Hypertension as a Risk Factor for Haemorrhagic Stroke in Females

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Abstract

Aim: To study the effect of hypertension as a risk factor for haemorrhagic stroke in women compared to men.

Method: Confirmed cases of haemorrhagic stroke by Computed Tomography scan were included in this study. The participants underwent detailed clinical examination based on preset questionnaire. Relevant laboratory investigations were done in this group. 100 consecutive cases were studied comparing the baseline characteristics with male patients admitted with haemorrhagic stroke.

Observations: Among all the risk factors studied hypertension was the single most important risk factor causing intracerebral bleed. Forty seven point four percentage (47.4%) of females were hypertensive as against 61% in males. Blood pressure recording of females showed lower systolic and diastolic measurement compared to males and the difference was statistically significant with a p value of 0.000. Majority of the female patients were overweight with a significant difference in body mass index compared to males. (p value 0.006).

Conclusion: Hypertension is an important risk factor for intracerebral bleed. Females developed intracerebral bleed at a lower blood pressure measurement compared to males. Females require better control of hypertension than males to prevent intracerebral bleed.

Introduction

Cerebrovascular disease is the second cause of death worldwide, and all projections indicate that this will remain in the year 2020.1,2 The greater prevalence of stroke in men is well known, but recent issues emphasise the importance of stroke in women.3 In the Unites States, it is estimated that 1 in 6 women will die of stroke, whereas 1 in 25 will eventually die of breast carcinoma,4 and over the entire lifetime, ≈16% of women but only 8% of men will die of stroke.5

Stroke is defined as an abrupt onset of a neurological deficit that is attributable to a focal vascular cause. It is manifested either, as brain infarction or haemorrhage. More than any other organ brain depends on adequate oxygenated blood supply. The presentation may be diverse in that in its more severe form the patient becomes hemiplegic and even comatose and in its mildest form it may consist of only a trivial neurological disorder insufficient to arouse concern or demand medical attention. A variety of causes result in stroke which comes under two sub groups; those resulting from ischaemia and those from haemorrhage. After thrombosis and embolism intracranial haemorrhage is the 3rd most frequent cause of stroke.

Intracerebral haemorrhage is a subgroup of intracranial haemorrhage that occur within the brain tissue. Intracerebral haemorrhage can be caused by brain trauma or occur spontaneously as in haemorrhagic stroke. Intracranial haemorrhage can be intra-axial or extra-axial. Extra-axial hemorrhage are extradural haemorrhage (EDH), subdural haemorrhage and (SDH), subarachnoid haemorrhage (SAH) which occur outside the brain tissue. Intraaxial haemorrhage include intracerebral and intraventricular
haemorrhage. Intraparenchymal haemorrhage can be recognised in computed tomography (CT) scan because blood appears brighter than other tissue and is separated from the inner table of skull by brain tissue. The tissue surrounding bleed is often less dense than rest of the brain tissue.

In India there are only a few studies regarding the incidence, morbidity and mortality pattern of stroke and there is difficulty in deriving conclusion from such limited studies in a diverse population like ours. Risk factors for haemorrhagic stroke are different in developed and developing countries. Stroke is more common among men, but women are more severely ill. There are several risk factors such as hypertension (HTN), diabetes mellitus (DM), hyperlipidaemia, use of cold remedies which contains phenylpropanolamine, oral anticoagulants, antiplatelets, drugs, malnutrition, infection and bleeding disorders, which increases a patient’s risk to haemorrhagic stroke. Control or elimination of these risk factors is the best long term approach to the management and prevention of stroke.

Monitoring the risk factors in a population can reflect the future trends of incidence of haemorrhagic stroke. Prevention of intracerebral haemorrhage is still the most effective method of reducing the impact of this devastating disease. To facilitate better development of prevention programme, we need precise estimation of risk and elucidation of minor risk factors.

Statistical analysis in the Medicine department, Calicut Medical College showed a 20% increase in the incidence of haemorrhagic stroke in females compared to previous year. There are only a few studies about the risk factors of the same. Hence we planned to study the clinical presentation of haemorrhagic stroke in females and to identify the risk factors of haemorrhagic stroke in women compared to men considering hypertension as a key risk factor. This study was carried out with a hope that by analysing the cause of haemorrhagic stroke the information gained would add to our experience in the recognition, prevention and treatment of CVA.

### Material and Methods

This is an observational study done for a period of one year during December 2009 – November 2010. One hundred consecutive female patients admitted with haemorrhagic stroke in medical wards, Calicut Medical College were included in this study. All the cases of intracranial haemorrhage secondary to SAH and SDH, EDH, intracerebral haemorrhage secondary to trauma were excluded. Patients were grouped according to their age. Equal number of males with haemorrhagic stroke were studied. Risk factors for both females and males were compared. The basis of case selection was plain CT scan of head. Other investigations were done according to clinical situation. Informed consent from the patients and approval from Ethics committee also obtained.

A detailed history including symptoms, occupational history, address, dietetic history, history of addictions, history of physical activity, history of diabetes mellitus, hypertension, ischaemic heart disease, cerebrovascular accident and family history of obesity, hypertension, diabetes mellitus, ischaemic heart disease, cerebrovascular accident were taken from the conscious patients and from reliable care giver in unconscious patients.

The patients had been subjected to detailed clinical examination including Blood pressure, weight in kilogram, height in metres, BMI (weight in Kg divided by square of height in metres). Blood pressure was measured at the time of admission, and after 24 hours with appropriate sphygmomanometer using the Phase I and IV Korotkoff sounds. The mean of 2 measurements were used for systolic and diastolic blood pressure. A complete nervous system examination was done. Complete haemogram with ESR, bleeding time, clotting time, prothrombin time, lipid profile, urine microscopy, random blood sugar, renal function, liver function tests, ECG, chest X ray, computed tomography scan were obtained in all subjects. Statistical analysis done by Epi-Info software, Microsoft excel data spread sheet. Mean and standard deviation were taken for quantitative variables, frequency for qualitative variables. P value less than 0.05 was taken as significant. Information and details of assessment of each individuals was discussed in all stages between the researchers to improve further assessment.

### Observations

The youngest of the patient was 15 years and oldest 90 years. Highest frequency of intracerebral bleed was in 61-70 year age group - 34 patients. Mean age of hypertensive bleed was 67 yrs. (Table 1).

Of the 100 female patients with intracerebral bleed, 47 had past history of hypertension, 20 patients were diabetic, 14 patients had past history of CAD, 10 patients were on antiplatelets, 4 patients had past history of CVA. 10 patients had both HTN

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and Diabetes. Three patients had history of bleeding disorder, 2 had immune thrombocytopenia (ITP), 5 patients were on anticoagulants. One patient was a known case of acute myeloid leukaemia. One case of intracerebral bleed secondary to cortical vein thrombosis was present.

Sixty one male patients were hypertensive, 16 patients were diabetic. Twenty one patients had past history of coronary artery disease, 10 patients were on aspirin. Two patients were on Warfarin treatment. Two patients had ITP and 2 patients had haematological malignancy (Figure 1).

Hypertension was the single most important risk factor of intracerebral bleed. Of 100 female patients 47 patients had past history of hypertension. Only 7 were on regular treatment. Majority of these had duration of hypertension > 5 yrs (74%). 39% of female patients had systolic blood pressure >160 mm of mercury and 22% had diastolic blood pressure more than 100 mm of mercury. Of 100 female patients were previously hypertensive. 59% of males had systolic blood pressure more than 160 mm of mercury, 53% had diastolic blood pressure more than 100 mm of mercury. p value was 0.000 comparing blood pressure as a risk factor for intracerebral bleed in females than males.

Of 100 female patients with intracerebral bleed 69 patients had sedentary life style. 15 patients 47 patients had past history of hypertension. Only 7 were on regular treatment. Majority of these had duration of hypertension > 5 yrs (74%). 39% of female patients had systolic blood pressure >160 mm of mercury and 22% had diastolic blood pressure more than 100 mm of mercury. Of 100 female patients were previously hypertensive. 59% of males had systolic blood pressure more than 160 mm of mercury, 53% had diastolic blood pressure more than 100 mm of mercury. Of 100 female patients were previously hypertensive. 59% of males had systolic blood pressure more than 160 mm of mercury, 53% had diastolic blood pressure more than 100 mm of mercury. p value was 0.000 comparing blood pressure as a risk factor for intracerebral bleed in females than males.

Of 100 female patients with intracerebral bleed 69 patients had sedentary life style. 15
were manual labourers, 16 patients engaged in moderate work (Figure 4). Of 100 male patients with intracerebral bleed 26 patients had sedentary lifestyle. 70 patients were manual labourers, 4 engaged in moderate work (Figure 4). Physical activity as a risk factor for intracerebral bleed in females compared to males was statistically significant (p value 0.000).

53% of female patients had BMI more than 23 kg/m² (Figure 5). Only 31% of males had BMI more than 23kg/m² (Figure 5). BMI as a risk factor for intracerebral bleed in females compared to males was statistically significant (p value 0.006).

**Discussion**

Cerebrovascular disease forms the third most common killer of adult. The overall prevalence of stroke is higher in men than in women and increases with age in both sexes. Interest and knowledge about the importance of stroke in women are increasing because of the demonstration of a higher mortality, higher disability, and higher incidence of dementia in women who survive a stroke. To find the exact incidence of intracerebral bleed according to age, large population based studies are required.

Present study included 100 female patients. Incidence of haemorrhagic stroke was more in the age group above 60 yrs. Previous studies also showed higher incidence of haemorrhagic stroke as the age advances. The increased incidence of intracerebral bleed may be due to increased incidence of hypertension and other risk factors in the elderly group. In analysing the stroke subtypes, Jaume Roquer et al in their study did not find any difference between haemorrhagic strokes according to sex.

Of several risk factors observed, hypertension was the single most important risk factor for intracerebral bleed. In this study 47 percentage of the female patients were previously hypertensive. Hypertension as the leading cause of intracerebral bleed was also highlighted in other studies, done by Muller and Rado in 1981 and Seppo in 1995.

As the duration of hypertension increased the incidence of intracerebral bleed also increased. High systolic and diastolic blood pressure is associated with increased risk of intracerebral bleed. The incidence of intracerebral bleed was found to increase stepwise with elevation of either systolic or diastolic blood pressure by Omar and Ueda 1987. Since the pressure inside the haematoma is equal to the arterial blood pressure, a high BP might be predisposing to large haematoma or re-bleeding. In this study blood pressure recording of females showed lower systolic and diastolic measurements compared to males and the difference was statistically significant with p value of 0.000. So it may be noted that females develop intracerebral bleed at a lower blood pressure level.

Majority of the female patients with intracerebral bleed had sedentary life style compared to males. Majority of the males were manual labourers. Bleeding happened in females with sedentary life style compared to males and was statistically significant with the p value of 0.000.

Obesity has been positively and independently associated with stroke. Incidence in several studies including the Framingham study (Hubert et al, 1983) and study done in Korea (Jong Ku Park) showed that body mass index is an independent risk factor for intracerebral bleed. This result suggests that obesity is a risk factor for hemorrhagic stroke. In this study majority of the female patients were overweight and male patients had BMI within normal range and the BMI as a risk factor for intracerebral bleed in males and females was compared and the p value was found to be significant (0.006).

**Conclusions**

Hypertension was an important risk factor for intracerebral bleed in both males and females. Maximum incidence of intracerebral bleed was in above 60yrs. Females developed intracerebral bleed at a lower blood pressure measurements compared to males. Females had increased risk of intracerebral bleed compared to males considering body mass index as a risk factor. Majority of the female patients with intracerebral bleed had sedentary life style compared to male patients.

**Limitations of study**

Analysis of 100 hospitalised patients may not reflect pattern of disease in the community and requires a large population study. Cases were selected from a tertiary care centre, so reference bias may be present.

**Recommendations**

- Life style modification
• Better control of systemic hypertension.

References


