

An Observational Study to Assess the Prevalence of Hypertension and its Associated Disorders Among School Teachers in Dhaka City

*R Barua¹, MA Noman², M Ismail³, MA Hossain⁴

ABSTRACT

Background: Urban school teachers are experiencing sedentary life style behaviors. This study was aimed to determine the prevalence of hypertension (HTN) and its relationship with associated disorders among school teachers of Dhaka city.

Methods: This cross sectional study was conducted between May-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, personal and family history, co-morbidities and blood pressure were recorded. HTN was recorded according to predefined criteria.

Results: The prevalence of HTN among school teachers was 52.3%. The mean±SD age was 46.5±7.8 years. About 82% hypertensive teachers were within 41-59 years category. Majority participants were female (65.6%) and female to male ratio was 1.9:1. Female teachers were more hypertensive compared to male (54.2% vs 48.6%). Majority teachers (52%) were earning between 20,000 and 50,000 Bangladeshi Taka per month and about 61.6% had service duration >15 years. Male teachers with positive family history of diabetes mellitus (DM) were about one and half times likely to have DM as compared to negative family history (p = 0.009, OR = 1.491, 95% CI 1.138-1.954). Among hypertensive teachers, about 70% were overweight/obese and they were about 1.7 times likely to develop HTN (p=0.024, OR=1.696 and 95% CI 1.069-2.692) which was statistically significant.

Conclusions: HTN is more prevalent among urban school teachers and they are at greater risk to develop HTN. Building awareness by promoting health education, healthy life style and behaviors for prevention and control of HTN should be given importance among teachers.

Key Words: Hypertension, Prevalence, School teachers, Bangladesh

Introduction

Globally it has been experiencing epidemiological transition from communicable diseases to non communicable diseases (NCDs). Hypertension (HTN), is the major cause for NCDs such as cardiovascular diseases, heart failure, stroke, cancer etc and a leading risk factor for fetal and maternal deaths in pregnancy, dementia and renal failure.¹ It

is a significant public health challenge and has a major impact on healthcare costs, contributing to around 10% of total healthcare spending globally.² It imposes a serious economic burden on individuals, households, healthcare systems and the entire nation as a whole.³

¹Dr. Ripon Barua, Associate Professor, Department of Microbiology, Faridpur Medical College, Faridpur, Bangladesh
e-mail: riponbarua38cmc@gmail.com

²Dr. Mohammed Abu Noman, Department of Internal Medicine, Al Shamar Polyclinic, Barka, Oman

³Dr. Mohammad Ismail, Department of Community Medicine, Cox's Bazar Medical College, Cox's Bazar, Bangladesh

⁴Dr. Md. Amir Hossain, Department of Neurology, National Institute of Neurosciences and Hospital, Agargaon, Dhaka, Bangladesh

*Corresponding Author

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A recent analysis of worldwide data from different regions estimated that the total number of adults with hypertension in 2000 was 972 million: 333 million in countries with established market economies and 639 million in economically developing countries. This proportion will increase by 60% - 1.56 billion by 2025.⁴ The prevalence of HTN varies considerably by country: 20% in the USA and 25-50% in different regions in Europe.⁵ In India, it is 25% in urban area.⁶ 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.⁷

HTN occurred in conjunction with a dramatic increase in the prevalence of overweight and obesity.⁸ HTN, diabetes mellitus (DM) and dyslipidaemia are important risk factors for atherosclerosis and its complications, including heart attacks and strokes. There is substantial overlap between HTN and other disorders, reflecting substantial overlap in their etiology and disease mechanisms.⁹

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.¹⁰ 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.¹¹ 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.

This present study was aimed to determine the prevalence of HTN and its relationship with associated disorders among school teachers of Dhaka city, so that they can be aware regarding early detection, proper treatment and adequate control of HTN and its associated disorders.

Materials & Methods

This was a cross sectional study. It was carried out in University of South Asia, Banani, Dhaka between 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 agreed to participate in this study were included. Teachers who had serious mental illness, pregnancy at any age group and not provided written informed consent were excluded.

For sample size calculation, the formula $N = Z^2pq/d^2$ was used. By considering the prevalence of HTN in urban area 30%,¹² acceptable limit of precision as 5% and Z value of 1.96, the expected sample size came to be 323. By adding 10% non response rate, sample size was calculated as 355. 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. 71 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 Head of schools. 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.

To collect data, modified WHO STEPS protocol was followed.¹³ Demographic data including age, gender, education, occupation and income etc were collected in pretested and predesigned structured questionnaire for each participant. The interview included questions related to having medical disorders as well as personal and family history. Body weight, height and blood pressure (BP) were measured accordingly.

Body weight was measured to the nearest 0.1 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, $BMI = \text{body weight (kg)}/\text{height (m}^2\text{)}$. 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 \geq 30).¹³

BP measurements was followed a common protocol adapted from WHO Stepwise approach.¹³ 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 10 mmHg 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. HTN was recorded as 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 2 weeks.¹⁴ Pre-HTN was 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 was considered as normotensive or non-HTN.¹⁴

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. $p < 0.05$ was considered as statistically significant. Factors associated with HTN analyzed by

Chi-square test (χ^2). 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

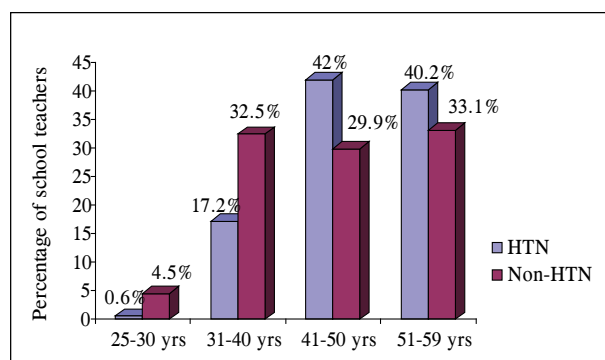
This study was based on the observations of total 323 school teachers in Dhaka city. The mean \pm SD age of the participants was 46.5 ± 7.8 years and about 73% was aged 41-59 years of age group. Gender wise distribution showed that majority participants were female (65.6%) and female to male ratio was 1.9:1 (Table 1). About 95% teachers were Muslim, 94% married and 60% were highly educated as holding masters degree. 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 (Table 1).

Out of total 323 teachers, 169 (52.3%) were hypertensive and only 154 (47.7%) were non-hypertensive. Among hypertensive teachers, female teachers were a little higher compared to male (54.2% vs 48.6%) (Table 2). This study showed that 42% hypertensive teachers were within 41-50 years category, followed by 40.2% and 17.2% among 51-59 and 31-40 years category respectively (Figure 1).

Male teachers with positive family history of DM were about one and half times likely to have DM as compared to negative family history ($p = 0.009$, OR = 1.491, 95% CI 1.138-1.954). This result was statistically significant. In the other hand, positive family history of DM among females and positive family history of HTN among both male and females were not likely to have DM and HTN as compared to negative family history ($p = 0.144$, OR = 1.193, 95% CI 0.948-1.501; $p = 0.844$, OR = 0.974, 95% CI 0.753-1.261 and $p = 0.620$, OR = 1.037, 95% CI 0.897-1.199 respectively) (Table 3).

Table 1: Sociodemographic characteristics of the study participants (N=323).

Variables	Frequency (n)	Percentage (%)
Age groups (years)		
25-30	8	2.5
31-40	79	24.5
41-50	117	36.2
51-59	119	36.8
Gender		
Male	111	34.4
Female	212	65.6
Religion		
Muslim	306	94.8
Hindu	12	3.7
Christian	5	1.5
Marital status		
Single	4	1.2
Married	303	93.8
Widowed	16	5.0
Education		
SSC	2	0.6
HSC	14	4.3
Graduate	113	35.0
Masters	194	60.1
Monthly family income (BDT)		
Low <20000	11	3.4
Middle 20000-50000	168	52.0
Higher >50000	144	44.6
Service durations (years)		
< 1	1	0.3
1-5	13	4.0
5-10	42	13.0
10-15	68	21.1
> 15	199	61.6

**Figure 1:** Distribution of hypertension (HTN) as per age groups of the study participants.**Table 2:** Prevalence of hypertension among school teachers in Dhaka city.

Variable	Male and Female (323) n (%)	Male (111) n (%)	Female (212) n (%)	p-value
Blood pressure measurement				
Hypertension	169 (52.3)	54 (48.6)	115 (54.2)	0.339
Non-Hypertension	154 (47.7)	57 (51.4)	97 (45.8)	

Table 3: Association between hypertension, diabetes mellitus and family history as per gender distribution among the study participants.

Medical condition	Gender	Family history positive (n)	Odds ratio (95% CI)	p-value
Hypertension	Male	36	0.974 (0.753-1.261)	0.844
	Female	91	1.037 (0.897-1.199)	0.620
Diabetes mellitus	Male	27	1.491 (1.138-1.954)	0.009*
	Female	47	1.193 (0.948-1.501)	0.144

N.B: * Indicates significant result. Analyzed by Chi-square test (χ^2).

Among hypertensive teachers, about 70% were overweight/obese and they were about 1.7 times likely to develop HTN ($p=0.024$, OR=1.696 and 95% CI 1.069-2.692). This result was statistically significant. In the other hand, about 33% were diabetic and 29% were dyslipidaemic among hypertensive teachers. But, there was no statistically significant difference observed between HTN, DM and dyslipidaemia ($p=0.996$, OR=0.999, 95% CI 0.628-1.589 and $p=0.229$, OR=1.357, 95% CI 0.824-2.234 respectively) (Table 4).

Table 4: Hypertension (HTN) and its associated disorder among school teachers in Dhaka city.

Medical condition	HTN (151) n (%)	Non-HTN (172) n (%)	Odds ratio (95% CI)	p-value
Diabetes mellitus				
Yes	50 (33.1)	57 (33.1)	0.999 (0.628-1.589)	0.996
No	101 (66.9)	115 (66.9)		
Dyslipidaemia				
Yes	44 (29.1)	40 (23.3)	1.357 (0.824-2.234)	0.229
No	107 (70.9)	132 (76.7)		
Overweight/Obesity				
Yes	106 (70.2)	100 (58.1)	1.696 (1.069-2.692)	0.024*
No	45 (29.8)	72 (41.9)		

N.B: *Indicates significant result. Analyzed by Chi-square test (χ^2).

Discussion

This present study showed that among 323 school teachers of Dhaka city, about 52.3% had hypertension (HTN) (Table 2). The study finding was lower than that found in adults (62.8%) in Nigeria¹⁵ 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.^{16,17} This is also a bit higher than the previous study results estimated a prevalence rate of HTN among Bangladeshi adult ranging from 16-34%.¹⁸ These differences may be due to urban residence, sedentary lifestyle of school teachers and lacking of large scale national survey of HTN among them.

Majority (42%) hypertensive teachers were within 41-50 years category, followed by 40.2% and 17.2% among 51-59 and 31-40 years category respectively. The study relation to age with HTN signifies that as the age advances chances of becoming hypertensive are also increases (Figure 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.¹⁶ Zhao XL *et al* conducted a study in china and found positive and statistically significant association between advancing age and prevalence of HTN.¹⁹

HTN was higher among female teachers (54.2%) compared to male teachers (48.6%) (Table 2). This study finding disagreed with that recorded in Nigeria, significant sex differences was established in blood pressure distribution¹⁵ 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.^{20,21} Also different with that found in India by Sania *et al*, the prevalence of HTN was higher (64%) among male teachers.²²

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 (Table 1). This study finding showed consistent results between income and HTN from many low and middle income countries.²³ 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 (Table 1).

Positive family history of DM among male teachers was about one and half times likely to have DM as compared to negative family history ($p = 0.009$, OR = 1.491, 95% CI 1.138-1.954). This result was statistically significant. But positive family history of DM among females and positive family history of HTN among both male and females were not likely to have DM and HTN as compared to negative family history ($p = 0.144$, OR = 1.193, 95% CI 0.948-1.501; $p = 0.844$, OR = 0.974, 95% CI 0.753-1.261 and $p = 0.620$, OR = 1.037, 95% CI 0.897-1.199 respectively) (Table 3). This study finding disagree the result of the study conducted among adults in Turkey by Dogan *et al* showed a significant association between HTN and positive family history.²⁴

This study showed that, among hypertensive teachers, about 70% were overweight/obese and they were about 1.7 times likely to develop HTN ($p=0.024$, OR=1.696 and 95% CI 1.069-2.692). This result was statistically significant. But, there was no statistically significant difference observed between HTN, DM and dyslipidaemia ($p=0.996$, OR=0.999, 95% CI 0.628-1.589 and $p=0.229$, OR=1.357, 95% CI 0.824-2.234 respectively) (Table 4). 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% ($p=0.001$).¹⁶

Conclusion

It is concluded that HTN is more prevalent among urban school teachers and they are at greater risk to develop HTN due to their sedentary lifestyle. The

increasing age has a significant role in the development of HTN. Overweight and obesity is directly related to development of HTN among urban school teachers.

Recommendations

School teachers should be regularly screened for early diagnosis, proper treatment and prevention of HTN. Awareness should be raised by promoting health education, healthy life style and behaviors. Longitudinal studies should be conducted among both urban and rural school teachers with a large sample size.

Limitations

Cross-sectional study design is the first limitation of this study as it limits the drawing of causal inferences. Secondly sample size was small. Finally, 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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Conflict of interest: None

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