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Original Article

Analysis of Risk Factors among the Hypertensive Patients in a Tertiary Care Hospital of a Northern District in Bangladesh

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Key Words : *Hypertension, Obesity, Dyslipidemia, Cardiovascular disease, Risk factor.*

Abstract:

Background: *Hypertension is the leading cause of cardiovascular morbidity and mortality all over the world. Although some epidemiological studies on hypertension have been conducted in Bangladesh, the factors associated with hypertension in this nation remain unclear. The objective of this study was to determine the factors associated with hypertension among the adult population in a northern district in Bangladesh.*

Methods: *This cross- sectional study was conducted at the Department of Cardiology, M. Abdur Rahim Medical College Hospital, Dinajpur from March 2021 to February 2022. Out of total of 500 participants from OPD and indoor Cardiology Department of this hospital, 250 hypertensive patients were recruited as cases and another 250 normotensive participants were taken as control.*

Results: *Majority of the hypertensive patients in the study population were in 46-55 years of age group [male 48(32.4%) and female 40(39.2%)]; whereas normotensive participants less in number in the same age group [male 20(16.1%) and female 24(19.0%)]. Hypertension was more common in males (59.2% of cases). Moreover, hypertensive participants had strong family history (66%) of hypertension, urban residential area (68%), habits of smoking (67.2%), diabetes mellitus (64%), and excess salt consumption (70%). Raised levels of total cholesterol, triglycerides, and LDL were more common among hypertensive participants than that of the normotensive control group and which was found to be statistically significant.*

Conclusion: *Our study shows that the risk of hypertension was significantly associated with older age, male sex, family history of hypertension, urban residence, smoking, excess salt consumption, higher BMI and waist circumference, dyslipidemia and diabetes mellitus. More studies and area-specific longitudinal research is needed in this field which would help adopt national policies to limit incidence as well as consequences of hypertension in our country.*

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Introduction:

Hypertension is one of the major non-communicable diseases (NCDs) in the world, which significantly contributes to the burden of cardiovascular diseases (CVDs), stroke, kidney failure, disability, and premature death.[1-3] It is also identified as a global diseases burden and is ranked third as a cause of disability-adjusted life-years (DALYs).[4] According to the World Health Organization (WHO), about 17 million deaths occur worldwide due to CVDs, of which hypertension alone accounts for 9.4 million deaths,[5-6] and 80% of the CVD-related deaths occurred in the developing countries.[7] The global prevalence of hypertension is projected to increase from 26% in 2000 to 29.2% by 2025.[5] which will be approximately 29% of the world's population. Although hypertension is more prevalent in developed counties like USA.[8] its prevalence is increasing in the low and middle-income countries (LMIC).[1] Countries in Asia, especially Southeast Asia, are facing an increasing burden of

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hypertension and CVDs.[9-11] According to the WHO, hypertension has become a significant health concern in the Asian region, affecting more than 35% of the adult population.[12] The two fast-growing economies, India, and China, have a huge burden of hypertension and are projected to proliferate by 2025.[13]

Bangladesh, a developing country in South Asia, has been experiencing an epidemiologic transition from communicable diseases to 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] The prevalence of hypertension was first reported as 1.10% in 1976 in Bangladesh.[16] A systematic review and Meta–analysis of the prevalence of hypertension in the country among 6,430 adults for the period 1995 to 2009 was estimated to be 13.5% with a 95% confidence interval (IC) ranging from 12.7-14.2% .[17] Another meta-analysis for the prevalence of CVDs and type 2 diabetes between 1995 to 2010 found the pooled prevalence of hypertension to be 13.7% (CI: 12.1%-15.3%).[18] Moreover, there was a wide range of variation in the prevalence of hypertension reported by several studies ranging from 11 to 44%.[17-21] Due to the lack of representative data,[14,17,22] these studies were small-scale, confined to urban-rural communities or some other specific groups (e.g. slum residents), which cannot provide sufficient information for Bangladesh at large.[14,16,] Also, a substantial proportion of the population with hypertension remains undiagnosed and not treated properly due to lack of access to health care and high treatment costs. Thus, this study was intended to assess the factors associated with hypertension in the general adult population in Bangladesh.

Methods:

This case-control study was conducted at the Department of Cardiology, M. Abdur Rahim Medical College Hospital, Dinajpur, Bangladesh from March 2021 to February 2022. 500 participants were recruited as the study population. Among them, 250 were primarily hypertensive patients of the age group between 25 to 65 years, as the case group, and 250 non-hypertensive patients of the same age group and gender who attended OPD and indoor cardiology department of the hospital for other illnesses were recruited as the control group of the study. History about associated risk factors like age, sex, family history, occupation, place of residence, diabetes mellitus, smoking, salt consumption, alcohol etc. were taken and history regarding causes of secondary hypertension like chronic renal failure, renal artery stenosis, hyperaldosteronism, pheochromocytoma, thyroid disease, Cushing syndrome, coarctation of the aorta, etc. were ruled out. General physical examination and anthropometric measurements like height and weight were measured, and blood pressure, and heart rate were recorded. Investigations like Total cholesterol (TC), High-density lipoprotein cholesterol (HDL) levels, Low-density lipoprotein cholesterol (LDL) levels, and triglycerides (TG) were estimated. Those who had TC ≥200 mg/dl or TG e”150 mg/dl or LDL ≥130 mg/dl or HDL<40 mg/dl for men and <50 mg/dl for women were considered dyslipidemic. Hypertension is defined as Systolic blood pressure (SBP) ≥140mmHg and or Diastolic blood pressure (DBP) ≥90mmHg. The body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared [weight (kg)/ height (m^2)] and it was categorized as follows: <18.50kg/m^2= underweight; 18.50 to 22.99 kg/ m^2= normal; 23.00 to 27.49 kg/m^2= overweight and ≥27.5 = obese.[27-29] Waist circumference was used as a measure of abdominal obesity. Waist circumference ≥102 cm in men and ≥88 cm in women is defined as elevated and having abdominal obesity. Smoking was defined as active smoking within the past 12 months. The dietary sodium intake included the intake of condiments and sodium contained in food. Extra salt was defined as at least one teaspoon full of salt everyday (2,300 mg sodium) as per WHO STEPS Guidelines.[23] And harmful alcohol consumption was defined as drinking ≥4 standard alcoholic beverages in a single occasion in the last 30 days for females and ≥5 standard drinks in a single occasion in the last 30 days among males.[24] Data were entered in an excel sheet and analyzed by using SPSS software version 23.0. Qualitative data were represented as proportions/percentages and quantitative data was represented as Means & standard deviations. An unpaired test was used to find out the significance of the difference between the two means. The significance of the

difference in the percentage of dyslipidemia among each group was analyzed using the chi-square test. P value <0.05 was considered statistically significant.

Results:

Table-I Shows that majority of the hypertensive participants both male 48 (32.4%) and female 40 (39.2%) were in 46-55 years age group. On the other hand, lower number of participants in normotensive group both male 20 (16.1%) and female 24 (19.0%) in same age group and the p-value was .001. Majority of the normotensive participants both male 50 (40.3%) and female 40 (31.7%) were in 25-35 years age group. On the other hand lower number of participants in hypertensive group both male 24 (16.2%) and female 18 (17.6%) in same age group and the p-value was .001.

Figure I shows out of total 500 participant, in case (Hypertensive) group male were 148 (59.2%) and female were 102 (40.9%). On the other hand, in control group male were 124 (49.6%) and female participants were 126 (50.4%) respectively and the p- value was 0.031.

Table-II shows that majority of the hypertensive patients had strong family history (66%), urban area as residence (68%), diabetes mellitus (64%) and excess salt consumption (70%). On the other hand, in the normotensive group family history, urban area, diabetes mellitus and excess salt consumption were 16%, 20%, 16% and 20% respectively and p-value was <.05. Alcohol consumption and smoking had similar prevalence in both the groups.

Table-III shows the comparison of mean SBP, DBP, and BMI where higher BMI status was seen in both case (25.53±3.94) and control (24.33±4.09). Hypertensive patients had (case group) elevated levels of SBP (153.52±24.40), and DBP (94.56±15.59).

Table-I

Age distribution of the study population (N= 500).

Age group (in years)	Case (hypertensive)		Control (normotensive)		p-value
	Male	Female	Male	Female	
25-35 yrs.	24 (16.2%)	18 (17.6%)	50 (40.3%)	40 (31.7%)	0.001
36-45 yrs.	42 (28.4%)	32 (31.4%)	44 (35.5%)	50 (39.7%)	0.058
46-55 yrs.	48 (32.4%)	40 (39.2%)	20 (16.1%)	24 (19.0%)	0.001
56-65 yrs.	34 (23.0%)	12 (11.8%)	10 (8.1%)	12 (9.6%)	0.002
Total	148 (100%)	120 (100%)	124 (100%)	126 (100%)	0.001

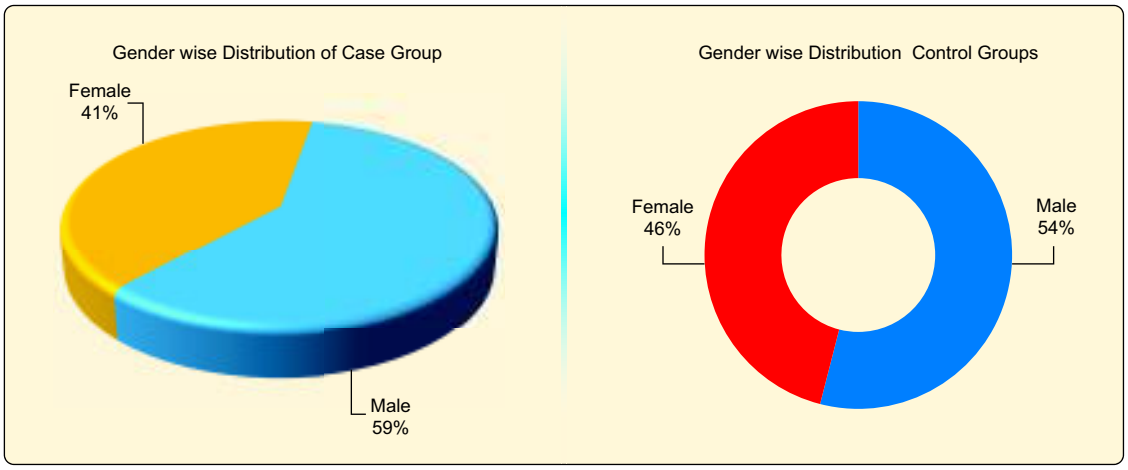

Fig.-1: *Gender wise Distribution of case and Control Group*

Table-II

Distribution of significant factors related to this study (N=500).

	Hypertensive group (N=250)	Non-hypertensive group (N=250)	p-value
Family history of HTN	165 (66%)	40 (16%)	<.05
Place of residence- urban	170 (68%)	50 (20%)	<.05
Smoking	168 (67.2%)	188 (75.2%)	>.05
Diabetes mellitus	160 (64%)	40 (16%)	<.05
Excess salt consumption	175 (70%)	50 (20%)	<.05
Alcohol consumption	5 (2%)	5 (2%)	>.05
	245 (98%)	245 (98%)	

Table-III

Comparison of blood pressure and obesity factors between case and control group. (N=500).

Parameter	CaseMean ± SD	Control Mean ± SD	p-value
SBP	153.52±24.40	116.92±13.50	0.001
DBP	94.56±15.59	76.44±8.47	0.001
BMI	25.53±3.94	24.33±4.09	0.001
Waist Circumference	95.97±9.33	91.98±9.08	0.001

Table-IV shows a comparison of mean lipid values between case and controls. In the case group, triglyceride level was mildly higher (192.62±107.81) than in the control group (149.70±69.99) and the p- value was 0.001. Besides that, in both groups elevated level of LDL was noticed, 125.82±44.17 and 119.15±40.20. Where total cholesterol was slightly higher in the case group (204.82±52.59) than in the control (191.95±45.89) and the p-value was 0.004.

Table-V shows a comparison of dyslipidemia between cases and controls. Raised levels of total cholesterol, triglycerides, and LDL were higher among hypertensive patients than controls and this difference was found to be statistically significant.

Table-IV

Comparison of lipid values between case and controls (N=500).

Parameter	CasesMean ± SD	Controls Mean ± SD	p-value
Total Cholesterol	204.82±52.59	191.95±45.89	0.004
Triglycerides	192.62±107.81	149.70±69.99	0.001
HDL	40.84±8.83	42.94±9.46	0.011
LDL	125.82±44.17	119.15±40.20	0.078

Table-V

Comparison of dyslipidemia between case and controls (N=500).

Lipid parameter	Cases	Controls	Total	p-value
High total cholesterol	124 (49.6%)	111 (44.4%)	235 (47.0%)	0.245
High triglycerides	127 (50.8%)	107 (42.8%)	234 (46.8%)	0.073
Low HDL	85 (34.0%)	85 (34.0%)	170 (34.0%)	1.000
Low LDL	117 (46.8%)	104 (41.6%)	221 (44.2%)	0.243

Discussion:

In our study, in the hypertensive group majority (59.2%) of the patients were male and 40.8% were female. Whereas in the control group, 50.4% were female, and 49.6% were male. This finding was similar to another study where the majority was male in both the hypertensive group and the control group. In fact, according to their study, hypertension increases as age increases. A similar type of results we have also found in our study where the hypertension in majority of the male group 48 (32.4%) belonged to 46-55 years age group, and majority of females were also in the same age group which was 40 (39.2%).[25] In one report it was found that, a mean age ± SD of 44.7±5.7 years and BMI of 25.2±3.8 kg/m^2. The mean SBP and DBP were 137.9±9.6 mmHg and 94.4±8.8 mmHg, respectively.

The mean BMI, TC, HDL, and LDL were higher for males compared to females, which was statistically significant (P<0.05).[26] Whereas, in our study, higher BMI status was seen in both cases, 25.53±3.94 and control 24.33±4.09. In the hypertensive group elevated levels of SBP, 153.52±24.40, and DBP, 94.56±15.59 were noticed. A wide range of risk factors for CVD has been studied in Bangladesh, but few studies have measured the association of CVD risk with hypertension and lipid profile.[27,28] A study in rural areas of Bangladesh reported that the prevalence of "high" TC concentration (>240 mg/dL or >6.2 mmol/L) in Bangladesh is about 17%, "high" LDL (≥160 mg/dL or ≥4.2 mmol/L) is about 2%, and "low" HDL (<40 mg/dL or <1.04 mmol/L) is about 67%.[29] Whereas, our study found that the mean ± SD of the total cholesterol, LDL, and triglycerides were significantly higher in hypertensive patients compared to the control group. The mean HDL was lower among cases than in controls. In this study smoking, alcohol and extra salt consumption were also significant risk factors among urban population which is similar to other studies in Bangladesh and India.[30-32]

This study also demonstrated that 160 (64%) hypertensive patients have diabetes mellitus. The prevalence of hypertension among patients with diabetes was higher in the current study than previously reported in Bangladesh 57.4%.[33] Moreover, a significant proportion of the adult men and women are not aware of the consequence of this disease, and a small proportion of them are compliant to antihypertensive drugs.[34]

Limitations of the study

It was a single-center study with a small sample size, so the result of this study may not reflect the scenario of the whole of the country.

Conclusion:

The current study shows a wide range of factors which are significantly associated with hypertension among the adults in Bangladesh. Individuals with older age, family history, urban area, smoking, excess salt consumption, higher BMI, dyslipidemia and diabetes have significant association with hypertension. Appropriate life style measures and control of these risk factors could likely delay the progression of hypertension and its consequences. Large scale study is needed for further strengthening of our study findings to adopt a social and national awareness program to fight to lower the incidence and prevalence of hypertension and its complications.

Conflict of Interest - None.

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