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Target Organ Damage in Hypertension in an Academic Hospital

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Abstract

One hundred hypertensive patients were selected randomly from medicine indoor; 66 were males, 34 were females. Age ranges were 20 to 70+ years. Detail history was taken, comprehensive physical examination and relevant investigations were done to detect various target organ damage. These findings were correlated with age, sex, occupation, socioeconomic status, duration of hypertension, drug compliance and other risk factors of cardiovascular disease. Incidence of TOD were as follows: 65.15% of males and 52.94% of females developed stroke; 70% of total patients developed some forms of cardiac complications, 14% had left ventricular failure, 43.93% of males had left ventricular hypertrophy (LVH) 26.47% of females had LVH; 27% of patients had renal complications; 23% of patients had retinopathies; 6% of patients had malignant hypertension; 20% of patients had peripheral vascular disease.

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Introduction

An elevated arterial pressure is probably the most important public health problem in developed countries. It is also being detected increasingly in developing countries and least developed countries like Bangladesh as well. It is common, asymptomatic, readily detectable and usually easily treatable and often leads to lethal complications if left untreated. It is one of the leading causes of morbidity and mortality in the world and will increase in worldwide importance as a public health problem by 2020.[1] In addition to the morbidity and morbidity directly attributable to hypertension, high blood pressure (BP) is a powerful risk factor (a condition or characteristic of an individual or population) that increases the likelihood of developing a wide variety of cardiovascular diseases.[1]

All health care providers routinely encounter patients who are likely to benefit from lowered BP. These include not only patients with definite hypertension but also those with pre-hypertension (Systolic BP 120 to 139 mmHg or diastolic BP 80 to 89 mmHg), who have a higher risk of cardiovascular events than individual with "optimal" BP. In the next decade, more patients will likely become candidates for antihypertensive therapy, as clinical trials demonstrate the benefits of treatment and pharmacologic approaches become safer and more effective. Furthermore, many peoples perhaps the majority of those over 40 years of age, who do not yet meet the criteria for drug treatment for hypertension will benefit from lifestyle modifications, a presumably safe and cost- effective public health approach to reducing BP . Many of the therapeutic lifestyle

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changes that lower BP or slow the rate of rise of BP should be incorporated into everyone's lifestyle very early.[1]

Despite progress in identifying risks associated with elevated BP and development of many ways to lower BP- and demonstration that these methods reduce death and hard endpoints- BP control remains suboptimal.[1] Improvement is needed in controlling BP to prevent higher morbidity and premature mortality rates.

In majority of patients there are no specific symptoms attributable directly to hypertension (HTN). Hypertension in majority of cases is detected on routine physical examination or because of one of its complications. In our country, there are only few studies about the types of complications especially in relation to different age groups, sex groups, duration of hypertension and risk factors. The effects of hypertension are widespread and no organ is spared. Higher blood pressures are associated with reduced life expectancy at all ages and in both sexes. Prospective observational studies, most notably the Framingham study, defined the risk in terms of greater incidence of stroke, coronary artery disease, cardiac failure, progressive renal disease and other vascular problems such as dissecting aortic aneurysm.

In our study we have taken hospitalized patients admitted with complications of hypertension for study of the followings:

(1) To find out different types of complications those occur in hypertension.

(2) To compare the complications of hypertension in relation to different age groups and also occupation, socioeconomic status.

(3) To find out the complications of hypertension in relation to duration of hypertension.

(4) To evaluate the complications of hypertension in relation to common risk factors.

(5) To find out the incidence of malignant hypertension.

(6) To observe the relationship between target organ damage and drug compliance.

Methodology

Selection of Subjects

A total of 100 patients, having hypertensive complications were studied in medicine indoor of Rajshahi Medical College Hospital during the period of May, 2004 to July, 2005. Among 100 patients, 66 were male and 34 were female. Their age ranges were 20-70+ years. Cases were entirely nonselective and random among hypertensive patients with complications and no attempts were made to differentiate between primary and secondary hypertension. The cases were collected from medicine indoor, not from cardiology or neurology or nephrology, to avoid selection bias.

Methods of study

It was an observational study. From each patient, a thorough history was taken with a special emphasis on duration of hypertension, risk factors including smoking, family history of hypertension, diabetes mellitus, ischaemic heart disease, stroke, sudden death, peripheral vascular disease, and treatment history, past history of stroke, angina, myocardial infarction, transient ischaemic attack and left ventricular failure. Patients were included in this study when diastolic blood pressure $\geq$90 mmHg and/or systolic blood pressure $\geq$140 mmHg. Patients with isolated systolic hypertension (systolic blood pressure $\geq$160 mmHg, diastolic blood pressure <90 mmHg) were also included. Patients previously diagnosed as hypertensive and were on antihypertensive medications, were also included, whatever the blood pressure.

Obesity of the patient was detected by measuring the height of the patient in meter, and taking the weight of the patient in kg. Then the body mass index (BMI) was calculated from formula: BMI=weight in kg/ (height in m). When BMI was greater than 30, patients were designated as obese in case of both male and female.

Patients were designated as diabetic when fasting blood glucose was >7 mmol/1 and for blood glucose 2 hours after breakfast was> 11 mmol/1

The following diagnostic tests were used detect the complications of hypertension:

(1) The cardiovascular complications are detected by physical examination, x-ray chest and ECG

(2) The guideline for the diagnosis of cerebrovascular complications was made by:

a) Evidence of focal brain disease: hemiplegia / monoplegia, dysphagia / aphasia were taken as evidence of focal character of brain disease

b) The temporal profile was ascertained by a clear history of the made of onset, evaluation and course of each symptom taken in relation to the medical status at the time of examination of the patient.

(3) The renal complication were detected by taking the history of the patient, urinalysis , blood urea and serum creatinine estimation and measurement of 24 hrs urinary protein (in selected cases only)

(4) Malignant hypertension were diastolic blood pressure as above 130 mm Hg along with rapid deterioration of renal function, retinal hemorrhages and exudates with or without papilloedema

(5) Eye complications was detected clinically and by opthalmoscopic examination of the fundus of the eye

(6) Following investigations were done in selected cases:

- Echocardiography
- CT scan of the brain
- Ultrasonography of abdomen
- Lumbar puncture and CSF study
- Estimation of serum lipid profile

Results and Discussion

A total of 100 patients were selected randomly, out of them 66 were males and 34 were females. Forty percent of patients were farmer 25% were housewives.

Table-1: Occupation of patients

Occupation	Number
Farmer	40
House wife	25
Business man	16
Service	9
Laborer	8
Others	2

Forty two percent of patients were smoker, 54% of patients were betel chewer 25% of patients were both smoker and betel chewer.

Total 61 patients developed stroke out of them 43 were males (65.15%) and 18 were females (52.94%) incidence of stroke were maximal among farmers and housewives, and amongst the low-income group people and higher amongst smokers and sedentary people. The higher the level of blood pressure and the longer the duration of hypertension the greater the incidences of stroke were.

Table-2: Age incidence of stroke

Age group	Number	Percentage
20-29	0	0%
30-39	4	6.55%
40-49	9	14.75%
50-59	15	24.59%
60-69	20	32.78%
70+	13	21.31%

Table-3: Incidence of stroke in relation to duration of hypertension

Duration	Newly detected	<1 year	1-2 years	2-5 years	5-10 years	10-15 years	>15 years
Number	21	3	6	13	11	6	1
Percentage	34.42%	4.91%	9.83%	21.31%	18.03%	9.83%	1.63%

TIA and hypertensive encephalopathy were in males incidence of malignant hypertension were 6: out of them 4 were males, 2 females. Incidences of subarachnoid hemorrhage were 5. A total of 71 patients developed some from cerebrovascular complications.

A total of 70 patients developed some forms cardiovascular complications. Thirty eight percent patients developed left ventricular hypertrophy (LVH); 43.93% of males and 26.47% of females had LVH; the higher the levels of BP the greater the incidences of LVH were. Fourteen percent of the patients had left ventricular failure (LVF). LVH and LVF incidences were higher among elderly people, among poor people and among people with longer duration of hypertension.

Haque MA[2] (1990) in his study of complications of systemic hypertension found 94% of cardiovascular complications in the age group of (41-75) years and only 6% in the age group of (30-40) years. Shaha PR[3] (1983) in his study of complications of hypertension found 86.6% of cardiovascular complications in the age group of (40-70) years and only 13.4% in the age group of (30-40) years. Our findings of age group of cardiovascular complications were closer to above two studies.

Table-4: Age distribution of LVH

Age	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70+**
Number	2	2	3	8	16	7
Percentage	5.26%	5.26%	7.89%	21.05%	42.10%	18.42%

Table-5: Incidence of LVH in relation to duration of hypertension

Duration of hypertension	Newly detected	<1 year	1-2 years	2-5 years	5-10 years	10-15 years
Number	14	3	2	5	9	5
Percentage	36.84%	7.89%	5.26%	13.15%	23.68%	13.15%

Incidences of ischaemic heart disease were 18%. IHD were higher among people with high BP among older age group and among people with increasing duration of hypertension.

"Hypertensive target-organ damage in the very elderly"[4], study published in hypertension 2003 Aug, showed following: in people aged>80 years, the so called very elderly, there is uncertainty about the relation between hypertension and cardiovascular morbidity. The aims of this study were to investigate whether hypertension in people aged > 80 years is associated with target organ damage, over and above the effects of age, and to determine whether ambulatory blood pressure monitoring (ABPM) could improve on conventional blood pressure monitoring (CBPM) in predicting target organ damage. Investigations included echocardiographic measurement of left ventricular mass index (LVMI), brain magnetic resonance imaging assessment of periventricular hyperintensity (PVH), urinary albumin creatinine ratio (ACR), aortic pulse wave velocity (PWV), and 24-hour ABPM. Forty three subjects at a mean age 84.3 years, were studied, 22 normotensive (NT) and 21 hypertensive (HT). CBP was 184/89 and 145/76 mm Hg in the HT and NT groups, respectively. In men, LVMI was significantly greater in HT subjects, 157±37 vs 123±15 g/m2 in NT subjects ($p<0.05$. In women, LVMI was similar in both groups. Urinary ACR was greater in HT than in NT subjects (log ACR, 1.21±-0.50 VS 0.95±0.23; $P<0.05$). Cerebral PVH grade was higher in the HT subjects (2.6±0.8 VS 2.2± 0.9), although this difference was not significant. Aortic PWV did not differ between the 2 groups. ABPM was positively associated with urinary ACR and cerebral PVH, independent of its correlation with CBPM. In advanced old age, HTN is associated with evidence of target organ damage. ABPM can improve on CBPM in predicting very elderly subjects with HT target organ damage.

Renal complications were found among 27% of patients. Increasing age, higher levels of BP, longer duration of hypertension all positively correlate with the development of renal complications. Renal involvement occurred in 33.33% of male patients and 14.70% female patients. Our study is closer to that of Ekram ARMS et al[5] where 12.5% of female patients had renal involvements.

Retinopathy was found in 23% of patients and was more prevalent among females than males (29.41% vs. 19.69%), whereas Ekram ARMS et al[5]. have shown 17.5% incidence of retinopathy among female patients. Increasing age and longer duration of hypertension increased the incidence of retinopathy.

Table-6: Sex distribution of individual retinopathy

Grade	Total	Male	Female
I	6	3	3
II	8	5	3
III	0	0	0
IV	9	5	4

PVD was found in 2% of cases; both were diabetics incidences of TOD were higher among patients with irregular drug intake among smokers among diabetics the risk of TOD is just slightly increased. Risk of obesity in TOD could not be established in this study.

Though cases were selected randomly, cerebrovascular complications was found as the most frequent complication of hypertension 71% this was followed by cardiovascular complication 70% renal complication were found to be 27% retinopathy 23% malignant hypertension was found 6% and PVD 2%

Both cardiovascular and cerebrovascular complications were found more in older age group and both were found more common in male than female.

It is also found that duration of hypertension enhances the risk of cerebrovascular, cardiovascular and renal complications and retinopathy .smoking habit is associated with increased incidence of cardiovascular cerebrovascular and renal complications there is a direct correlation between the higher cholesterol and LDL levels and incidences of CHD.

Majority of the patients were non-diabetics and diabetes mellitus increases the risk of cardiovascular and cerebrovascular complications only a few folds .but DM is an important risk factor for PVD.

Incidences if TOD are higher among patients who are poor compliant to their medications and a large number of patients were completely unaware about their hypertension.

Incidences of stroke were more among people with less physical activities and cerebrovascular and cardiovascular complications were more in lower socioeconomic group.

Out of 6 malignant hypertension cases, 3 were hypertensive for more than 5 years and one was hypertensive for more than 10 years indicating essential hypertension has turned into accelerated and malignant phases.

Conclusion

Hypertension is the most important etiologic factor in most of the cardiac and vascular disorders. Some of these e.g. cardiomegaly, congestive cardiac failure, cerebral hemorrhage, dissecting aneurysm of aorta, renal failure and hypertensive crisis are directly related to blood pressure elevation, while others e.g. myocardial infarction, cerebral infarction and peripheral vascular insufficiency are related to effects of hypertension in accelerating atherogenesis. The deleterious effects of any given level of blood pressure are determined to a great extent by other coexisting cardiovascular risk factors. Thus the overall picture dictates the aggressiveness of antihypertensive therapy. There is good evidence that control of blood pressure prolongs life and prevents congestive cardiac failure, disabling stroke, renal insufficiency but modern therapy has not yet provided the expected protection against coronary heart disease the most serious consequence of an elevated blood pressure.[3]

As hypertension is mostly asymptomatic, health education and motivation play a vital role in the continuation of treatment. WHO defined 3 components of hypertension control program i.e. education of public, health care professionals and the patients. Awareness creation and strengthening of motivation strategies to improve adherence to anti-hypertensive drugs through the use of multidisciplinary approaches are necessary.[6]

Behavioral models suggest that the most effective therapy prescribed by the most careful physician will control hypertension only if the patients are motivated to take the prescribed medication and to establish and maintain a health-promoting lifestyle. Motivation improves only when patients have positive experiences with and trust in their physician. Empathy builds trust and is a potent motivator. Patient attitudes are greatly influenced

by cultural differences, beliefs, and previous experiences with the health care system. These attitudes must be understood if the clinician is to build trust and increase communication with patients and families.[7]

Failure to titrate or combine medications, despite knowing the patient is not at goal BP, represent clinical inertia and must be overcome. Decision support systems (i.e. electronic and paper), flow sheets, feedback reminders, and involvement of nurses, clinicians and pharmacists can be helpful.[7]

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