

Original Research Article

Risk Factors of Hypertension in the Elderly: An Observational Study

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Abstract: Background: Hypertension is a significant non-communicable disease across the world which contributes to the worldwide disease burden. With the trend of graying population, this is a global pandemic. **Objective:** This study was aimed to assess the associated risk factors of hypertension in the elderly population in urban community of Dhaka city. **Method:** A total of 256 elderly people aged above 60 years with either pre-hypertension or hypertension were enrolled in this community-based cross-sectional study. The study period was January to July 2024. **Results:** It was found that, age, gender, being overweight, stress levels, red meat consumption and family history of hypertension were statistically significant with development of hypertension in the elderly. There was 3.5 times greater risk of development of hypertension in the elderly those who were overweight and had higher stress levels. It was also found that, those who not currently smoking, took normal amount of salt and consumed sufficient fruits and vegetables, were also vulnerable to hypertension. Diabetes mellitus was the commonest comorbidity in hypertensive elderly. **Conclusion:** Hypertension should be addressed with importance by the stakeholders, policy makers and the government in order to promote health awareness in the communities. Risk factors should be evaluated and prospective, larger-scale studies are recommended.

Keywords: Hypertension; elderly; urban community; risk factors; prevalence, Dhaka; graying population.

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INTRODUCTION

Demographic shift is a challenging phenomenon in the recent times, as the health system should be well-equipped and fully developed to serve the needs of the elderly population. By 2030, 1 in 6 people in the world will be aged 60 years or over [1]. The concept of population aging will apply specifically for the middle- and lower-income nations and the greatest change will now be experienced in these regions. It is speculated that, by 2050, 80% of the senior citizens will belong to these regions [1].

With the trend of graying population, the prevalence of non-communicable diseases is only expected to take the higher toll. Furthermore, owing to the projection of a 30% increase in worldwide prevalence of hypertension, by the year 2025 along with its crucial role in the rising burden of disease and disability, has become one of the most challenging concerns for global public health [2]. Hypertension is a condition which is one of the most important risk factors for the development of cardiovascular diseases and mortality

[3]. Studies suggest that, three-fourths of the world's hypertensive population reside in low- and middle-income countries and the prevalence of hypertension is higher in low- and middle-income countries (31.5%) than in high-income countries (28.5%) [4]. Furthermore, Bangladesh is one of those low- and middle-income countries which is undergoing an epidemiological transition from communicable to non-communicable diseases [3]. In this region, near-about 68% of deaths are caused by non-communicable diseases, with hypertension accounting for 15–20%. Hypertension in Bangladesh is the leading modifiable cause of a wide range of diseases and hence, an economic burden [5].

Hypertension can be defined as systolic BP level of ≥ 140 mm of Hg and/or diastolic BP level ≥ 90 mm of Hg. It is linked to development of a multitude of severely morbid conditions in older adults, for instance, stroke, coronary artery disease, cardiac failure, peripheral vascular disease [3]. Persistent untreated hypertension can also lead to renal failure, dementia and cognitive decline [6].

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Various risk factors, such as advancing age, family history, obesity, diet with high salt content (more than 3 grams/day), physical inactivity as well as excessive alcohol intake, are found to have links with the onset of hypertension [7]. These factors vary across nation to nation; in addition, differences exist between urban and rural regions of the same country [8].

Usually, hypertension is free of symptoms in its earlier stages, and measurement remains the only method to detect it. Even though large number of patients with hypertension remain asymptomatic, few people with HTN report headaches, lightheadedness, vertigo, altered vision, or syncopal attacks [9].

Furthermore, elderly people often suffer from issues such as frailty, multiple comorbidities, polypharmacy, cognitive impairment, depression, disability, falls, dizziness, and syncope. All of these interrelated factors can interfere with the control of BP. Thus, elderly hypertensive patients are a heterogeneous group, and chronological age is not necessarily synonymous with biological age. In addition, as individuals age, the rate of comorbidities increases. As mentioned, elderly patients usually have multiple comorbidities such as dyslipidemia, diabetes, ischemic heart disease, stroke, heart failure, sleep apnea, chronic lung disease, and chronic kidney disease. A comprehensive diagnostic work-up for multiple comorbidities is required to evaluate the medical condition of elderly hypertensive patients because such comorbidities are associated with poor clinical outcomes. Moreover, multimorbidity is common in hypertensive patients, and is associated with poor BP control. Accordingly, multimorbidity must absolutely be considered in the treatment of hypertension in the elderly population. Polypharmacy associated with multiple comorbidities has also been pointed out as a major factor in the low drug adherence and low hypertension control rate among elderly hypertensive patients [10].

In order to take effective preventive steps, identification of the risk factors is an essential prerequisite. This study intends to generate information on the risk factors among the geriatric population in urban areas of Dhaka city. The findings will highlight the socio-demographic and clinical elements of hypertension in the elderly emphasizing on the prevention and early evaluation of the modifiable ailment.

METHODS

Study design, participants and settings

A cross-sectional community-based study was conducted in the urban communities of Dhaka city. The duration of the study was January to July 2024. A total of 256 elderly people aged 60 years and above took part in the study. The sampling technique involved was purposive method. We included those patients with known hypertension meaning those who were diagnosed to have the disease and taking prescribed medication.

People who were not willing to participate, had any form of dementia or those who were critically ill were excluded from our study. Those participants who completed the written informed consent form were enrolled in this study.

The researchers measured BP using digital BP machine (OMRON 5 Series®, model: BP742N) during the data collection. Three measurements of both systolic and diastolic blood pressure were taken at approximately 5-minute intervals. All measurements were recorded in the questionnaire and the average of the last two measurements were utilized. In addition, the WHO's expanded STEP instrument was used to collect data on potential risk factors including data on dietary habits, intake of salt, tobacco consumption and physical activity (PA).

Data on other co-variates (e.g., household socio-economic status, education, occupation) and comorbid conditions including family history of hypertension, history of diabetes, and cardiovascular disease were also taken into consideration.

Measurements

BP was classified as normal, prehypertension or hypertension, based on criteria used in the WHO-International Society of Hypertension (WHO-ISH). The participants who had systolic BP (SBP) <120 mm Hg and diastolic BP <80 mm Hg and not taking any medication were taken to be normal. Those who had an SBP of 120-139 mm Hg or DBP of 80-89 mm Hg with no history of anti-hypertensive medications are taken to be prehypertensive. Only if the SBP was ≥ 140 mm Hg or DBP was ≥ 90 mm Hg or the BP was below these cut-offs and the participant was taking prescribed medication for treatment of hypertension, he/she was considered as a case of hypertension. Furthermore, by controlled hypertension we meant the SBP <140 mm Hg and DBP <90 mm Hg and the participant admitted he/she was on medication. On the contrary, uncontrolled hypertension could be referred to ≥ 140 mm Hg SBP or ≥ 90 mm Hg DBP despite the patient taking anti-hypertensive medication. Those cases with high measured BP were referred to hospitals for further diagnosis and management [11-12].

WHO-recommended cut-offs were used to classify Body Mass Index (BMI) accordingly. Meaning, underweight was below 18.5 kg/m²; normal weight was 18.5 to 24.9 kg/m²; overweight being 25.0 to 29.9 kg/m²; moderately obese was 30.0 to 34.9 kg/m² and lastly Severely obese being 35.0 to 39.9 kg/m² [13].

The data on fruits and vegetables intake were combined and categorized into <2 servings per day, 2-4 servings per day and ≥ 5 servings per day. Similarly, participants were defined as currently smoking if they reported smoking cigarettes, cigars or pipes during the data collection and vice versa. Besides, stress level was

assessed using Perceived Stress Scale. Severe stress and light stress were the two types of stress. Excess salt consumption was divided into two categories: excessive and normal; consumption of red meat into two categories regularly and occasionally. In addition, family history of hypertension was classified into either present or absent. Likewise, data on physical activity was gathered and time spent on physical activity were converted into minutes per week and calculated metabolic equivalent task (MET)-min per week. According to standard classification, a MET-min of <600 per week was classified as low PA, 600-3000 MET-min as moderate PA and >3000 MET-min was considered as high PA. As this study was done with elderly, we modified the categorization as very low PA (<300 MET-min/week),

low PA (300-<600 MET/min/week) and moderate PA (>600 MET-min/week) [14].

Data analysis

After collecting relevant data, they were all cleaned and sorted. Findings were expressed using frequencies and percentages where relevant. They were presented in the forms of tables. Chi square was conducted to evaluate association and lastly multivariate logistic regression was performed to establish the most empirical factors of hypertension. P value was considered to be statistically significant when it was <0.05. Data were analyzed using Statistical Package for Social Sciences (SPSS; Version 25).

RESULTS

Table 1: Socio-demographic and lifestyle attributes of the participants (n=256)

Characteristics	Number (n)	Percentage (%)
Age (in years)		
60-69	170	66.4
70-79	65	25.4
≥80	21	8.2
Gender		
Female	174	67.9
Male	82	32.1
Level of education		
Primary	41	16.0
Secondary	159	62.1
Higher	56	22.4
BMI (kg/m²)		
Normal weight	112	43.7
Overweight	136	53.1
Moderately obese	8	3.1
Family history of HTN		
Present	149	58.2
Absent	107	41.8
Current smoking status		
No	186	72.6
Yes	70	27.3
Number of servings of fruits and vegetables/day		
<2 servings	66	25.7
2-4 servings	159	62.1
≥5 servings	31	12.1
Salt consumption		
Excessive	53	20.7
Normal	203	79.2
Consumption of red meat		
Regularly	114	44.5
Occasionally	142	55.4
Physical activity		
Very low (<300 MET-min/week)	103	40.2
Low 300-<600 MET/min/week	124	48.4
Moderate (>600 MET-min/week)	29	11.3
Level of stress		
Heavy	180	70.3
Light	76	29.7

*BMI: Body mass index; HTN: Hypertension

Table 1 highlights the socio-demographic and lifestyle characteristics of the study participants. It is evident that, 66.4% respondents belonged to 60-69 years old range and majority of them were females (67.9%). Most of the participants (62.1%) completed their secondary level of education. Regarding BMI, 53.1% respondents were overweight. Family history was

present in 58.2% cases. Maximum participants (72.6%) were currently non-smokers. In addition, 62.1% consumed 2-4 servings of fruits and vegetables on daily basis and 55.4% took red meat occasionally. Besides, 48.4% used to indulge in low levels of physical activity. Lastly, it was clear that, 70.3% of the respondents suffered from heavy stress levels.

Table 2: Distribution of blood pressure levels among the participants (n=256)

Blood pressure categories	Males (n=82) (n/%)	Females (n=174) (n/%)
According to value		
Pre-hypertension	26 (31.7)	78 (44.8)
Hypertension	56 (68.3)	96 (55.2)
According to control		
Controlled HTN	50 (60.9)	135 (77.5)
Uncontrolled HTN	32 (39.1)	39 (22.4)

*HTN: Hypertension

The table depicts the distribution of the participants according to categories of blood pressure. It can be seen that; maximum cases were hypertensive (68.3% and 55.2%) in terms of males and females

respectively. Besides, control-wise, most of the patients' blood pressure (60.9% and 77.5%) fell into the controlled hypertension category for both males and females respectively [Table 2].

Table 3: Pattern of comorbidities along with hypertension in the participants (n=256)

Attributes	Comorbidities	Frequency (f)/ Percentage (%)
No. of comorbidities (along with hypertension)	Single disease	137 (53.5)
	Two diseases	105 (41.1)
	Three diseases	14 (5.5)
Types of comorbidities** (other than hypertension)	Diabetes Mellitus	78 (30.5)
	COPD	55 (21.4)
	Osteoarthritis	52 (20.3)
	Ischemic heart disease	47 (18.3)
	Chronic kidney disease	29 (11.3)
	Cerebrovascular disease	18 (7.0)
	Malignancy	4 (1.5)
	Parkinson's disease	1 (0.4)
	Others	23 (8.98)

** : Multiple response; COPD: Chronic Obstructive Pulmonary Disease

Table 3 above mentions about the patterns of comorbidities in the participants. Around 53.5% participants were suffering from another chronic condition along with hypertension. It is also evident that,

Diabetes mellitus was the commonest comorbidity [78 (30.5%)] followed by COPD [55 (21.4%)] and osteoarthritis [52 (20.3%)].

Table 4: Results of multiple logistic regression analysis of risk factors with hypertension

Risk factor	p-value	OR	95% CI
Age	0.005	1.654	1.091-4.193
Gender	0.004	2.756	1.195-6.165
BMI	0.001	3.546	1.587-8.457
Family history of HTN	0.003	2.527	1.123-6.386
Smoking status	0.362	0.598	0.210-2.006
Fruits and vegetable intake	0.170	0.967	0.415-1.197
Salt consumption	0.238	0.390	0.127-2.245
Red meat consumption	0.002	1.981	0.998-3.764
Physical activity	0.004	1.698	0.865-2.357
Stress level	<0.001	3.587	1.899-7.105

*OR: Odds Ratio; CI: Confidence Interval

A multiple logistic regression analysis was performed. Subjects with higher BMI (95% CI: 1.587-8.457) and stress levels had 3.5 times greater chances of developing hypertension. Age ($p=0.005$), gender ($p=0.004$), BMI ($p=0.001$), family history of hypertension (0.003), red meat consumption (0.002) and physical activity (0.004) had statistically significant association with development of hypertension. The association of stress level with hypertension was statistically highly significant ($p<0.001$).

DISCUSSION

This study was aimed to assess the modifiable and non-modifiable risk factors of hypertension in the elderly. We have also emphasized on the different classes of hypertension. Urban communities of Dhaka city were taken into account for our paper.

It was evident that, majority of the patients were aged between 60-69 years and were females. Similar findings were reported in another paper [15] in urban areas of Karnataka, India where 62.2% participants were 60-69 years old and 51.5% were females. We found that, most of the individuals had completed their secondary education. Another paper [16] regarding the prevalence and associated factors in some selected urban and rural areas of Bangladesh reveals that, no education was the commonest finding in terms of level of education; meaning 35.3% and 33.2% were illiterate in both urban and rural areas. This study included both slums and non-slum areas. The socio-economic status plays a key role in determining the educational factors of the communities.

Most of our respondents were overweight. Relevant study [17] was done in urban area of Bagalkot, India where 59.8% elderly people were found to have BMI greater than 25 kg/m². In addition, the findings expressed that, most of the people had a family history of hypertension. Previous study [18] done in urban population of India showed that, 70% of the respondents had family history.

Furthermore, majority of the participants were currently non-smokers. Similar study [16] found that, 74.5% of the urban elderly were never smokers. In addition, most of the individuals took 2-4 servings of fruits and vegetables on daily basis. Previous study [14] done in rural areas of Bangladesh exposed that, most of the participants (49.1%) consumed less than 2 servings of fruits and vegetables per day. The differences can be attributed to financial conditions and knowledge about healthy eating habits.

In our study, most of the people consumed salt in a normal manner. Another paper [19] in Indonesia found that, 55.1% consumed salt in an excessive manner. Awareness and concern about health can be linked with the variations in findings. Furthermore, we found that maximum respondents were doing low physical activity.

Another paper done in Bangladesh [15] reported that, 81.4% individuals were involved in low level of physical activity. Regarding stress level, majority of the respondents reported that they had excessive amount of stress in their lives. Relevant study [17] exhibited similar findings about stress levels, where both pre-hypertensive and hypertensive individuals had major stress among them.

With the context of categorization of hypertension, most of our respondents, both males and females fell into classification of hypertension according to value, and according to control, most of them had controlled hypertension. Study [14] done in rural areas of Bangladesh illustrated different findings, meaning only 20.1% respondents were pre-hypertensive followed by 18.1% being hypertensive. In addition, it was also found that, 31.3% had controlled hypertension and 24.2% had uncontrolled hypertension. Most of the participants had newly identified hypertension. The differences owe to regional variations in urban and rural settings. It should be added that, various studies show that hypertension is more prevalent in urban than rural communities; however, the gap is slowly reducing as hypertension is become more prevalent in the rural areas [19].

Regarding associated comorbid conditions, most of the people were found to suffer with another disease along with hypertension; however, multimorbidity was also a common phenomenon. Besides, diabetes mellitus was the most frequently occurring ailment followed by chronic obstructive pulmonary disease and osteoarthritis. Recent paper [20] on the prevalence of comorbidities in the elderly in Bangladesh found that, most of the patients presented with single disease (53.30%); commonest comorbidities were diabetes mellitus (28.37%), COPD (26.84%) osteoarthritis (19.94%) and ischemic heart disease (18.88%).

Lastly, we found age, gender, BMI, physical activity, stress, red meat consumption and family history of hypertension to have statistically significant association with hypertension in elderly. Aging is a significant component in development of hypertension. The ability of our organs, especially the cardiovascular system, which includes the heart and blood vessels, decreases as a person ages.

Relevant paper [21] found gender to have association with hypertension. In addition, on the basis of another study conducted in Sri Lanka, people with a family history of HTN were nearly 1.4 times more likely than those without a family history to acquire HTN [22]. Furthermore, previous research [23] threw light on the link of BMI and hypertension in the elderly.

Our findings expressed that; stress contributes to the occurrence of hypertension. This finding is in

alignment to prior research [24] which indicated that stress can influence the occurrence of hypertension. The majority of the elderly who suffered significant stress had hypertension, according to this study.

Another paper [16] reported that both the urban (AOR: 1.3; 95% CI: 1.0 to 1.7) and rural (AOR: 1.5; 95% CI: 1.2 to 1.9) participants who were involved in inadequate physical activity had significantly higher odds of hypertension compared with those who performed adequate physical activity. Stakeholders should take essential steps to make people aware of the benefits of performing adequate physical activities to halt the hypertension burden in Bangladesh. The government can develop strategies for keeping enough free spaces in the workplace so that people can perform physical activities. In addition, there is also need for creating more green space, parks, low-cost gymnasium facilities and parks in urban residential areas.

Since the prevalence of overweight and obesity is increasing in Bangladesh, it is anticipated that this existing high burden will further increase the risk of developing hypertension among Bangladeshi people. A population-based intervention for prevention and control of overweight and obesity is warranted to restrain the rising trend.

Lastly, previous paper [25] suggested that, those who consumed red meat had multivariable relative risks (95% CI) of hypertension compared to those who consumed no red meat. Government needs to take the necessary steps to raise awareness among people highlighting the consequences of an unhealthy lifestyle and hypertension. Otherwise, the burden of hypertension will continue to rise and will continue to create a considerable burden on our health system.

CONCLUSION

It can be concluded that, hypertension was a prevalent comorbidity among the urban elderly community in Dhaka city. Common chronic disease with hypertension included diabetes mellitus, osteoarthritis and chronic obstructive pulmonary disease. The findings comprehend that increasing age, female gender, being overweight, higher levels of stress, excessive consumption of red meat, inadequate physical activity and family history of hypertension were linked to development of hypertension. It was also deduced that, those who took sufficient fruits and vegetables, were smokers or consumed normal amounts of salt, were also prone to develop hypertension. Improving health literacy to increase the awareness of hypertension is the need of the hour. Interventions like weight management, increased physical activity, increased fruits and vegetables consumption, and reduction in tobacco are highly recommended.

Conflict of interest: None.

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