Factors associated with blood pressure control amongst hypertensive patients in Northwest Bangladesh.

Md. Golam Rabbani[a], Md. Anayet Ullah[b], Md. Sahinur Rahman[c]
Nasrin Jahan Shammi[d]

Abstract

Background: Hypertension is a major public health problem worldwide including Bangladesh. In Bangladesh only 31.4% of patients with hypertension on treatment had their blood pressure controlled. **Objective:** To evaluate the control of hypertension and its associated factors among the adults patients with hypertension attending at outpatient clinic in a district headquarter of western part of Bangladesh. **Methods:** This was a cross sectional study conducted among hypertensive patients attending at private chamber in Chapai Nawabganj over 02 years period from January 2016 to January 2018. Total 260 hypertensive patients were selected purposively. Data were collected using a structured questionnaire by interview, physical and clinical examination and review the past medical documents of the patients. The questionnaire was designed to record patients' demographic, anthropometric and lifestyle factors and medical information (present and past up to 6 months) including treatment of hypertension and co-morbid conditions and documented clinical and laboratory findings. Chi-square test was applied to verify an association of demographic and life style factors, BMI status, disease (hypertension) duration and associated co-morbid **(Diabetes mellitus)** with blood pressure status. **Results:** Out of 260 hypertensive patients, only 30 (11.5 %) had their blood pressure levels controlled. Majority of the study subjects, were female (74.6%), >50 years (56.0%), under graduate (83.4%) and overweight or obese (50.4%). A high prevalence (27.3%) of diabetes mellitus was noted in this study. Majority (56.9%) of the study subjects noticed their hypertension within 5 years. Higher educated and more physically active hypertensive patients were significantly and positively associated with optimally controlled BP. **Conclusion:** A higher proportion of hypertensive patients remain with un-controlled BP. Massive public awareness campaign targeting modifiable risk factors is essential in controlling hypertension in Bangladesh, especially focusing on physical exercise and control of diabetes

[a]Associate Professor, Department of Medicine, Barind Medical College, Rajshahi, Bangladesh.

[b]Professor, Department of Community Medicine, Barind Medical College, Rajshahi, Bangladesh.

[c]Medical officer UH & FPO office, Jhenaidah Sadar, Jhenaidah, Bangladesh.

[d]Associate Professor, Department of Pharmacology, Barind Medical College, Rajshahi, Bangladesh.

Correspondence to : MG Rabbani golamrabbani1964@gmail.com

Cite this as: BMCJ 2019; 5(2):9-16

Received : 11 January 2019

Accepted : 15 February 2019

Keywords: Hypertension, Controlled blood pressure, uncontrolled blood pressure.

Introduction

Hypertension is a major public health problem worldwide.[1] Hypertension is one of the major non-communicable diseases (NCDs) in the world, which significantly contributes to the burden of cardiovascular diseases (CVDs), stroke, renal failure, disability and premature death.[2-4] It is also identified as a global disease burden and ranked third as a cause of disability-adjusted life years.[5] According to WHO, about 17 million deaths occur worldwide due to CVDs, of which hypertension alone accounts for 9.4 million deaths[6,7] and 80% of CVD related death occurred in developing countries.[8] The global prevalence of hypertension is projected to increase from 26% in 2000 to 29.2% by 2025,[6] which will be approximately 29% of the world's population. Although hypertension is more prevalent in developed countries like USA[9],

its prevalence is increasing in low and middle income countries.[2] Countries in Asia, especially Southeast Asia, are having an increasing burden of hypertension including CVDs.[10-12]According to WHO, hypertension has become a significant health concern in Asian region, affecting more than 35% of the adult population.[13]

Bangladesh, a developing country in south Asia, has been experiencing an epidemiologic transition from communicable diseases to non-communicable diseases (NCDs).[14] In recent years, rapid urbanization, increased life expectancy, unhealthy diet and lifestyle changes have led to an increase in the rate of CVD including hypertension in Bangladesh.[15] In Bangladesh, there is a wide range of variation in the prevalence of hypertension reported by several studies ranging from 11-44%.[16-20] Despite the high prevalence of hypertension in Bangladesh and low rate of control, factors associated with hypertension control in those receiving treatment have not been described. These factors may differ from those of developed nations. Despite the availability of multiple effective antihypertensive medications with proven benefits in reducing cardiovascular morbidity and mortality, control of hypertension remains poor.[21,22] In both high and low income countries, less than 27% and 10% respectively of hypertensive patients achieved their target blood pressure.[21,22] In recent population based survey in Bangladesh only 31.4% of patients with hypertension on treatment had their blood pressure controlled.[23] For the improvement of this worse situation, it is needed to identify the factors that affect hypertension control. Unfortunately, the reasons for uncontrolled hypertension remain unclear in low income countries and have been insufficiently studied in Bangladesh. The prime objective of this study is to identify the correlates of blood pressure control among the patients with hypertension attending at outpatient clinic in Chapai Nawabganj, a district headquarter of western part of Bangladesh. Understanding predictors of poor blood pressure control can facilitate development of targeted strategies

Methods

This was a cross sectional study conducted among hypertensive patients attending at private chamber in Chapai Nawabganj over 02 years period from January 2016 to January 2018. Total 260 hypertensive patients were selected purposively. Data were collected using a structured questionnaire by interview, physical and clinical examination, and review the past medical documents of the patients. The questionnaire was designed to record patients' demographic, anthropometric and lifestyle factors, and medical information (present and past up to 6 months) including treatment of hypertension and co-morbid conditions, and documented clinical and laboratory findings. Standing height in meter and weight in kg were measured during the physical examination of the patients, which were used to calculate their body mass index (BMI). Blood pressure was measured with the patient in sitting position after 10 minutes of rest, using a Mercury sphygmomanometer. Phase V korotkoff sound was used to determine the diastolic blood pressure. Hypertension was defined as either systolic BP > 140 mm of Hg or diastolic BP >90 mm Hg.[21] Past medical information provided by the patients during present visit was cross-checked with their medical records.

Data were analyzed by computer using SPSS for windows. Descriptive analytical techniques involving frequency distribution and computation of percentage were applied.

Chi-square test was applied to verify an association of demographic and life style factors, BMI status, disease (hypertension) duration and associated co-morbid (**Diabetes mellitus)** with blood pressure status.

Results

A total of 260 study subjects, three fourth (74.6%) were female. More than 56% of the study subjects were >50 years. Most (83.4%) of the participants were under graduate. Two-thirds (66.2%) of the subjects reported a sedentary life style. A high prevalence (27.3%) of diabetes mellitus was noted in the study sample. Majority (56.9%) of the study subjects noticed their hypertension within 5 years. Almost half (50.4%) of the study subjects were overweight or obese (Table 1).

Table 1: Characteristics of the study subjects. N=260

Characteristics	Number N (%)
Age of the patients	
Up to 30 years	11(4.2)
31 - 50 years	103 (39.6)
>50 years	146 (56.2)
Gender	
Male	66 (25.4)
Female	194 (74.6)
Educational Status	
Up to HSC	217 (83.4)
Graduate or above	43(16.6)
Life style	
Sedentary	172 (66.2)
Active	88 (33.8)
Diabetes mellitus	
Present	71 (27.3)
Absent	189 (72.7)
Disease duration	
5 year or below	148 (56.9)
>5 years	112 (43.1)
BMI status	
<25	129 (49.6)
25 – 29.9	99 (38.1)
30 or above	32 (12.3)

Table 2: Factors associated with blood pressure status. n = 260

Factors	Blood pressure status		p-value
	Controlled N (%)	Uncontrolled N (%)	
Age of the patients			
Up to 30 years (n=11)	3(27.3)	8(72.7)	
31 - 50 years (n=103)	16 (15.5)	87(84.5)	0.37
>50 years (n=146)	11 (7.5)	135 (92.5)	
Gender			
Male (n=66)	10(15.2)	56 (84.8)	0.28
Female (n=194)	20 (10.3)	174 (89.7)	
Educational Status			
Up to HSC (n=217)	20 (9.2)	197 (90.8)	0.008
Graduate or above (n=43)	10 (23.3)	33 (76.7)	
Lifestyle			
Sedentary (n=172)	15 (8.7)	157 (91.3)	0.047
Active (n=88)	15 (17.0)	73 (83.0)	
Diabetes mellitus			
Present (n=71)	4 (5.6)	67 (94.4)	0 .068
Absent (n=189)	26 (13.8)	163 (86.2)	
Disease duration			
5 year or below (n=148)	22 (14.9)	126 (85.1)	**0.054**
>5 years (n=112)	8 (7.1)	104 (92.9)	
BMI status			
<25 (n=129)	18 (14.0)	111 (86.0)	
25 – 29.9 (n=99)	10 (10.1)	89 (89.9)	**0.404**
30 or above (n=32)	2 (6.2)	30 (93.8)	

Out of 260 hypertensive patients, only 30 (11.5 %) had their blood pressure levels controlled and remaining 230 (88.5%) had not.

In Chi-square test higher educated and more physically active hypertensive patients were significantly and positively associated with optimally controlled BP. Age, gender, presence of diabetes mellitus, duration of disease (hypertension) and BMI were not identified as associated factors of blood pressure status. Having Diabetes mellitus and longer duration of disease (hypertension) were marginally non-significant and negatively correlated with optimal BP control. Only 7.5% patients had controlled blood pressure in age group >50 years. On the other hand 27.3% patients had controlled blood

pressure in age group below 30 years. Though the rates of controlled hypertension among the different age groups was not significantly differed, but it showed an upward trend as age advances. Males more likely to have optimal BP control as compared to females patients, but it was not significantly associated with blood pressure control. The patients with BMI <25 kg/m^2 had adequately controlled their blood pressure levels more than the patients who were over weight (25 – 29.9 kg/m^2) or obese (BMI ≥ 30 kg/m^2). Though obese patients experienced less blood pressure control, but BMI was not significantly associated with BP control (Table 2).

Discussion

Despite the availability of multiple effective antihypertensive medications with proven benefits in reducing cardiovascular morbidity and mortality, control of hypertension remains poor.[22,24] The target of 140/90 mmHg is not attained by the majority of hypertensive patients. The proportion of patients achieving this target is still below 50% worldwide 281.[22] The proportion of hypertensive patients achieving this target varies between different countries. In both developed and developing countries, less than 27% and 10% respectively of hypertensive patients have achieved their target blood pressure.[22,24] The lowest rates of blood pressure control have observed in developing countries. For instance in a survey from Asian countries,Van Minh et al. reported that only 5.4% of hypertensive participants had blood pressure below 140/90 mmHg.[25] In this study, we observed that only 11.5% patients had their hypertension controlled, it was much less than the hypertension control rates in the United States (29-53%) and European (30-50%) population.[26,27] It may be due to the difference of individual and social conditions, and the quality of care from health providers. By contrast, in a comparison between the National Health and Nutrition Examination Survey (NHANES) 1988-1994 and 1999-2008 Egan *et al.* found that the percentage of hypertensive patients with controlled blood pressure increased from 27.3% to 50.1% over the period in USA.[28] A similar trend has been observed in England.[28,29] We have also a space to improve the worst situation in Bangladesh by effective intervension programs for controlling the blood pressure. Being older is commonly associated with poor controlled blood pressure.[25,28,30] In this study, though the rates of controlled hypertension among the different age groups was not significantly differed, but it showed an upward trend as age advances. It may be due to age-related increases in blood pressure leading to a higher prevalence of isolated systolic hypertension in individuals specially over 50 years.[33]

The relationship between gender and poor blood pressure control has been contradictory. Some studies revealed a negative association between women and blood pressure control.[32-34] By contrast others studies revealed that women were more likely to have controlled blood pressure.[35,36] In one study the relationship between women and blood pressure control changed with age. Compared to men, younger women were more likely to have controlled blood pressure and older women were less likely to have controlled blood pressure.[37] Moreover, some studies reported being male as a predictor for inadequate blood pressure control.[38-40] Due to these discrepancies, there does not seem to be strong evidence supporting any particular association between gender and poor blood pressure control. The present study finding also didn't find any association of gender with blood pressure control.

A higher level of education was associated with better blood pressure control.[36,41] In study conducted in 184 general practices with free access to care, Paulsen et al identified that patients with less than 10 years education were less likely to achieve blood pressure control compared to those with higher levels of education.[42] In the analysis of NHANES 1999-2004, Ostchega et al. found that hypertensive patients with lower levels of education were less likely to have controlled blood pressure.[43] Sandoval et al found that low education was associated with poor blood pressure control.[41] Wong et al found that individuals with lower education background had 3.5 times higher life years lost than those with higher education. Hypertension was an important contributor to this disparity accounting for 3.5% the total difference in years lost between both groups.[44] In this present study we also observed that lower education levels had been more consistently associated with poor blood pressure control. It may be due to less awareness of the lower educated people about the complications of uncontrol blood pressure.

In previous studies the positive role of physically active life to control the blood pressure up to the optimum level is well documented.[45,46] Physically active lifestyle not only helps control high blood pressure (Hypertension), it also helps to manage weight, strengthen heart and lower stress level. A healthy weight, a strong heart and general emotional health are all good for your blood pressure.[45] Regular physical activity makes your heart stronger. A stronger heart can pump more blood with less effort. If your heart can work less to pump, the force on your arteries decreases, lowering your blood pressure.[46] The present study findings also go in favor of it.

Having Diabetes mellitus was nearly significant and negatively correlated with optimal BP control (≤140/90 mm of Hg) in this study. It is plausible, that diabetic patients, may have encountered challenges in observing the treatment for blood pressure control. This finding is similar with the reported studies that highlight reduced BP control among patients with diabetes.[41,47] It is plausible that among such patients, treatment of the comorbidity may be suboptimal. This poses a challenge to the successful control of hypertension among such patients.

Longer duration of disease (hypertension) was negatively correlated with optimal BP control. Patients with long established hypertension have been found more likely to have uncontrolled blood pressure.[48] This short of observation also noted in the present study.

Lower body weight is associated with better longitudinal BP control. The continually increasing BMI in normotensives may account for increasing prevalence of hypertension.[49] Same trend also observed in our study though BMI was not statistically associated with BP control.

A degree of bias may exist in this present study. We did not assess patients' adherence to antihypertensive medication. However, these data have relevant clinical implications. This study provides a framework for identifying hypertensive patients who are at high risk of poor control, and identified factors, like low educational status, sedentary lifestyle, presence of diabetes and long established hypertension may be amenable to improve the bleak situation.

References

1. Yousuf S, Reddy S, Ounpuus *et al.* Global burden of cardiovascular diseases: part 1: general considerations, the epidemiologic transition, risk factors and impact of urbanization. Circulation 2001;104:2746-53.

2. Alwan A. World Health Organization. Global status report on noncommunicable diseases 2010-2011.
3. He J, Whelton PK. Epidemiology and prevention of hypertension. Medical Clinics of North America. 1997;81(5):1077-97.
4. Whelton PK. Epidemiology of hypertension. The Lancet 1994;344 (8915):101-6.
5. Ezzati M, Lopez AD, Rodgers A, Vander Hoorn S, Murray CJL. Selected major risk factors and global and regional burden of disease. The Lancet 2002;360 (9343):1347-60.
6. Lim SS, Vos T, Flaxman AD, *et al.* A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet 2012;380 (9859):2224-60
7. World Health Organization. A global brief on hypertension: silent killer, global public health crisis: World Health Day 2013. 2013
8. Lozano R, Naghavi M, Foreman K, *et al.* Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet 2012;380 (9859): 2095–2128.
9. Olives C, Myerson R, Mokdad AH, Murray CJL, Lim SS. Prevalence, awareness, treatment, and control of hypertension in United States counties, 2001–2009. PLOS One 2013;8(4): c60308.
10. Singh RB, Suh IL, Singh VP, *et al.* Hypertension and stroke in Asia: prevalence, control and strategies in developing countries for prevention. J Hum Hypertens. 2000;14 (10-11): 749-64.
11. Van Minh H, Byass P, Chuc NTK, Wall S. Gender differences in prevalence and socioeconomic determinants of hypertension: findings from the WHO STEPs survey in a rural community of Vietnam. J Hum Hypertens. 2005;20(2): 109-15.
12. Hoang VM, Byass P, Dao LH, Nguyen TK, Wall S. Risk factors for chronic disease among rural Vietnamese adults and the association of these factors with sociodemographic variables: findings from the WHO STEPs survey in rural Vietnam, 2005. Prev Chronic Dis. 2007;4(2):422-2.
13. Neupane D, McLachlan CS, Sharma R, *et al.* Prevalence of hypertension in member countries of South Asian Association for Regional Cooperation (SAARC): systematic review and meta-analysis. Medicine 2014;93(13):e 74.
14. Islam AK, Majumder AA. Hypertension in Bangladesh: a review. Indian Heart J. 2012;64(3):319-23.
15. Joshi P, Islam S, Pais P, *et al.* Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. JAMA 2007;297(3):286-94.
16. Moniruzzamani AT, Rahmani S, Acharyyai A, Islami FA, Ahmedi MSAM, Zamanii MM. Prevalence of hypertension among the Bangladeshi adult population: a meta-analysis. Regional Health Forum 2013;17(1):15-9.
17. Saquib N, Saquib J, Ahmed T, Khanam MA, Cullen MR. Cardiovascular diseases and type 2 diabetes in Bangladesh: a systematic review and meta-analysis of studies between 1995 and 2010. BMC Public Health 2012;12:434.

18. Karar ZA, Alam N, Streatfield PK: Epidemiologic transition in rural Bangladesh, 1986-2006. Global Health Action, [S.l.], V 2, Jun. 2009. ISSN 16549880. Available at: http://www.globalhealthaction.net/index.php/gha/article/ view/25510; Last accessed March 8, 2019.
19. Alamgir AKM, Ali SMK, Haque K. Extra salt intake as determinant of high blood pressure. Chest Heart J. 2009;33:127–133.
20. Moni MA, Rahman MA, Haque MA, Islam MS, Ahmed K. Blood pressure in relation to selected anthropometric measurements in senior citizens. Mymensingh Medical Journal: MMJ 2010;19(2):254-8.
21. Chobanian AV, Bakris GL, Black HR, *et al.* Seventh Report of Joint National Committee on Prevention, Detection, Evaluation And Treatment Of Hypertension, Hypertension 2003;42; 1206-52 .
22. Pereira M, Lunet N, Azevedo A, *et al.* Differences in Prevalence, Awareness, Treatment and Control of Hypertension between Developing and Developed Countries. J Hypertens 2009;27;963-75.
23. Rahman, Mizanur, Gilmour, Stuart, Akter, Shamima, ABE, Sarah K , Saito, Siko, Shibuya, Kenji. Journal of hypertension 2015;33(3):465-72
24. Chobanian AV, Bakris GL, Black HR, *et al.* Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension 2003;42:1206-52.
25. Van Minh H, Soonthornthada K, Ng N, et al. Blood pressure in adult rural INDEPTH population in Asia. Glob Health Action. 2009;2.
26. GO AS, Mozaffarian D, Roxr VZ, et al. Heart Disease and Stroke Statistics 2013 Update: A Report From American Heart Association Circulation 2013;127 :E 6-E 245.
27. Kearney PM,Whelton M, Reynolds K, *et al.* Worldwide Prevalence of Hypertension: A Systematic Review J Hypertens. 2004;22:11-9.
28. Egan BM, Zhao Y, Axon RN. US trends in prevalence, awareness, treatment, and control of hypertension, 1988-2008. JAMA 2010;303(20):2043-50.
29. Falaschetti E, Chaudhury M, Mindell J, Poulter N. Continued improvement in hypertension management in England: results from the Health Survey for England 2006. Hypertension 2009 ;53(3):480-6.
30 Franklin SS, Jacobs MJ, Wong ND, L'Italien GJ, Lapuerta P. Predominance of isolated systolic hypertension among middle-aged and elderly US hypertensives: analysis based on National Health and Nutrition Examination Survey III. Hypertension 2001;37(3) :869-74.
31. Franklin SS, Gustin Wt, Wong ND, et al. Hemodynamic patterns of age-related changes in blood pressure. The Framingham Heart Study. Circulation 1997 July 1;96(1):308-15.
32. Lloyd-Jones DM, Evans JC, Larson MG, O'Donnell CJ, Roccella EJ, Levy D. Differential control of systolic and diastolic blood pressure : factors associated with lack of blood pressure control in the community. Hypertension 2000;36(4):594-9.
33. Zanchetti A, Hansson L, Menard J, Leonetti G, Rahn KH, Warnold I, et al. Risk assessment and treatment benefit in intensively treated hypertensive patients of the hypertension optimal treatment study. J Hypertens. 2001; 19(4):819-25.
34. Collins R, MacMahon S. Blood pressure, antihypertensive drug treatment and the risks of stroke and of coronary heart disease. Br Med Bull. 1994;50(2):272-98.

35. Labeit AM, Klotsche J, Pieper L, et al. Changes in the prevalence, treatment and control of hypertension in Germany? A clinical-epidemiological study of 50,000 primary care patients. PLOS One. 2012;7(12):e 52229.

36. Agyemang C, van Valkengoed I, Koopmans R, Stronks K. Factors associated with hypertension awareness, treatment and control among ethnic groups in Amsterdam, the Netherlands: the SUNSET study. J Hum Hypertens. 2006;20(11):874-81.

37. Qvarnstrom M, Wettermark B, Ljungman C, Zarrinkoub R, Hasselstrom J, Manhem K, et al. Antihypertensive treatment and control in a large primary care population of 21, 167 patients. J Hum Hypertens. 2011;25(8):484-91.

38. Dzudie A, Kengne AP, Muna WF, et al. Prevalence, awareness, treatment and control of hypertension in a self-selected SubSaharan African urban population: a cross-sectional study. BMJ. 2012;2(4):1-10.

39. Godet-Mardirossian H, Girerd X, Vernay M, Chamontin B, Castetbon K, de Peretti C. Patterns of hypertension management in France (ENNS 2006-2007). Eur J Prev Cardiol. 2012;19(2):213-20.

40. Hyman DJ, Pavlik VN. Characteristics of patients with uncontrolled hypertension in the United States. N Engl J Med. 2001;345(7):479-86.

41. Sandoval D, Bravo M, Koch E, Gatica S, Ahlers I, Henriquez O, et al. Overcoming barriers in the management of hypertension: the experience of the cardiovascular health program in chilean primary health care centers. Int J Hypertens. 2012:405892. doi:10.1155/2012/405892

42. Paulsen MS, Andersen M, Munck AP, et al. Socio-economic status influences blood pressure control despite equal access to care. Fam Pract. 2012;29(5):503-10.

43 Ostchega Y, Hughes JP, Wright JD, McDowell MA, Louis T. Are demographic characteristics, health care access and utilization, and comorbid conditions associated with hypertension among US adults? Am J Hypertens. 2008;21(2):159-65.

44. Wang Z, Wu Y, Zhao L, Li Y, Yang J, Zhou B. Trends in prevalence, awareness, treatment and control of hypertension in the middle-aged population of China, 1992-1998. Hypertens Res. 2004;27(10):703-9.

45. Getting Active to Control High Blood Pressure. Available at: https://www.heart.org/en/health-topics/high-blood-pressure/changes-you-can-make-to-manage-high-blood-pressure/getting-active-to-control-high-blood-pressure. Last accessed March 10, 2019.

46. Exercise: A drug-free approach to lowering high blood pressure. Mayo Clinic. Available at: https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/in-depth/high-blood-pressure/art-20045206; Last accessed March 18, 2019.

47. Serra,, A. Oliveras , S. Bergoñon , L. Sans , A. Cobos , P. M art ínez , R. Art igas , E. Poch. Factors associated with blood pressure control in diabetic patients treated in nephrology units. Presdiab study. Nefrologia 2011;31(3): 313-21.

48. Kim KI, Kim Y, Kim HJ, Kang DH, Park JB, Choi DJ, et al. Current status and characteristics of hypertension treatment by primary physicians in Korea: data from Korean epidemiology study on hypertension. Am J Hypertens. 2008;21(8):884-9.

49. Ross D. Fletcher, Ronald Jones, Hans Moore, et al. Increased body mass index (BMI) promotes hypertension and worsens blood pressure control among US veterans. JACC 2018; 71(11). Available at : https://www.onlinejacc.org/content/71/11_Supplement/A1817?rss=1: Last accessed February 18, 2019.