Modifiable Cardiovascular Risk Factors in Hypertensive Patients

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Keywords- *Hypertension, risk factors, noncommunicable disease.*

Abstract

Background*: Hypertension is one of the most important noncommunicable diseases. Presence of other cardiovascular risk factors in hypertensive patients increases the risk of ischaemic heart disease and cerebrovascular diseases. We evaluated the prevalence of cardiovascular risk factors among the hypertensive patients.*

Methods*: Patients presenting to the outpatient department of a secondary hospital were included in the study. The prevalence of diabetes mellitus, current smoking, family history of ishaemic heart disease, dyslipidaemia and nephropathy were evaluated.*

Results: *A total of 144 patients were included in the study (male 66 & female 78). 29.8% patients were smoker (57% of male patients and 6% of female patients); 34% patients were diabetic; 27% patients had raised total cholesterol, 40.3% had reduced HDL, 22% had raised LDL, 36.8% had raised triglyceride and 33.3% patients had nephropathy (proteinuria/ raised serum creatinine).*

Conclusion*: The prevalence of cardiovascular risk factors, specifically smoking, diabetes mellitus, raised LDL and nephropathy were more among the hypertensive patients. All the hypertensive patients should be evaluated for modifiable cardiovascular risk factors during diagnosis and follow up. Treatment of these risk factors can improve the prognosis of the hypertensive patients.*

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Introduction:

Bangladesh is in the process of epidemiological transition from communicable disease to non-communicable disease. During the period of 1986 to 2006 the mortality due to non-communicable disease increased from 8% to 68%, whereas communicable disease mortality dropped from 52% to 11%.[1] Cardiovascular disease (CVD) is the most common of these communicable diseases. The reasons behind this transition are many including: successful childhood immunization against infectious diseases, improvement in the socioeconomic condition, rapid urbanization, change in food habits and life style, lack of physical activity,etc.[2-5] To control this scenario we need appropriate policy and change in our health care system. For this we need adequate data about the incidence and prevalence of CVD and the risk factors of cardiovascular disease. Two most important risk factors for CVD are hypertension (HTN) and diabetes mellitus (DM). In a meta-analysis of 61 prospective studies, the risk of CVD increased in a log-linear fashion from SBP levels <115 mm Hg to >180 mm Hg and from DBP levels <75 mm Hg to >105 mm Hg. In that analysis, 20 mm Hg higher SBP and 10 mm Hg higher DBP were each associated with a doubling in the risk of death from stroke, heart disease, or other vascular disease.[6]The global prevalence of hypertension is projected to increase from 26 % in 2000 to 29.2 % by 2025 [5, risk factors chow], which will be approximately 29 % of the world's population.[7] There is a wide range of variation in the prevalence of hypertension in Bangladesh reported by several studies ranging from 11 to 44 %.[1,8-11]According to the Bangladesh NCD Risk Factor Survey 2010 (27Monwar), the prevalence of hypertension is 17.9% in general, 18.5% in men and 17.3% in women.[5] On the other hand, overall, age standardized prevalence of prehypertension and hypertension were 27.1 and 24.4%, respectively, in a recently published analysis based on the nationwide population-based 2011 Bangladesh Demographic and Health Survey (BDHS).[12]

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Most of the adults with HTN have got other cardiovascular risk factors also. Among U.S. adults with hypertension between 2009 and 2012, 15.5% were current smokers, 49.5% were obese, 63.2% had hypercholesterolemia, 27.2% had DM, and 15.8% had chronic kidney disease. Presence of these risk factors increases the risk of ischaemic heart disease and stroke.[13]Some of these risk factors share the same patho-physiological mechanisms like HTN, including-rennin angiotensin- aldosterone system, sympathetic nervous system, cardiac natriuretic peptide system and endothelial function. So we should look for and take care of these risk factors in hypertensive patients. However, there is no well documented data of the prevalence of cardiovascular risk factors in patients with HTN in Bangladesh. So we decided to estimate the prevalence of cardiovascular risk factors in the patients with HTN who were attending the outpatient department of cardiology in a secondary hospital of Bangladesh.

Methods:

This is a cross sectional study conducted in the outpatient department of cardiology of Manikganj Sadar Hospital. Manikganj is a district 60 km from Dhaka. She has got a total population of 1.4 million, with 869,000 people more than 18 years of age and a literacy rate of 56%. Patients with low and lower middle class attend the outpatient department of Sadar Hospital. Patients with systolic blood pressure > 140 mm of Hg and/or diastolic pressure> 90 mm of Hg or patients who were taking anti hypertensive drugs were considered as hypertensive. We included all the patients aged more than 18 years who attended the department from March 2018 to May 2018. Informed written consent was taken from the patients. Clinical history was taken including: age, sex, duration of HTN, history of DM, family history of ischaemic heart disease, history of taking anti-hypertensive & anti lipid drugs and history comorbid conditions like IHD, left ventricular failure, renal failure, cerebrovascular disease, peripheral vascular disease, retinopathy.Blood pressure of the patients was measured in all patients using the protocol as directed by JNC VIII. (). Fasting blood sugar, fasting serum lipid profile and serum creatinine was measured and urine was examined for proteinuria in all patients using hospital protocol. Patients were diagnosed as diabetic if he/she were on anti-diabetic drugs or had a fasting blood glucose e”7.8 mmol/L or 2hr after meal blood glucose e”11.1 mmol/L. Dyslipidemia was diagnosed if the patient were taking antilipid drugs or had high density lipoprotein (HDL)< 40mg/dl and/or low density lipoprotein >130mg/dl and/or triglyceride > 150mg/dl and/or total cholesterol >200mg/dl. Serum creatinine >1.4mg/dl and/or protein detected in routine urine examination was defined as having nephropathy. Patients with history smoking in last 30 days were defined as current smoker. Data were collected in a preformed data sheet. Data were analyzed by using SPSS program and were presented in appropriate tables and charts.

Results:

The study was conducted with a view to evaluate the prevalence of cardiovascular risk factors in hypertensive patients attending the outpatient department of a secondary hospital in Bangladesh. Total number of patients was 144. Minimum age of the patients was 20 years and maximum age 90 years with an average age of 56.1 years. Most of the patients (64.6%) were in the age group of 50-69 years. Sixty six of the patients were male and 78 were female. Twelve of the patients were newly diagnosed, diagnosed for the first time in outpatient of cardiology. Maximum duration of HTN was 30 years and average duration was 66.5 months.One hundred and nine(75.7%) patients had their blood pressure not controlled at the time attending the OPD. Among them, 103 patients had systolic blood pressure ≥140 mm of Hg, 99 patients had diastolic blood pressure ≥90 mm of Hg and 92 patients had both systolic and diastolic pressure raised. Average systolic blood pressure of the patients was 145.1 mm of Hg and average diastolic blood pressure was 90.7 mm of Hg.

Regarding cardiovascular risk factors, 43 patients were current smoker which is 29.8% of the study population. Half of the patients in the age group 60-69 were smoker. On the other hand 26.7% patients of the age group 40-59 years were smoker. If we consider the incidence of smoking

in relation to gender, 75% males in the age group 60-69 years and 70% of the males in the age group of 50-59 years were smoker. 57% of the male patients were smoker, but only 6% of the female patients were smoker. Forty nine (34%) patients were diabetic. The prevalence of DM increased with age. In the age group 40-49 years it was 10.5%, in 50-59years age group 29.5% and in 60-69 years age group it was 46.9%. Thirty nine patients (27%) had total cholesterol more than 200mg/dl, 58 (40.3%) patients had HDL cholesterol less than 40 mg/dl, 32 (22.2%) patients had LDL cholesterol more than 130 mg/dl and 53 (36.8%) patients had serum triglyceride level more than 150 mg/dl. Average level of total cholesterol was 214.7 mg/dl, HDL cholesterol was 35.8 mg/dl, LDL cholesterol was 116.8 and triglyceride was 166 mg/dl. Twenty two (15.3%) patients had raised LDL, reduced TG and reduced HDL. 16 (11%) patients had isolated reduced HDL. 13 (09%) patients had reduced TG and reduced HDL. 11(7.6%) patient had isolated raised TG, 7 (4.9%) patients had raised LAD & raised TG, 3 (2.1%) patients had raised LDL & reduced HDL and one (0.7%) patient isolated raised LDL. Dyslipidemia was more common in the patients with age more than 60 years. Forty eight (33.3%) patients had either proteinuria and/or raised serum creatinine level.This was also more common in patients with age>60years.

Table-I

Distribution of study population according to age and gender (N=144).

Age	Number	Male	Female
20-29	03(02.1)	01(33.3%)	02 (66.6%)
30-39	07(04.8)	02 (28.6%)	05 (71.4%)
40-49	19(13.2)	05 (26.3%)	14(73.7%)
50-59	44(30.6)	17 (38.6%)	27 (61.4%)
60-69	49(34.0)	32 (65.3%)	17 (34.7%)
70-79	17(11.8)	06 (35.3%)	11 (64.7%)
≥80	05(03.5)	03 (60.0%)	02 (40.0%)
Total	144	66	78

If we consider the distribution of risk factors in relation to gender- smoking, raised total cholesterol level, reduced HDL level and nephropathy was significantly more prevalent in male patients. Nephropathy was more common in patients with duration of HTN ≥12 months. But the prevalence of other risk factors was similar. The patients with uncontrolled HTN are significantly more likely to be diabetic and had family history of IHD and they had more nephropathy and reduced level of HDL.

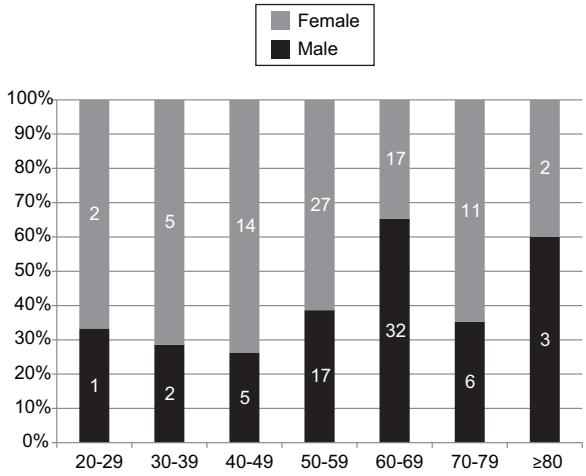

Fig.- 1: *Distribution of study population according to age groups and gender (N=144).*

Table-II

Distribution of patients with uncontrolled HTN according to age groups and gender (N=144).

Age	Uncontrolled HTN
20-29 (n=3)	2 (66.6%)
30-39 (n=7)	6 (85.7%)
40-49 (n=19)	13 (68.4%)
50-59 (n=44)	23 (52.3%)
60-69 (n=39)	32 (82.0%)
70-79 (n=17)	13 (76.4%)
≥80 (n=05)	3 (60.0%)
	Uncontrolled HTN
Male (n=66)	46 (69.6%)
Female (n=78)	56 (71.8%)

Table-III

Distribution of cardiovascular risk factors in different age groups of study population (N=144).

Age (years) (no.)	Smoking	DM	Family history of IHD	Raised total cholesterol (>200mg/dl)	Reduced HDL (<40mg/dl)	Raised LDL (>130mg/dl)	Raised Triglyceride (>150mg/dl)	Nephropathy
20-29 (03)	00 (0%)	00(0%)	00 (0%)	00 (0%)	01 (33%)	00 (0%)	00 (0%)	00 (0%)
30-39 (07)	00 (0%)	01(14.3%)	00 (0%)	02 (28%)	03 (43%)	01 (14%)	01 (14%)	00 (0%)
40-49 (19)	05 (26.3%)	02 (10.5%)	01 (05%)	03 (16%)	05 (26%)	01 (5%)	04 (21%)	04 (21%)
50-59 (44)	12 (27.3%)	13 (29.5%)	04 (09%)	08 (18%)	17 (39%)	08 (18%)	16 (36%)	11 (25%)
60-69 (49)	24 (48.9%)	23 (46.9%)	05 (10%)	18 (37%)	19 (39%)	15 (31%)	21 (43%)	20 (41%)
70-79 (17)	05 (29.4%)	08 (47.1%)	04 (23%)	07 (41%)	10 (59%)	05 (29%)	08 (47%)	08 (47%)
≥80(05)	01 (20%)	02 (40%)	02 (40%)	01 (20%)	03 (60%)	02 (40%)	02 (40%)	05 (100%)

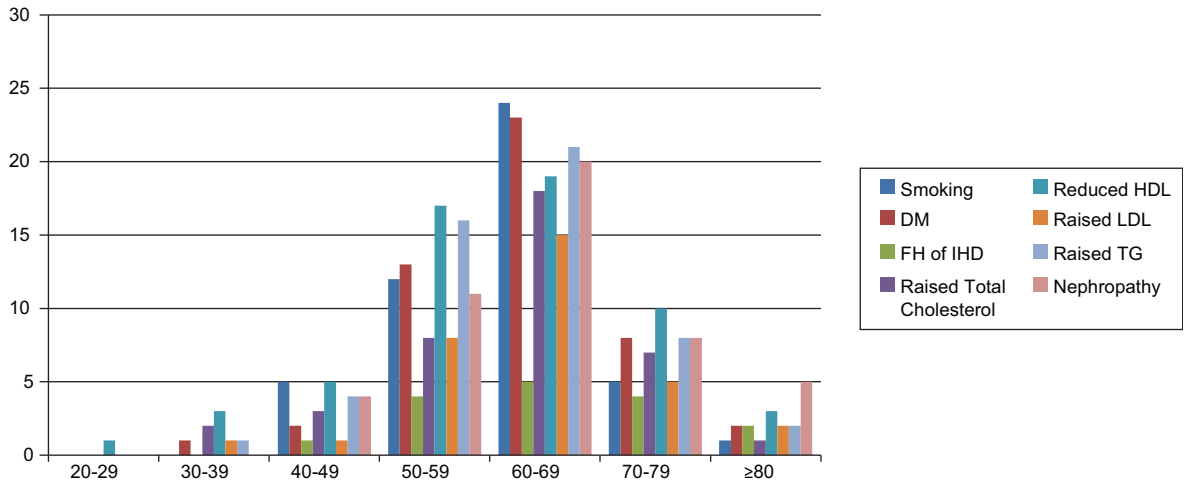

Fig.-2: *Distribution of cardiovascular risk factors in different age groups of study population (N=144).*

Table-IV

Distribution of cardiovascular risk factors in hypertensive patients in relation to sex (N=144).

	Smoking	DM	FH of IHD	Raised total cholesterol	Reduced HDL	Raised LDL	Raised TG	Nephropathy
Male(n=66)	38 (57%)	23 (35%)	11 (17%)	24 (36%)	34 (51%)	17 (26%)	26 (39%)	28 (42%)
Female(n=78)	05 (06%)	26 (33%)	5 (06%)	15 (18%)	24 (31%)	15 (18%)	27 (35%)	20 (24%)
p value	<0.05	0.84	.051	0.02	0.011	0.347	0.55	0.033

Table-V

Distribution of cardiovascular risk factors in relation to duration of HTN (N=144).

Duration in years	Smoking	DM	FH of IHD	Raised total cholesterol	Reduced HDL	Raised LDL	Raised TG	Nephropathy
<1 (28)	08 (28%)	06 (21%)	01 (3%)	07(25%)	11 (39%)	05 (18%)	08 (28%)	05(18%)
1-5 (65)	19 (29%)	19 (29%)	08 (12%)	18 (27%)	24 (37%)	17 (26%)	29 (45%)	18 (27%)
6-10 (27)	08 (30%)	12 (44%)	05 (18%)	08 (30%)	11 (41%)	06 (22%)	11 (41%)	15 (54%)
>10 (24)	08 (33%)	12 (50%)	02 (8%)	06 (25%)	12 (50%)	04 (25%)	05 (21%)	10 (42%)
p value	0.42	0.06	0.15	0.34	0.34	0.10	0.002	0.012

Table-VI
Distribution of cardiovascular risk factors in relation to control of HTN (N=144).

	Smoking	DM	FH of IHD	Raised total cholesterol	Reduced HDL	Raised LDL	Raised TG	Nephropathy
Controlled HTN (n=42)	13 (31%)	11 (26%)	02 (5%)	13 (31%)	18 (43%)	11 (26%)	21 (50%)	09 (21%)
Uncontrolled HTN (n=102)	30 (29%)	38 (37%)	13 (13%)	26 (26%)	40 (39%)	21 (21%)	32 (31%)	39 (38%)
p value	0.85	<0.05	0.007	0.06	0.003	0.14	0.25	<0.05

Discussion:

This study was done in secondary hospital in a district near Dhaka, capital city of Bangladesh. Most of the patients in the study were from low socioeconomic condition who were attending the outpatient department of the hospital. Objective of the study was to evaluate the risk factors of cardiovascular disease in the hypertensive patients. Average of the patients was 56.1 and male female ratio was 0.84 (66vs.78). Most of the patients (88%) were 40-79 years of age with maximum (34%) between 60-69 years. So the patients were almost evenly distributed regarding age and gender. The increased number of female patients among the study population may be a reflection of increased prevalence of HTN in Bangladeshi female population in relation to male. It was evident a cross-sectional study using data from the nationally representative 2011 Bangladesh Demographic and Health Survey (BDHS).[14] Though it was not supported by other studies.[15] Twelve of the patients were newly diagnosed and rest of the patients was already diagnosed and was receiving treatment. The important risk factors as per HTN Guidelines 2017 like, current smoking, DM, family history of cardiovascular diseases, dyslipidemia and nephropathy were evaluated.

29.8% of the patients were current smoker, which was more common in male (57% vs.6%). About three fourths of the hypertensive patients in the age group of 50-69 were smoker. The overall rate of smoking was higher than the average population. According to National Risk Factor survey in 2010, the prevalence of smoking in general population was 26.2%, which was higher than the prevalence (23.0%) according to the Global Adult Tobacco Survey (GATS) published in 2014.[5,16] The smoking habit of male and female patients was also more than the findings in GATS (44.7% in male and 1.5% in female). This may be related with the age and socioeconomic status of the patients. A study conducted among the garments workers of Bangladesh with low socioeconomic status showed the prevalence of smoking was 86.2%, though the age of the population was 18-45 years.[17] High prevalence of smoking in male patients was due to the difference in smoking habit in relation to gender. It was evident in a meta-analysis; which revealed pooled prevalence of smoking among males was 50% and among females 06%.[18] Another study conducted recently in Chandpur by Banik et al. found that 31% of the general population & 74% of the male are current smoker.[19] The high rate of smoking (79%) was also evident in the BRAVE study conducted in National Institute of Cardiovascular Diseases among patients with ischaemic heart disease.[20]

About one third of the patients were diabetic. The prevalence of DM was maximum in the age group of 60-69 years. This rate of DM was much higher than the general population. According to BDHS data (2011), the overall prevalence of DM and prediabetes was 9.7% and 22.4%, respectively (15.2% urban and 8.3% in rural areas).[21,22]

The prevalence of dyslipidemia was also high among the study population. About one third of the patients had some form dyslipidemia. According to one study in a suburban area 3201 individuals found; prevalence of dyslipidemia was 16.6% in general and 22.2% in males and 15.9% in females.[23] A study in rural areas of Bangladesh

reported that the prevalence of "high" TC concentration (>240 mg/dL) in Bangladesh is about 17%, "high" LDL (≥160 mg/dL) is about 2%, and "low" HDL (<40 mg/dL) is about 67%.[24] In a meta-analysis involving 08 studies, the pooled prevalence of low HDL was estimated as 52% and that of high TG was 37%.[18]Reduced HDL and raised TG were more common (40% and 36% respectively) than the prevalence of raised LDL (22%) and raised total cholesterol (27%) in our study population. So, the prevalence of dyslipidemia with high LDL was more common than general population, prevalence of low HDL was less and prevalence of high TG was similar. Another study conducted in National Centre for Control of Rheumatic Fever and Heart Disease (NCCRF&HD) in Dhaka, Bangladesh, has also found that hypertensive patients suffer more from dyslipidemia than the normotensive patients.[25]

About one third of the patients had proteinuria and/ raised serum creatinine level. This was also more prevalent in patients with age > 60 years. Nephropathy was more common in patients who had HTN for more than five years. Raised serum triglyceride levels were also more prevalent in this group of patients. A study conducted in a rural area (Bheramara) of Bangladesh also found relation between HTN and proteinuria (38%).[26]Though proteinuria was more common in patients with DM and HTN (55%).They hadn't found any relation between age and proteinuria. The longer duration of HTN among the elderly patients may contribute to the higher prevalence of nephropathy. Patients with nephropathy also had more uncontrolled HTN.

Smoking, raised total cholesterol, reduced HDL and nephropathy were more common among the male patients. But other risk factors were similar in both male and female.

Detection of modifiable risk factors in hypertensive patients is important, because they increase the morbidity and mortality of these patients. Sometimes these risk factors also share pathophysiological processes in common with HTN. Treating some of these modifiable risk factors may reduce blood pressure and CVD risk. The increased prevalence of these risk factors in these patients may be due to their genetic, geographic, lifestyle and socioeconomic status. So, further study is required in the similar cohort of population with normal blood pressure to estimate the prevalence of these risk factors. This type of study should also be done in other regions of the country to evaluate the exact prevalence in the whole population, which will help to take appropriate national strategies to reduce cardiovascular risk. Furthermore, it is evident that these risk factors in this group of patients were not adequately addressed. This is also a failure of the medical facilities. We should raise the awareness about other cardiovascular risk factors along with HTN especially in this high risk group of patients.

So every hypertensive patient should be evaluated for the modifiable risk factors for cardiovascular diseases. They should be counseled adequately to control these risk factors. Measures like lifestyle modification and medications should be prescribed. During follow up of hypertensive patients along with evaluation of HTN, cardiovascular risk factors should also be evaluated.

Conclusion:

Hypertensive individuals have got more prevalence modifiable cardiovascular risk factors than the general population. Specifically diabetes, high LDL and nephropathy are more common in this group of patients. Also prevalence of smoking is very high like that of general population. All the hypertensive patients should be evaluated for cardiovascular modifiable risk factors and properly counseled and treated to control them. This can change the prognosis of hypertensive patients including morbidity and mortality.

Conflict of Interest - None.

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