## Original Article

# Frequency of ischaemic heart disease and stroke in hypertension

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## Abstract

**Objective:** To assess the frequency of ischaemic heart disease and cerebrovascular accident in hypertensive patients.

**Methods:** A cross sectional study was conducted from June 2007 to December 2007 at Shahina Jamil Teaching Hospital Abbottabad. The study included 200 patients with hypertension who attended the medical outpatient's clinic at Shahina Jamil Teaching Hospital of Frontier Medical College Abbottabad. Hypertensive patients of either sex who were of more than 15 years of age were included in the study. All the included patients were investigated for ischaemic heart disease and cerebrovascular accident (CVA) and the frequency of these disorders was estimated.

**Results:** Of 200 hypertensive patients, 136 were female and 64 were male with mean age (female = 53.1 ± 13.5 years and male = 60.1 ± 11.9 years), mean systolic blood pressure (female = 162.0 ± 27.2 mmHg and male = 160.9 ± 28.7 mmHg), mean diastolic blood pressure (female = 99.5 ± 12.9 mmHg and male = 101.6 ± 15.3 mmHg), mean BMI (female = 28.9 ± 05.1 and male = 25.8 ± 03.8), mean total serum cholesterol level (female = 192.3 ± 15.1 mg/dL and male = 191.0 ± 17.1 mg/dL), and mean serum triglyceride level (female = 168.7 ± 15.3 mg/dL and male = 169.2 ± 20.9 mg/dL). Ischaemic heart disease was present in 44% of hypertensive patients, CVA in 13% with 9% having ischaemic CVA and 4% haemorrhagic CVA. Frequency of IHD and cerebrovascular accident was higher in male hypertensives compared to females.

**Conclusion:** Ischaemic heart disease and cerebrovascular accident are more prevalent in male hypertensives as compared to female hypertensive patients, and frequency of both disorders can be decreased by controlling systemic hypertension (JPMA 60:297; 2010).

## Introduction

Hypertension, an abnormal elevation in blood pressure is not a discrete disease but an expression of a disturbance in integrative physiology. Its cause and pathogenesis is multi faceted and if left untreated, hypertension can involve the kidneys, heart, eyes, blood vessels or even brain resulting in cardiovascular diseases.[1] Hypertension is the major risk factor for stroke and most other cardiovascular diseases. Globally, approximately two-thirds of stroke and one-half of ischaemic heart disease were attributable to non-optimal blood pressure.[2] Although all measures of blood pressure are strongly and directly related to the risk of coronary artery disease and cerebrovascular accident, isolated systolic blood pressure is the best single predictor of cardiovascular events.[3]

According to the data from WHO and others, hypertension and cardiovascular accident (CVA) are an emerging health problem in the developing countries.[4] It has been estimated that from 1990-2020, cerebrovascular mortality will be much higher in the developing countries as compared to the developed countries of the world.[5] Worldwide, Indo-Asian people are among the populations at highest risk for cardiovascular disease.[6] About 80% of the global cardiovascular disease burden is in the developing countries[7] and due to economic advancement, progressive urbanization and aging population with greater lifestyle risk factors will further increase.[8] Another reason for increased mortality in these countries is poverty because the poor are less likely to receive preventive care and are more likely to die from acute myocardial infarction and stroke.[9]

Hypertension is a main risk factor for heart disease and stroke in Pakistan[10] which was the rationale to determine the frequency of ischaemic heart disease and stroke among hypertensive patients in this study.

## Patients and Methods

This study was conducted at the outpatients department of Shahina Jamil Teaching Hospital of Frontier Medical College Abbottabad from June 2007 to December 2007.

Patients, who were more than 15 years of age, diagnosed as systemic hypertension, were included in the study. Patients younger than 15 years of age, and patients who were not willing for investigations for cardiovascular disease were excluded. Purposive type of sampling was used. Consent was taken from the patients to record the data that included age, sex, systolic and diastolic blood pressure, pulse rate, height and weight, BMI, serum total

cholesterol, serum triglyceride level and history of ischaemic heart disease and CVA. All the data of included patients was recorded on a pre-designed performa. Hypertension was diagnosed on the basis of either previous history of hypertension and taking antihypertensive medication or newly diagnosed case on the basis of presence of average blood pressure of >140/90 mmHg. Blood pressure was taken as an average of 2 measurements taken after the participants were seated quietly with their backs supported without crossing their legs and with arms supported at heart level for 5 minutes. Blood pressure was measured by a doctor using a standard and regularly tested aneroid sphygmomanometer. Body mass index was calculated by using the Quetelet formula, weight (kg)/height ($m^2$). Patients were considered of normal weight if BMI was 18.5-24.9 and overweight/obese if BMI was ≥ 25. All patients were investigated for fasting serum cholesterol, and serum triglyceride using the chemistry analyzer MATROLAB 1600. High serum cholesterol was defined as total serum cholesterol level >200 mg/dL, high serum triglyceride was considered at >155 mg/dL. Patients were considered diabetic if they were already diagnosed and taking hypoglycaemic agents or diagnosed first time if the fasting blood sugar level was >126 mgm/dL or 2 hour post prandial blood sugar was >200 mgm/dL. Patients were considered to have ischaemic heart disease if they had either a documented record of old MI, coronary artery bypass graft surgery, coronary angioplasty, a positive stress test, and angiographic evidence of luminal narrowing of a major coronary artery or one of its primary branches or had recently attended the medical outpatient department with typical chest pain and diagnosed as a case of ischaemic heart disease on the basis of ECG changes, increased levels of cardiac enzymes, troponin T test, a positive stress test or angiography. Cerebrovascular accident (CVA) was diagnosed on the basis of history of focal neurological deficit and report of computed tomography scan of brain consistent with CVA or previous documented record of CVA. Patients were divided into two groups on the basis of gender to asses any statistically significant difference regarding the frequency of ischaemic heart disease and stroke among male and female hypertensives.

It was an analytical (cross-sectional) study. All the data was stored and analyzed by using statistical package for social sciences (SPSS) version 14. Independent-samples T-Test was used to compare the means of variables between two groups of hypertensive patients. Chi-square test was used to compare the parameters of the patients and differences were regarded significant when p-value was equal to or <0.05.

## Results

Two hundred patients with systemic hypertension were included in the study. Table-1 shows mean and standard deviation of parameters of female and male hypertensive patients. There were 68% female and 32% male patients with a significant difference in the mean age ($p = < 0.05$). No significant difference was found regarding systolic and diastolic blood pressure and mean pulse rate. Significant difference was found between the mean BMI of male and female patients. Also there was no significant difference in hte lipid levels of males and females.

Table-2 shows the frequency of metabolic risk factor for cardiovascular disease in hypertensive patients. Obesity

**Table-1: Mean with standard deviation of different parameters of female and male hypertensive patients.**

| | Sex | Mean | p-value |
|---|---|---|---|
| Age | Female | 53.1±13.5 | 0.01 |
| | Male | 60.1±11.9 | |
| Systolic B.P | Female | 162.0±27.2 | 0.85 |
| | Male | 160.9±28.7 | |
| Diastolic B.P | Female | 99.5±12.9 | 0.48 |
| | Male | 101.6±15.3 | |
| Pulse rate | Female | 86.8±11.7 | 0.99 |
| | Male | 86.8±13.3 | |
| Height | Female | 1.5±00.0 | 0.00 |
| | Male | 1.6±00.0 | |
| Weight | Female | 70.8±13.7 | 0.31 |
| | Male | 73.5±09.9 | |
| BMI | Female | 28.9±05.1 | 0.00 |
| | Male | 25.8±03.8 | |
| Total cholesterol | Female | 192.3±15.1 | 0.69 |
| | Male | 191.0±17.1 | |
| Triglyceride | Female | 168.7±15.3 | 0.89 |
| | Male | 169.2±20.9 | |

**Table-2: Frequency of metabolic risk factor for cardiovascular disease.**

| | Sex | | | P-value |
|---|---|---|---|---|
| | Female (n=136) | Male (n=64) | Total (n=200) | |
| Overweight/obesity | 96 (70.5%) | 32 (50%) | 128 (64%) | 0.00 |
| Diabetes mellitus | 34 (25%) | 14 (21.8%) | 48 (24%) | 0.62 |
| Hypercholesterolaemia | 40 (29.4%) | 22 (34.3%) | 62 (31%) | 0.47 |
| Hypertriglyceridaemia | 90 (66.1%) | 42 (65.5%) | 132 (66%) | 0.93 |

**Table-3: Frequency of cardiovascular disease among hypertensive patients.**

| | Sex | | | P-value |
|---|---|---|---|---|
| | Female (n=136) | Male (n=64) | Total (n=200) | |
| IHD | 53 (39.0%) | 35 (54.7%) | 88 (44%) | 0.03 |
| Stroke | 13 (09.6%) | 13 (20.3%) | 26 (13%) | 0.03 |
| Ischaemic Stroke | 09 (06.6%) | 09 (14.1%) | 18 (09%) | 0.08 |
| Haemorrhagic stroke | 04 (02.9%) | 04 (06.3%) | 08 (04%) | 0.26 |

was more frequent in female hypertensives as compared to males while no significant difference was found regarding DM, hypercholesterolaemia and hypertriglyceridaemia.

Table-3 shows frequency of ischaemic heart disease and cerebrovascular disease (CVA) in female and male hypertensive patients. No significant difference was noted between the two genders.

## Discussion

Several studies have shown that hypertension is an independent risk factor for cerebrovascular disease and ischaemic heart disease.[13-15] In this study, the frequency of ischaemic heart disease and cerebrovascular accident was assessed among the female and male hypertensive patients. There were more females (68%) compared to male (32%).

The reason for female preponderance could be attributed to the study being hospital based including the patients attending the OPD which comprise mainly of women and children, and not from the general population. The catchments area of the hospital is a hilly region and resources are comparatively less. Therefore most men go to other cities for earning a living.

Mean age of the included female patients was 53.1±13.5 years and that of male patients was 60.1±11.9 years. Obara and his colleagues found a mean age of 58.6 years in their patients.[16] The mean blood pressure of the hypertensive patients was high in this study. It was probably due the presence of newly diagnosed hypertension, first follow up cases of hypertension and cases who present with uncontrolled hypertension. It is evident from the study done by Rehman et al, that the mean blood pressure was 170±104 mm Hg in their patients[12] is higher than in this study.

Obesity, dyslipidaemia and diabetes mellitus contribute significantly to hypertension. Lespira et al reported that hypertensive patients had a greater BMI, higher level of total cholesterol and triglycerides as compared to normotensive people. It was also found in this study that significant numbers of patients were suffering from higher BMI, hypercholesterolaemia, hypertriglyceridaemia and diabetes mellitus. It was also observed that higher BMI was significantly associated with female hypertensive patients as compare to male patients, while according to data from the Framingham Cohort, obesity accounts for 65% and 78% of essential hypertension in women and men, respectively.[13]

Heart attacks are the leading cause of death in both males and females all over the world and hypertension is the major contributing modifiable risk factor.[14] This study showed that ischaemic heart disease was 44% among hypertensive patients, which is comparable with a study by Sheikh et al.[15] They assessed hypercholesterolaemia as a risk factor for ischaemic heart disease in hypertensive patients and obtained a result of 50% hypertensive patients to be suffering from ischaemic heart disease. Similarly Njoh showed 55.2% of hypertensive patients to have ischaemic heart disease.[16]

According to British Heart Foundation, heart attacks occur more frequently in men than women (128,000 in men vs. 103,000 in women in 2004).[17] Similarly according to WHO, coronary heart disease deaths are also more frequent in men (53%) than women (47%).[10] This study gave similar results. Wilson et al.[18] also documented that the occurrence of ischaemic heart disease is more prevalent in males.

There is strong evidence that Pakistanis have a tendency for cerebrovascular atherosclerotic disease affecting blood vessels and causing stroke.[19] As elsewhere in the world, in Pakistan also hypertension appears to be the major risk factor for stroke,[20] compounded by lack of awareness and poor compliance with anti-hypertensive medication. Hypertension increases the risk for transient ischaemic attacks as well as the incidence of any type of stroke including ischaemic stroke and focal intracerebral haemorrhage.

In the present study, stroke was found in 13% hypertensive patients which correlates with the study done by Khan et al, who found stroke in 11% hypertensive patients.[21] It was also seen that the frequency of stroke was higher in males as compared to females. This has been reported by various hospital based studies in Pakistan that the frequency of males is higher as compared to females among the patients presenting with stroke.[20-24] The results of this study showed that ischaemic stroke was more common as compared to haemorrhagic stroke in hypertensive patients. Sherin et al also reported similar findings.[25] They found that 61.1% of hypertensive patients had cerebral infarction while 38.9% had cerebral haemorrhage.

## Conclusion

It is concluded from this study that ischaemic heart disease and cerebrovascular accident are more frequent in male hypertensives as compared to female hypertensives. Modifiable risk factors like obesity, hypercholesterolaemia, hypertriglyceridaemia and diabetes mellitus were assessed among both genders and had a significant correlation.

It is suggested that for the prevention of ischaemic heart disease and stroke, it is important to prevent and control hypertension. This will reduce the morbidity and mortality rates.

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