Original Research Article

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20193964

Prevalence of hypertension and its significant correlates among Bangladeshi adults: a quantitative analysis from City Corporation Rangpur, Bangladesh

Sukanta Das¹*, B. K. Chakravorti², Sahebul Islam²

¹Department of Statistics, ²Department of Physics, Begum Rokeya University, Rangpur, Bangladesh

Received: 04 July 2019 Accepted: 08 August 2019

*Correspondence:

Sukanta Das. E-mail: sdas1@isrt.ac.bd

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Hypertension (HTN) is a common medical problem and the premier risk factor for cardiovascular disease. Hypertension is growing at a faster rate among all aged population. Therefore, this study aimed to investigate the prevalence of hypertension and to identify the significant risk factors of hypertension among the respondents.

Methods: The sample of 1302 randomly selected respondents of various government offices at Rangpur City Corporation, Bangladesh are taken for this study. Hypertension was defined by the systolic blood pressure reading above 140 or the diastolic reading above 90 mmHg. Pre-hypertension was defined by the systolic blood pressure reading 120-139 or the diastolic reading 80-89 mmHg. Prevalence and risk factors of hypertension are presented as percentages. The significant association between the categorical variables is measured using Chi-square test.

Results: It is found that the prevalence of hypertension and pre-hypertension (stage-1 HTN) among the respondents are 25% and 54%, respectively. Most of the respondents are in the pre-HTN stage, and at any time they may fall under hypertension. Respondent's age, gender, residence, smoking habit, and physical activity are found as significant factors of hypertension.

Conclusions: Reliable information about the prevalence of hypertension and its associated risk factors is very essential for growing awareness, treatment, and control of hypertension. Prevalence of hypertension is high among the study subjects. The male respondents who are at the higher age group, residing in the urban area, not taking regular physical exercise, and having smoking habit are found more prevalent cases of hypertension than the other counterparts.

Keywords: Hypertension, Prevalence, Risk factors, Non-communicable diseases

INTRODUCTION

High blood pressure or hypertension (HTN) is an enormous health problem and is one of the biggest health challenges in the 21st century for the low and middleincome countries like Bangladesh.1 HTN is usually symptomless and often regarded as a disease in its own right. Hypertension usually effects on health and causes coronary heart disease, stroke, heart failure, chronic kidney disease, aortic aneurysm, retinal disease, and peripheral vascular disease without giving any sign and for these reasons some people called it as "silent killer". The definite cause of hypertension is unknown until now. But some risk factors for hypertension are age, gender, ethnicity, excess salt intake, overweight and obesity, physical inactivity, smoking habits, smokeless tobacco habits, excessive alcohol intake, etc. Nowadays people are familiar with the symptom of hypertension and with the associated diseases related to hypertension that are detectable and easily treatable. Though people are not concern about the proper treatment and remedy

precautions of HTN, they know about the premature death rate of HTN.

Analysis of worldwide data on the global burden of HTN showed an overall prevalence of hypertension 26.4% among the adult population in 2000. A recent report showed that about 12 million of adult aged 25 years or older population in Bangladesh suffer from hypertension with higher prevalence in the urban rather than in the rural population.²⁻³ Okpara et al assessed the prevalence and level of awareness of hypertension in a tertiary institution in Nigeria. The overall prevalence of hypertension in the study population was 15.7% and the hypertension was more prevalent in males than females with rates of 16.5% and 14.1% respectively. Diaz et al revealed the fact that, the prevalence of hypertension is growing fast particularly in developing countries that are experiencing epidemiological transitions, economic improvement, urbanization and longer life expectancy.⁵ Basu et al also carried out another study to estimate the prevalence of hypertension, its various risk factors and to find out their biosocial association in a selected village of West-Bengal.⁶ The prevalence of hypertension is increasing in almost all the countries and the rate of increase depends on the epidemiological transition the country is passing through.⁷ The prevalence pattern of hypertension in developed countries is different from in developing counties.⁸ Bangladesh is a developing country and now it is going through the demographic transitions. Non-communicable diseases like hypertension are a common problem for adult aged population of Bangladesh. This study was undertaken to measure the prevalence of hypertension and to identify the significant risk factors of hypertension among government employees in Rangpur city corporation, Bangladesh.

METHODS

For the quantitative analysis, data were obtained by a primary survey to assess the prevalence of hypertension of Rangpur City Corporation in Bangladesh. This survey was conducted from August to December 2017 with technical support of the Hypertension and Research Centre, Rangpur. The study was a population-based cross-sectional research design. Government employee including men and women of aged 18 years and above, residing in rural, suburban or urban areas of City Corporation Rangpur, Bangladesh were included in this study. Information was collected on the respondent's age, sex, race, height, weight, personal and family history of hypertension, and previous and present salt intake. All inpatient blood pressures were taken upon awakening of the subject in the morning. All outpatient pressure readings were taken after the patients had rested for 15 minutes. Hypertension was defined by the systolic blood pressure reading above 140 mmHg or the diastolic reading above 90 mmHg. And the pre-hypertension or stage-1 hypertension was defined by the systolic blood pressure ranging from 130-139 mmHg or the diastolic blood pressure ranging from 80-89 mmHg.

Data collection

The sample consists of 1302 randomly selected respondents of various government offices at Rangpur city corporation, Bangladesh. The government employees were 18 to 60+ aged both men and women. Employees of different designation were included after obtaining necessary permission from the authority of the office of Rangpur City Corporation, Bangladesh. A self-structured questionnaire, testified by a medical officer of Rangpur Medical College, Rangpur, Bangladesh, was designed for the purpose of data collection, which included all the details about age, sex, marital status, residence, job type, smoking habits, smokeless tobacco habits, recreational activity, working days (per week), working hours (per days), working shift, extra working status, job satisfaction, physical exercise, sleeping hours, working mode, salt intake status, mode of food intake, family history, recording of anthropometric parameters, and medical history of hypertension. Data were collected from the individual employee from their respective office during their office hour. The blood pressure was measured by a medical assistant using an error-free sphygmomanometer and stethoscope. During the measurement, the employee was seated on a chair and hands put on a table since the heart and artery were levels. At least two readings at 5 minutes intervals were observed and the average was taken and if high blood pressure (≥140/90 mmHg) was noted, a third reading was taken after 30 minutes and the average of lowest two readings was recorded as blood pressure. Resting pulse rate was observed from the radial artery for 1 minute using wristwatch. Height and weight of the employees were measured by a meter scale and a portable weighing machine respectively with the employees standing barefoot and in light clothing.

Covariates

The following variables were used as covariates for analyses: area of residence, sex, age, smoking habit, physical exercise and body mass index (BMI). Age was categorized into three age groups: 18-44, 45-59, and 60+ years. Data on physical activity were collected based on self-report as yes or no and if yes, then regular or irregular. To calculate BMI, we used the height (in meters) and weight (in kilograms) measurements. We categorized BMI to the following groups: underweight (≤ 18.50), normal (18.6-25), overweight (25.1-30), and obese (>30).

Data analysis

All statistical analyses were performed using Statistical Package for Social Sciences (SPSS) version 21. Prevalence and risk factors of hypertension are presented as percentages. The associations between hypertension and socio-demographic variables, viz., age, sex, residences, smoking habit, physical activity, and family history of hypertension were assessed by comparing the

prevalence of hypertension in individuals with and without these risk factors. The bivariate analyses and chi-square test of significance were used to find out the association between hypertension and several risk factors or correlates of hypertension by considering p-value less than 5% (i.e., p<0.05) as statistically significant. The test statistic is defined as follows:

$$\chi^{2} = \sum_{k}^{r} \sum_{j}^{k} \frac{\left(O_{ij} - E_{ij}\right)^{2}}{E_{ij}}$$

Where O_{ij} (i = 1,2,3,...,r and j = 1,2,3,...,k) denotes observed frequencies and E_{ij} (i = 1,2,3,...,r) and j = 1,2,3,...,k denotes the expected frequencies.

RESULTS

Demographic characteristics of the respondents

The baseline characteristics of the study subjects are shown in Table 1. A total of 1302 respondents participated in this study whose age ranged from 18 to 60+ years old. About 56.5% of respondents were 18-44 age level whereas only 2.8% were above 60 years old that indicates the large portion of working forces are young generation. The male respondents were approximately six times greater than the female, because larger percentages of government employees are still now male. About 86% of respondents live in urban area whereas only 14% live in rural region; this is the case because of most of the govt. offices are located in urban areas.

Table 1: Demographic characteristics of the sample (n=1302).

Characteristics	N	%
Age group		
18-44	737	56.6
45-59	529	40.6
60+	36	2.8
Sex		
Male	1112	85.4
Female	190	14.6
Residence		
Urban	1122	86.2
Sub-urban/rural	180	13.8
Smoking habit		·
Smoker	446	34.3
Non smoker	856	65.7
Physical exercise		
Yes	386	29.6
No	916	70.4
Family heritage		·
HTN	298	22.9
DM	154	11.8
Others	110	8.5
No	740	56.8

In terms of smoking habit, 34.3% and 65.7% of the respondents were smoker and non-smoker respectively. The study also shows that approximately 70% of the respondents did not take their regular physical exercise and 22.9% of the respondents had the family history of hypertension (Table 1).

Prevalence of hypertension

Figure 1 shows the percentage distribution of hypertension of 1302 government employees in Rangpur City Corporation, Bangladesh. It depicts that only 21% of respondents reported no hypertension. It is also noticeable that about 25% of respondents had hypertension whereas about 54% of respondents were found at pre-level or stage-1 hypertension. That means a large number of the respondents (79%) were found at hypertension and pre-hypertension conditions (Figure 1).

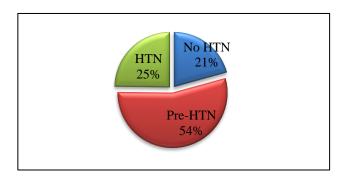


Figure 1: Percentage allocation of hypertension with reference to blood pressure.

Table 2 indicates the hypertension level of sampled respondents in Rangpur City Corporation according to the age group. About 28.4% of the respondents were in hypertension level at age group 45-59 and 22.2% were at age 60+. Roughly, the pre-hypertension level is approximately two times greater than the hypertension level for all of the age group. The test statistic χ^2 value is 28.05 and p-value is less than 0.0001, indicates that there is a significant relationship between hypertension and age of the respondents (Table 2).

Table 3 reveals the hypertension level of government employees in Rangpur City Corporation according to gender. It was found that 18.9% of female were in hypertensive condition whereas 23.7% of male were hypertensive that means hypertension is more prevalent in men than women. In the case of pre-HTN level, about 58.4% male and 40.5% female were suffering from stage-1 hypertension. It assumes that the respondents who are at the pre-HTN level may fall into hypertension in future; so, it creates public concern at this moment. The test statistic χ^2 value is 50.08 and p-value is less than 0.0001, shows a significant association between gender and hypertension level. It is clearly represented that the hypertensive tendency of male is higher than the female counterparts (Table 3).

Table 2: Hypertension levels according to age group.

A go guoun	HTN group	HTN group			
Age group	No HTN	Pre-HTN	HTN	Total	(P value)
18-44	189	406	142	737	
%	25.6	55.1	19.3	131	
45-59	83	296	150	529	
%	15.7	56.0	28.4	329	
60+	4	24	8	26	28.05
%	11.1	66.7	22.2	36	(<0.0001)
Total	276	726	330	1302	

Table 3: Hypertension levels according to gender.

Sex	HTN group	HTN group				
	No HTN	Pre-HTN	HTN	Total	(P value)	
Male	199	649	264	1112		
%	17.9	58.4	23.7	1112		
Female	77	77	36	100	50.08	
%	40.5	40.5	18.9	190	(<0.0001)	
Total	276	726	300	1302		

Table 4: Hypertension levels according to residence.

Residences	HTN group	χ² value			
	No HTN	Pre-HTN	HTN	Total	(P value)
Urban	241	610	271	1122	7.48 (0.0237)
%	21.5	54.4	24.1	1122	
Sub-urban/rural	35	116	29	190	
%	19.5	64.4	16.1	180	
Total	276	726	300	1302	

Table 5: Hypertension levels according to smoking habit.

Smoking habit	HTN group	χ² value			
	No HTN	Pre-HTN	HTN	Total	(P value)
Smoker	77	256	113	116	
%	17.3	57.4	25.3	446	
Non-smoker	199	470	187	956	6.83
%	23.3	54.9	21.8	856	(0.0329)
Total	276	726	300	1302	

Table 6: Hypertension levels according to physical exercise.

Physical exercise	HTN group	χ² value			
	No HTN	Pre-HTN	HTN	Total	(P value)
Yes	99	205	82	296	
%	25.6	53.1	21.3	386	
No	177	521	218	016	6.585
%	19.3	56.9	23.8	916	(0.0371)
Total	276	726	300	1302	(0.0371)

The given Table 4 depicts the percentage allocation of different hypertension level of the government employees who live at urban and sub-urban/rural areas in Rangpur City Corporation. Most of the respondents were in urban

areas and the prevalence of hypertension and pre-HTN in urban areas were 24.1% and 54.4% respectively. It is evident from Table 4 that a large percentage of the respondents were in pre-HTN condition for both urban and sub-urban areas. As p-value (0.0237) is less than

0.05, means the association between residence and HTN is significant (Table 4).

Table 5 shows the cross-tabulation of hypertension level and smoking behaviour of the respondents. In terms of smoker respondents, the prevalence of hypertension and pre-HTN were found at 25.3% and 57.4% respectively. Hypertension was more prevalent among the smoker group. The pre-HTN level is approximately two times greater than HTN level for both smoker and non-smoker cases. As the p-value (0.0329) is less than 0.05, means the association between smoking habit and HTN is significant (Table 5).

Table 6 represents the bivariate analysis to measure the association between hypertension level and practicing physical exercise of the respondents. Almost 24% of hypertensive respondents do not take their physical exercise as well as almost 57% pre-hypertensive study population does not do their physical exercise. Hypertension is more prevalent (23.4%) among the respondents who do not take regular exercise than the respondents who take regular exercise. In this case, the value of the Chi-square test of significance is 6.585 and the p-value (0.0371) is less than 0.05, indicates the association between physical exercise and HTN is significant (Table 6). The result indicates that physical exercise is a significant factor for the hypertension of the respondents.

DISCUSSION

The prevalence of hypertension among Bangladeshi adults on a national level has been previously studied. This study illustrates similar results for the more closed community level case. After analysing data, the result shows that about 25% of the respondents had hypertension and about 54% of the respondents had prelevel or stage-1 hypertension. Overall, a total of 79% of the government employee were hypertensive at aged 18-60+. This study also reveals some significant correlates of hypertension. The previous studies conducted with the technical support of World Health Organization country office for Bangladesh, found the prevalence of hypertension among adults aged ≥25 years were 20% in 2010 and 21% in 2013. 9,10 The higher prevalence of hypertension noted among males and the age wise distribution noted in this study was concordant with other reported literature. 11-13 Advancing age, male gender, current diabetic status, overweight and obesity defined by BMI, and central obesity were identified as significant correlates in the previous study, based on multivariate analysis. 14,15 Stress, staying away from home due to being job station, odd hours of work with changed sleep pattern, consumption and probable indulgence in the usage of tobacco and alcohol to beat loneliness could be some of the potential reasons for the high prevalence of hypertension noted in the area, as speculated by the authors. 14-16 This study shows that the overall prevalence of hypertension among the government employee of the

City Corporation Rangpur is very high and its significant correlates are age, gender, residence, smoking habit, and physical exercise. The male respondents who are at the higher aged group, residing in urban areas, not taking regular physical exercise, and having smoking habit were found more prevalent of hypertension than the other counterparts.

CONCLUSION

Hypertension is very common non-communicable disease among all aged population in developing country like Bangladesh. Nowadays, disease changes its pattern from infectious disease to non-communicable disease like hypertension, diabetes, cardiovascular disease, etc. This case study shows a large percentage of respondents are hypertensive and pre-hypertensive. The result indicates the prevalence of hypertension among the government employee in Rangpur City Corporation, Bangladesh is approximately 25% and pre-hypertension approximately 54%. Prevalence of hypertension has some correlates; finding the significant factors of hypertension are very important to reduce the hypertension level and its associated consequences. This study mainly reveals the prevalence of hypertension and its significant correlates or risk factors among the respondents. It is recommended that conducting more comprehensive population-based studies to estimate the prevalence of hypertension among government employees in Rangpur City Corporation as well as Bangladesh and this study would be an important source of baseline information about the present situation of hypertension and its risk factors.

ACKNOWLEDGEMENTS

The authors are thankful to the director, hypertension and research centre, Rangpur for their kind instrumental supports. They also acknowledge the invaluable guidelines regarding statistical analysis and data presentation rendered by Dr. Prosannajid Sarkar, senior scientific officer, Dr. Wajed Mia Research and Training Institute, Begum Rokeya University, Rangpur, Bangladesh.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

REFERENCES

- 1. Rao CR, Kamath VG, Shetty A, Kamath A. High blood pressure prevalence and significant correlates: a quantitative analysis from coastal Karnataka, India. ISRN Prevent Med. 2013:574973.
- 2. Devi P, Rao M, Sigamani A, Faruqui A, Jose M, Gupta R, et al. Prevalence, risk factors and awareness of hypertension in India: a systematic review. J Hum Hypertens. 2013;27(5):281.

- Sayeed MA, Banu A, Haq JA, Khanam PA, Mahtab H, Azad AK. Prevalence of hypertension in Bangladesh: effect of socioeconomic risk factor on difference between rural and urban community. Bangladesh Medical Research Council Bulletin. 2002;28(1):7-18.
- 4. Chinyere OI, Mwuese UP, Ara BI. Prevalence and awareness of hypertension amongst staff and students of a tertiary institution in Nigeria. Global Adv Res J Med Medical Sci. 2015;4(1):61-6.
- Diaz A, Ferrante D. Trends in prevalence of hypertension in Argentina in the last 25 years: a systematic review of observational studies. Revista Panamericana de Salud Pública. 2015;38:496-503.
- 6. Basu G, Biswas S. Epidemiology of hypertension and its risk factors in a village of West Bengal. Indian J Res Rep Med Sci. 2013;3:13-7.
- 7. Agarwal AK, Yunus M, Khan A, Ahmad J. A clinical-epidemiological study of hypertension in rural population of Jawan Block, Distt, Aligarh (UP) India. J Royal Societ Health. 1994;114(1):17-9.
- Ahlawat SK, Singh MM, Kumar R, Kumari S, Sharma BK. Time trends in the prevalence of hypertension and associated risk factors in Chandigarh. J Indian Med Assoc. 2002;100(9):547-2.
- 9. Rahman M, Zaman MM, Islam JY, Chowdhury J, Ahsan HN, Rahman R, et al. Prevalence, treatment patterns, and risk factors of hypertension and prehypertension among Bangladeshi adults. J Hum Hypertens. 2018;32(5):334.
- Zaman MM, Bhuiyan MR, Karim MN, Rahman MM, Akanda AW, Fernando T. Clustering of noncommunicable diseases risk factors in Bangladeshi adults: an analysis of STEPS survey 2013. BMC Public Health. 2015;15(1):659.
- 11. Muntner P, Carey RM, Gidding S, Jones DW, Taler SJ, Wright JT, et al. Potential US population impact

- of the 2017 ACC/AHA high blood pressure guideline. Circulation. 2018;137(2):109-18.
- 12. Jo I, Ahn Y, Lee J, Shin KR, Lee HK, Shin C. Prevalence, awareness, treatment, control and risk factors of hypertension in Korea: the Ansan study. J Hypertens. 2001;19(9):1523-32.
- Zachariah MG, Thankappan KR, Alex SC, Sarma PS, Vasan RS. Prevalence, correlates, awareness, treatment, and control of hypertension in a middleaged urban population in Kerala. Indian Heart J. 2003;55(3):245-51.
- 14. Islam JY, Zaman MM, Haq SA, Ahmed S, Al-Quadir Z. Epidemiology of hypertension among Bangladeshi adults using the 2017 ACC/AHA Hypertension Clinical Practice Guidelines and Joint National Committee 7 Guidelines. J Hum Hypertens. 2018;32(10):668.
- 15. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. The seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. J Am Med Assoc. 2003;289(19):2560-72.
- Sayeed MA, Banu A, Haq JA, Khanam PA, Mahtab H, Azad AK. Prevalence of hypertension in Bangladesh: effect of socioeconomic risk factor on difference between rural and urban community. Bangladesh Med Res Council Bulletin. 2002;28(1):7-18.

Cite this article as: Das S, Chakravorti BK, Islam S. Prevalence of hypertension and its significant correlates among Bangladeshi adults: a quantitative analysis from City Corporation Rangpur, Bangladesh. Int J Community Med Public Health 2019;6:3748-53.