Incidence of Hypertension and Associated Cardiovascular and Metabolic Status in a Group of Official Population of Bangladesh

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Abstract:

Hypertension is one and the major non communicable diseases in the world and contributing significantly to the burden of cardiovascular diseases, stroke, kidney failure and premature death. The prevalence of hypertension in Bangladesh varies from 11- 20% and 7% of the death in Bangladesh are due to hypertension related disease. Only 11% of the total cases of hypertension have effective control of blood pressure. Education, social awareness, income, access to physicians may be factors for less adherences to medications and effective control of the disease.

This study was undertaken in a group of population with average to good educational, social and economic background to see the incidence of the disease, its control and associated cardiovascular and metabolic status.

599 working officials above the age of 50 years were evaluated in BIRDEM General Hospital from January 2013 to December 2013 to see the incidences of hypertension, control of blood pressure and cardiac and metabolic status of the population. Total 308 patients in the study population had hypertension and 39 were newly detected. 68.8% of the patients with hypertension have effective control of blood pressure with medications and systolic hypertension was revealed in 8.7% cases. This might be due to increase awareness of the study population related to the educational, economic and social background and this plays an important role in effective control of the disease.

Keywords: Hypertension, Ischemic Heart Disease, Diabetes, Treadmill Test.

Introduction:

Hypertension is one of the major non-communicable diseases (NCDs) in the world, which significantly

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contributes to the burden of cardiovascular diseases (CVDs), stroke, kidney failure, disability, and premature death.[1–3] It is also identified as a global disease burden and is ranked third as a cause of disability-adjusted life-years (DALYs).[4]

According to World Health Organization (WHO), about 17 million deaths occur worldwide due to CVDs, of which hypertension alone accounts for 9.4 million deaths and 80 % of the CVD-related deaths occurred in the developing countries.[5-7] The global prevalence of hypertension is projected to increase from 26 % in 2000 to 29.2 % by 2025 which will be approximately 29 % of the world's population. [5] Although hypertension is more prevalent in developed countries its prevalence is increasing in the low and middle-income countries (LMIC).[8, 1] Countries in Asia, especially Southeast Asia, are having an increasing burden of hypertension including CVDs.[9–11] According to WHO, hypertension has become a significant health concern in the Asian

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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] The exact prevalence of HTN in Bangladesh is not known. Only a limited number of small-scale epidemiological studies are available. The prevalence of HTN was first reported in 1976, as 1.10%.[15] One meta-analysis, a population-based study and a recently published survey found the prevalence of HTN as 11.3%, 18.6%, and 20.1%, respectively.[16-18] 7% of deaths in Bangladesh are due to HTN-related diseases, which is equivalent to 9.6 million people of age 25 or above. [19-20] Effective control of blood pressure is found in about 11% of total cases. [20] This may be due to socioeconomic factors, including lack of awareness, high illiteracy rates, low income and difficulty in physician access. This has lead to late HTN detection and lack of compliance in HTN control through pharmacotherapy and lifestyle changes.

At the advent of the new millennium, we are really not aware of our real situation. Large-scale nation-wide survey and clinical research are needed to explore the different aspects of HTN in Bangladesh. This study is undertaken in a group of population having average to good educational, social and financial background to find out the incidence of hypertension along with the pattern of control and associated cardiovascular and metabolic status.

Materials and Methods:

This prospective observational study was conducted in BIRDEM General Hospital during a period of one year from January 2013 to December 2013. 599 Working officials of Bangladesh Bank with 50 years and above were studied during their yearly health checkup. An informed, voluntary written consent was obtained from each participant before enrolment. Detailed medical history and physical examination of the study population were entered in a data sheet. Patients with physical disability and known psychiatric illness were excluded.

The population group was screened for Hypertension according to JNC-7 (systolic blood pressure e" 140 mmHg and diastolic blood pressure e" 90 mmHg or taking antihypertensive medications). During the course of the interview, two measurements of blood pressure on each study participant were measured with the mercury sphygmomanometer by auscultatory method.

Study participants were instructed to refrain from drinking any caffeinated beverage and from smoking half an hour preceding the check up. Both blood pressure measurements were obtained after the subject was rest for at least 5 min in a seated position. All blood pressure measurements were made on the left arm of each study subject, using a cuff of appropriate size at the level of the heart. The cuff pressure was inflated 30 mmHg above the level at which the radial pulse disappeared, and then deflated slowly at the rate of about 2 mm Hg/sec. The first (appearance) and the fifth (disappearance) Korotkoff sounds were recorded as indicative of the systolic (SBP) and the diastolic blood pressure (DBP) respectively. The average of two readings of SBP and DBP were used to describe the blood pressure of the participants. In case where the two readings differed by over 10 mm of Hg, a third reading was obtained and the three measurements were averaged. The control of Blood Pressure of each individual was assessed by measuring the Blood Pressure on different settings.

Cardiac Status was evaluated by 12 Lead ECG, Exercise Tolerance Test and Colour Doppler Echocardiography. Ischemic heart disease was considered by the presence of T wave inversion and ST depression and Myocardial Infarction was considered by standard characteristics ST elevation and pathological Q wave in corresponding leads representing a wall in 12 lead ECG. In ETT Bruce Protocol in majority and Modified Bruce in selected cases were carried out to evaluate Ischemic Heart Disease with standard excepted criteria.

Body Mass Index (BMI) of the study population was calculated by measuring the body height and weight with the subject standing motionless on the weighing scale, feet about 15 cm apart and the weight equally distributed on each leg. Subjects were instructed to wear minimum outwear (as culturally appropriate) and no footwear while their weight was being measured. This population group was also assessed for Metabolic Derangement by Fasting Blood Glucose, 2 Hours after Breakfast Blood Glucose, HbA1C and fasting Lipid Profile.

Data was analyzed for mean, percentage, standard deviation, chi square test, multiple correlation and multivariate analysis, by using SPSS-12 Windows. The t-test and chi square test was done for quantitative and qualitative analysis, respectively. P-value <0.05 was considered significant.

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Results:

Total 599 persons of above 50 year of age were studied from January 2013 to December 2013 in BIRDEM General Hospital. There were 533 male and 66 female. 297 (49.6%) had the age below 55 years and 302 (30.4%) had age above 55 years. The yearly income was bellow 50,000 taka in 70.78% subjects and 50,000-1, 00,000 taka in 28.71% person (Table-1).

Table-I
Age, Sex and Monthly income

Variables	Parameters	No of Subjects	Percentage
Age	≤55	297	49.6%
	>55	302	50.4%
Sex	Male	533	89.0%
	Female	66	11.0%
Monthly Income	<50000	424	70.78%
	50000-100000	172	28.71%
	>100000	3	0.5%

In this study population 308 (51.4%) subjects were found to have Hypertension of which only 30 (9.7%) were newly detected and 278 were previously known case of the hypertension. 68.8% were taking drug regularly and had effective control of Blood Pressure, 12.6% person had no control and only 8.7% had Systolic Hypertension (Table-2).

Table-II
Incidence of Hypertension.

Number of population with HTN	308 (51.3%)
Newly detected HTN	30 (9.7%)
Known case of HTN	278 (90.3%)
Controlled HTN	212 (68.8%)
Uncontrolled HTN	39 (12.6%)
Systolic HTN	27 (8.7%)

ECG evidence of Ischemic Heart Disease was found in 97 cases of which 17 patients had the evidence of old Myocardial Infarction (Table-3)

Table-III
ECG evidence of ischemic heart disease (97)

ECG	With HTN	Without HTN	Total
Myocardial Ischemia	47	33	80
Old MI	15	02	17

ETT were done in all patients. Symptom limited ETT were done in patients having ECG evidence of Myocardial Ischemia or Infarction. ETT was found positive in 208 out of 502 patients with negative ECG for Ischemic Heart Disease. In ETT positive patients 120 had hypertension (Table-4).

Table-IV
Relation between ECG and ETT

		ECG		Total
		No	Yes	
ETT	Negative	350	41	391
	Positive	152	56	208
	Total	502	97	599

Transthoracic 2D Echocardiography with Color Doppler study were carried out in all patients and regional and global wall motion abnormality were seen in only 16 cases and diastolic dysfunction was present in 127 cases (Table-6).

Table-V
Echocardiography findings

Echocardiography	Total
RWMA	14
GWMA	02
Diastolic Dysfunction	127

470 out of 599 study population had some form glycaemic abnormality. Diabetes Mellitus Type-2 were found in 238 (39.73%), 113 (18.86%) had IGT and 119 (19.86%) had IFG. 129 patients has normal Glycaemic Status.
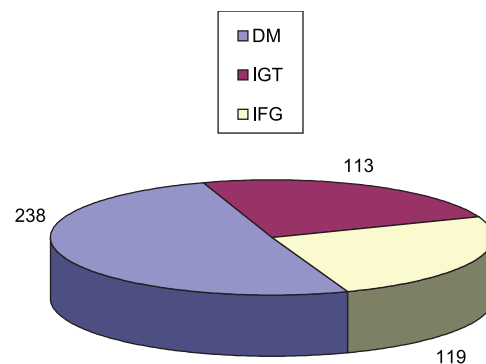

Fig-1: *Pattern of glycemic status*

It was revealed from BMI assessment that 48.4% of the study population was overweight and 12.8% had obesity of different grades (Table-6).

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Table-VI
Assessment of BMI

Body Mass Index	Under Weight (<18.5)	3	(0.5%)
	Normal (18.5-24.9)	229	(38.2%)
	Over Weight (25-29.9)	290	(48.4%)
	Obesity G-I (30-34.9)	69	(11.5%)
	Obesity G-II (35-39.9)	6	(1%)
	Obesity G-III (40 and >)	2	(0.3%)

All patients were evaluated for lipid status in fasting state. 326 (54.4%) had raised LDL, 361 (61.3%) low HDL and 289 (48.2%) had raised Triglycerides. Status of the Lipid Profile in the study population is shown in the following bar diagram.
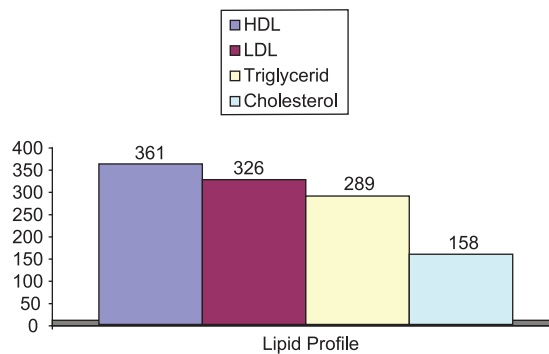
Fig.-2: *Pattern of lipid profile*

Table-VII
Risk Factors for IHD.

	No (%)	P value	Odds Ratio (95% Class Interval)
Family H/o IHD positive	29 (4.9%)	.003	59.3% (.350-1.005)
Sex			
Male (533)	179 (29.9%)	.006	
Female (66)	29 (4.8 %)	.001	15.5% (.923- 2.603)
DM	102 (17.0%)	.001	55.4% (.394-.781)
BMI			
Overweight	42 (7.0%)		
Obesity-1	46 (7.7%)	.002	48.5% (.430-.810)
Obesity- 2	00 (0.0%)	HTN	
123(20.5%)	.003	62.1% (.442-.872)	
Tobacco Consumption	50 (8.4%)	.506	33.2%
Lipids			
High Cholesterol	54 (9.0%)	.003	96.8% (.660-1.419)
High TG	108 (18.0%)	.198	12.5% (.895-1.755)
High LDL	114(19.0%)	.002	102.4% (.730- 1.436)
Low HDL	126 (21.0%)	.001	98.0% (.695-1.383)

In table 7 risk factors for IHD were analyzed in patients who had positive ETT. There were 208 (34.72%) individuals who have evidence of IHD. Among them 179 (29.9%) (p=.006) were Male and 29(4.8 %) (p=.001) were Female. 102 (17.0%) (p= .001) had Diabetes Mellitus and 123(20.5%) (p= .003) had Hypertension.   Family history of IHD was positive among 29 (4.9%) (p=.003) individuals of IHD and 50 (8.4%) persons were smoker.

Discussion:

The health status and disease profile of human societies have historically been linked to the level of their economic and social development. With industrialization, the major causes of death and disability, in the more advanced societies, have shifted from a predominance of nutritional deficiencies and infectious diseases, to those classified as chronic diseases such as cardiovascular disease (CVD), cancer, and diabetes. High-fat diets, cigarette smoking, and sedentary lifestyles become more common along with continuous improvement of life expectancy. [21] Non-communicable diseases become predominate, with the highest mortality caused by atherosclerotic CVD, most frequently ischemic heart disease and athero-thrombotic stroke.

Hypertension is one of the most important preventable causes of premature morbidity and mortality and a major risk factor for ischemic and hemorrhagic stroke, myocardial infarction, heart failure, chronic kidney disease, cognitive decline and premature death. With ageing, systolic hypertension becomes a more significant problem, as a result of progressive stiffening and loss of compliance of larger arteries.

The high current burdens of non-communicable diseases (NCDs) are highlighted by the estimates provided by the Global Burden of Disease Study and in the World Health Report 1999, which indicate that these disorders together contributed to 59% of global mortality (31.7 million deaths) and 43% of the global burden of disease in 1998. [22] Several NCDs such as cardiovascular diseases (CVD), cancers, diabetes, and chronic obstructive pulmonary disease are linked by common lifestyle determinants such as diet, physical activity, and tobacco consumption. [23] These four disorders together contribute to about 50% of global mortality. It is estimated that 30.9% of all deaths in 1998, as well as 10.3% of the total disease related burden, in terms of disability adjusted life year loss (DALY loss) were attributable to CVD. [20]

In this context this observational study were undertaken in a specific population group of age 50 years and above having average to good educational background, social status and income to see the incidence of hypertension along with the state of control, number of medications needed and cardiovascular & metabolic status of the patient.

In this study we had only 39 cases of newly detected hypertension and 68.8% had effective control contrary to the effective control of hypertension in only 11% of the total cases in Bangladesh. This might be due to their increase awareness which is related to their educational, social and economical background leading to good compliance to treatment. Systolic hypertension was revealed in 8.7% of the study population.

Out of 502 patients with normal ECG 152 (31.4%) had positive ETT indicating myocardial ischemia and undoubtedly ETT is a good screening tool for IHD in this group of patients.

Of total 208 ETT positive patients 123 (62.1%) had hypertension and the individual who had raised LDL cholesterol, raised total cholesterol and low HDL cholesterol are more likely to develop IHD (Table 7). Only 8.4% of the study population had the history of smoking or tobacco consumption. This may also be due to increase awareness in this group.

Almost 50% of the study populations were overweight and 39.9% had Diabetes Mellitus. 18.8% had IGT and 19.8% had IFG which are also important risk factors for macrovascular complication.

In conclusion we can draw an inference that education, social and economic status helps to increase the awareness of the patients to adhere to the medications and in other way contributes to the effective control of the disease.

This was a small study in specific group of population having particular social, educational and economic background. So this may not reflect the exact scenario of the disease. We are not really aware of the magnitude of these diseases in our population and large scale nationwide study is needed to find it out.

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