaction. About 74.3% and 58.8% teachers had a positive family history of HTN and DM, respectively (Table 3).

The risk factors significantly associated with development of HTN were taking extra salt, intake of low amount of vegetables, higher waist circumference and presence of mental distress. Participants who took extra salt (OR 1.977, 95% CI 1.269-3.079) and low vegetables

(OR 2.048, 95% CI 1.228-3.416) were at higher risk to develop HTN. Participants with higher WC (OR 1.990, 95% CI 1.006-3.933) and who had mental distress (OR

1.724, 95% CI 1.045-2.844) also were at risk of developing HTN (Table 4).

**Table 1: Socioeconomic and demographic characteristics among school teachers in Dhaka city, Bangladesh.**

| Variables  | Total (323), N (%) | HTN, N (%) | Non-HTN, N (%) | P-value |
|--|--------------------|------------|----------------|---------|
| <b>Age categories (years)</b>  |                    |            |                |         |
| 25-30  | 8 (2.5)            | 1 (0.6)    | 7 (4.5)        | 0.001*  |
| 31-40  | 79 (24.5)          | 29 (17.2)  | 50 (32.5)      |         |
| 41-50  | 117 (36.2)         | 71 (42.0)  | 46 (29.9)      |         |
| 51-59  | 119 (36.8)         | 68 (40.2)  | 51 (33.1)      |         |
| <b>Age mean <math>\pm</math>SD = 46.5 <math>\pm</math> 7.8 years</b> |                    |            |                |         |
| <b>Sex</b>   |                    |            |                |         |
| Male   | 111 (34.4)         | 54 (32)    | 57 (37)        | 0.339   |
| Female   | 212 (65.6)         | 115 (68)   | 97 (63)        |         |
| <b>Female:Male = 1.9 : 1</b>   |                    |            |                |         |
| <b>Religion</b>  |                    |            |                |         |
| Muslim   | 306 (94.8)         | 158 (93.5) | 148 (96.1)     | 0.615   |
| Hindu  | 12 (3.7)           | 8 (4.7)    | 4 (2.6)        |         |
| Christian  | 5 (1.5)            | 3 (1.8)    | 2 (1.3)        |         |
| <b>Marital status</b>  |                    |            |                |         |
| Single   | 4(1.2)             | 1 (0.6)    | 3 (1.9)        | 0.588   |
| Married  | 303 (93.8)         | 159 (94.1) | 144 (93.5)     |         |
| Widowed  | 16 (5.0)           | 9 (5.3)    | 7 (4.5)        |         |
| <b>Education</b>   |                    |            |                |         |
| SSC  | 2 (0.6)            | 0 (0)      | 2 (1.3)        | 0.432   |
| HSC  | 14 (4.3)           | 8 (4.7)    | 6 (3.9)        |         |
| Graduate   | 113 (35.0)         | 62 (36.7)  | 51 (33.1)      |         |
| Masters  | 194 (60.1)         | 99 (58.6)  | 95 (61.7)      |         |
| <b>Monthly family income (BDT)</b>                                   |                    |            |                |         |
| Low <20000   | 11(3.4)            | 2 (1.2)    | 9 (5.8)        | 0.001*  |
| Middle 20000-50000   | 168 (52.0)         | 75 (44.4)  | 93 (60.4)      |         |
| Higher >50000  | 144 (44.6)         | 92 (54.4)  | 52 (33.8)      |         |
| <b>Service durations (years)</b>                                     |                    |            |                |         |
| <1   | 1 (0.3)            | 0 (0)      | 1 (0.6)        | 0.001*  |
| 1-5  | 13 (4.0)           | 1 (0.6)    | 12 (7.8)       |         |
| 5-10   | 42 (13.0)          | 23 (13.6)  | 19 (12.3)      |         |
| 10-15  | 68 (21.1)          | 25 (14.8)  | 43 (27.9)      |         |
| >15  | 199 (61.6)         | 120 (71.0) | 79 (51.3)      |         |

\* Indicates significant result

## DISCUSSION

This study identified hypertension (HTN) as a significant health burden among school teachers of Dhaka city in Bangladesh. Out of total 323 teachers, 52% had HTN using  $\geq 140$ mmHg SBP and/or  $\geq 90$ mmHg DBP as cut-off point (Figure 1). The study finding was lower than that found in adults (62.8%) in Nigeria 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>20-22</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>23</sup> These

differences may be due to urban residence, sedentary lifestyle of school teachers and lacking of large scale national survey of HTN among them.

The mean age of the participants was 46.5 $\pm$ 7.8 years. About 73% of them were within 41-59 years of age. The study relation to age with HTN signifies that as the age advances chances of becoming hypertensive is also increases ( $p < 0.05$ ) (Table 1). Similarly, the prevalence of HTN showed to be increased with increasing age ( $p = 0.001$ ) in the study by Ibrahim NKR et al in Jeddah.<sup>21</sup> Zhao XL et al, conducted a study in china and found positive and statistically significant association between advancing age and prevalence of HTN.<sup>24</sup> In this present

study, majority participants were female (65.6%) with female to male ratio of 1.9:1. The results showed no statistical significant difference according to sex ( $P>0.05$ ) (Table 1). HTN was higher among female teachers (68%) compared to male teachers (32%). This study finding disagreed with that recorded in Nigeria, significant sex differences was established in blood pressure distribution and agreed with the study of Vyas et al and Girish B et al in India showed that female school teachers were hypertensive by 70.9% and 72.8% respectively.<sup>20,25,26</sup> Also different with that found in India by Sania et al, the prevalence of HTN was higher (64%) among male teachers.<sup>27</sup>

**Table 2: Distribution of behavioral risk factors and co-morbidities among school teachers in Dhaka city, Bangladesh.**

| Variables                               | Frequency (n=323) | Percent (%) |
|---|-------------------|-------------|
| <b>Dietary habit</b>                    |                   |             |
| Vegetarian                              | 3                 | 0.9         |
| Mixed diet                              | 320               | 99.1        |
| <b>Extra salt intake</b>                |                   |             |
| Yes                                     | 169               | 52.3        |
| No                                      | 154               | 47.7        |
| <b>Daily intake of fresh vegetables</b> |                   |             |
| Low                                     | 86                | 26.6        |
| Normal                                  | 237               | 73.4        |
| <b>Daily intake of fresh fruits</b>     |                   |             |
| Low                                     | 107               | 33.1        |
| Normal                                  | 216               | 66.9        |
| <b>Smoking</b>                          |                   |             |
| Non smoker                              | 254               | 79.9        |
| Smoker                                  | 58                | 16.7        |
| Ex-smoker                               | 11                | 3.4         |
| <b>Intake of smokeless tobacco</b>      |                   |             |
| Non user                                | 276               | 85.4        |
| User                                    | 47                | 14.6        |
| <b>Alcohol consumption</b>              |                   |             |
| Non alcoholic                           | 309               | 95.7        |
| Current alcoholic                       | 14                | 4.3         |
| <b>Daily exercise</b>                   |                   |             |
| Non exerciser                           | 157               | 48.6        |
| Ex exerciser                            | 76                | 23.5        |
| Current exerciser                       | 90                | 27.9        |
| <b>Having Diabetes mellitus (DM)</b>    |                   |             |
| Yes                                     | 107               | 33.1        |
| No                                      | 216               | 66.9        |
| <b>Having Dyslipidaemia</b>             |                   |             |
| Yes                                     | 84                | 26          |
| No                                      | 239               | 74          |

Majority teachers (52%) were in the middle income category earning between 20,000 and 50,000 Bangladeshi Taka per month and about 61.6% had service duration more than fifteen years. The statistically significant

association found between developing HTN and monthly family income and service duration ( $p=0.001$ ) (Table 1).

**Table 3: Distribution of anthropometric, psycho-social stress assessment and family history among school teachers in Dhaka city, Bangladesh.**

| Variables                                       | Frequency (n=323) | Percent (%) |
|---|-------------------|-------------|
| <b>Anthropometric assessment</b>                |                   |             |
| <b>Body mass index (BMI) (Kg/m<sup>2</sup>)</b> |                   |             |
| Underweight <18.5                               | 5                 | 1.5         |
| Normal 18.5-24.9                                | 112               | 34.7        |
| Overweight 25-29.9                              | 150               | 46.5        |
| Obese $\geq 30$                                 | 56                | 17.3        |
| <b>Waist circumference (WC) (cm)</b>            |                   |             |
| High (M $\geq 90$ , F $\geq 80$ )               | 283               | 87.6        |
| Low (M $\leq 90$ , F $\leq 80$ )                | 40                | 12.4        |
| <b>Waist-hip ratio (WHR)</b>                    |                   |             |
| Normal ( $\leq 1$ )                             | 96                | 29.7        |
| High ( $\geq 1$ )                               | 227               | 70.3        |
| <b>Psycho-social stress assessment</b>          |                   |             |
| <b>Family type</b>                              |                   |             |
| Joint family                                    | 74                | 22.9        |
| Nuclear family                                  | 249               | 77.1        |
| <b>Duration of sleep (hours)</b>                |                   |             |
| <6  | 144               | 44.6        |
| >6  | 179               | 55.4        |
| <b>Mental distress</b>                          |                   |             |
| Yes   | 238               | 73.7        |
| No  | 85                | 26.3        |
| <b>Job satisfaction</b>                         |                   |             |
| Satisfied                                       | 290               | 89.8        |
| Not satisfied                                   | 26                | 8.0         |
| Neutral   | 7                 | 2.2         |
| <b>Family history of HTN</b>                    |                   |             |
| Yes   | 240               | 74.3        |
| No  | 83                | 25.7        |
| <b>Family history of Diabetes mellitus (DM)</b> |                   |             |
| Yes   | 190               | 58.8        |
| No  | 133               | 41.2        |

This study finding showed consistent results between income and HTN from many low and middle income countries.<sup>28</sup> 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 of HTN. About 95% teachers were Muslim, 94% married and 60% were highly educated as holding masters degree. But the association between HTN and religion, marital status and education level was not statistically significant ( $p>0.05$ ) which may be due to nature of them (Table 1).

**Table 4: Bivariate analysis showing the association between behavioral, anthropometric and psychosocial risk factors and HTN among school teachers in Dhaka city, Bangladesh.**

| Variables                         | HTN, n | Non-HTN, n | OR (95% CI)         | p-value |
|-----------------------------------|--------|------------|---------------------|---------|
| <b>Dietary habit</b>              |        |            |                     |         |
| Vegetarian                        | 1      | 2          | 0.452 (0.041-5.039) | 0.607   |
| Mixed diet                        | 168    | 152        |                     |         |
| <b>Extra salt intake</b>          |        |            |                     |         |
| Yes                               | 102    | 67         | 1.977 (1.269-3.079) | 0.002*  |
| No                                | 67     | 87         |                     |         |
| <b>Taking smokeless tobacco</b>   |        |            |                     |         |
| Non user                          | 139    | 137        | 0.575 (0.303-1.090) | 0.087   |
| User                              | 30     | 17         |                     |         |
| <b>Alcohol consumption</b>        |        |            |                     |         |
| Non alcoholic                     | 163    | 146        | 1.489 (0.505-4.391) | 0.468   |
| Current alcoholic                 | 6      | 8          |                     |         |
| <b>Daily intake of vegetables</b> |        |            |                     |         |
| Low                               | 56     | 30         | 2.048 (1.228-3.416) | 0.006*  |
| Normal                            | 113    | 124        |                     |         |
| <b>Daily intake of fruits</b>     |        |            |                     |         |
| Low                               | 63     | 44         | 1.486 (0.930-2.374) | 0.097   |
| Normal                            | 106    | 110        |                     |         |
| <b>Waist circumference (cm)</b>   |        |            |                     |         |
| High (M $\geq$ 90, F $\geq$ 80)   | 154    | 129        | 1.990 (1.006-3.933) | 0.045*  |
| Low (M $\leq$ 90, F $\leq$ 80)    | 15     | 25         |                     |         |
| <b>Waist-hip ratio (WHR)</b>      |        |            |                     |         |
| Normal ( $\leq$ 1)                | 42     | 54         | 0.612 (0.379-0.991) | 0.045   |
| High ( $\geq$ 1)                  | 127    | 100        |                     |         |
| <b>DM</b>                         |        |            |                     |         |
| Yes                               | 56     | 51         | 1.001 (0.629-1.592) | 0.997   |
| No                                | 113    | 103        |                     |         |
| <b>Dyslipidaemia</b>              |        |            |                     |         |
| Yes                               | 50     | 34         | 1.483 (0.896-2.455) | 0.124   |
| No                                | 119    | 120        |                     |         |
| <b>Family type</b>                |        |            |                     |         |
| Joint family                      | 29     | 45         | 0.502 (0.295-0.852) | 0.010   |
| Nuclear family                    | 140    | 109        |                     |         |
| <b>Duration of sleep (hours)</b>  |        |            |                     |         |
| <6                                | 80     | 64         | 1.264 (0.814-1.963) | 0.297   |
| >6                                | 89     | 90         |                     |         |
| <b>Mental distress</b>            |        |            |                     |         |
| Yes                               | 133    | 105        | 1.724 (1.045-2.844) | 0.032*  |
| No                                | 36     | 49         |                     |         |

\* Indicates significant result

This study showed that 99% teachers having mixed diet, followed by 52.3% taking extra salt, 26.6% and 33.1% taking lower amount of fresh vegetables and fruits, respectively. About 16.7% smokers, 14.6% smokeless tobacco user, 4.3% current alcoholic teachers were also found. Only 33% teachers were diabetic and 26% had dyslipidaemia (Table 2). In different studies, Gupta GK et al found that prevalence of HTN was significantly associated with diet habit.<sup>29</sup> Globally 1.65 million deaths occurred from cardiovascular causes that were attributed

to excess sodium consumption above a reference level of 2.0 g per day.<sup>30</sup> Study by de Brito-Ashurst et al, showed that salt consumption is deeply-rooted in the dietary beliefs, attitudes and a culturally-established taste for salt among Bangladeshi population.<sup>31</sup>

General awareness should be created about the harmful effects of extra salt consumption in Bangladesh. The low intake of fresh vegetables and fruits has been linked with increased risk of CVD and all-cause mortality.<sup>32</sup>

The present study result disagreed with that recorded among adults in Bangladesh and India that tobacco smoking and smokeless tobacco use were associated with HTN.<sup>33,34</sup> Alcohol consumption was not the significant risk factor of HTN among teachers probably due to the fact that there were very few alcoholics (4.3%) among male teachers only. Study finding showed that 48.6% teachers were physically inactive (Table 2).

It may be due to fact that when the age advances, the frequency of doing exercise is also reduced. The result was similar to the study done in India among school teachers and adults and in Kenya among adults that less physical activity is associated with HTN.<sup>35,36</sup>

This study results showed that, majority teachers (46.5%) were overweight. About 87.6% and 70.3% of the study participants had high waist circumference (WC) and waist-hip ratio (WHR), respectively (Table 3). Ibrahim NKR et al in Jeddah had found high BMI was associated with HTN; the prevalence of HTN was 14.4% for normal weight teachers compared to 21.9% in overweight teachers and prevalence among obese individuals was 37.1% ( $p=0.001$ ).<sup>21</sup> Previous studies reported similar results that higher waist circumference was associated with developing HTN among Bangladeshi adults.<sup>37</sup>

Majority (77.1%) teachers lived in nuclear family and 73.7% had mental distress. Living in nuclear family instead of joint family may play an important role for increasing psycho-social stress that contributes to the development of HTN among the school teachers. It also showed that about 74.3% and 58.8% teachers had a positive family history of HTN and DM, respectively (Table 3). The study conducted among adults in Turkey by Dogan et al showed a significant association between HTN and positive family history.<sup>38</sup> Factors associated with HTN measured by Chi-square test ( $\chi^2$ ). The study showed that taking extra salt (OR 1.977, 95% CI 1.269-3.079), intake of low amount of vegetables (OR 2.048, 95% CI 1.228-3.416), higher waist circumference (OR 1.990, 95% CI 1.006-3.933) and mental distress (OR 1.724, 95% CI 1.045-2.844) were significant risk factors (Table 4). School teachers with these risk factors were at higher risk for developing HTN. These findings are similar to other studies among adults in Bangladesh and India.<sup>33,39</sup>

There were certain limitations in this study. First of all, cross-sectional study design limits the drawing of causal inferences. Secondly no measurement scale was used to assess the psychosocial stress. Finally, 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.

## CONCLUSION

Prevalence of hypertension (HTN) among the school teachers was 52%. The increasing age had a significant

role in the development of HTN. There was a significant association between HTN and different factors like taking extra salt and low fresh vegetables, higher waist circumference and mental distress.

So, it can be concluded that school teachers are at greater risk as they are exposed to the above several risk factors responsible for developing HTN.

## Recommendations

Since HTN and majority of its risk factors among school teachers are modifiable and preventable, early diagnosis, preventive behavior and taking policies can reduce the burden of the disease. Followings are the recommendations: a) making and implementing strategies to increase the required screening and diagnosis of the HTN, b) building awareness by promoting health education regarding risk factors, symptoms and complications of HTN, c) promoting healthy life style and behaviors for prevention and control of HTN and d) conducting longitudinal studies among both urban and rural school teachers with a large sample size.

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