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General Medicine

A STUDY OF RISK FACTORS OF ISCHEMIC CEREBRAL STROKE IN WOMEN

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ABSTRACT

Introduction: Cerebral stroke is the third most common cause of death across the globe. In India, it is the fourth major cause of death.

Objective: This study was done to evaluate the risk factors of ischemic cerebral stroke in women and to study the association between types of stroke, stroke severity and risk factors.

Materials & methods: A cross sectional observational study conducted in a hospital setting. A sample size of 96 was taken considering the prevalence of ischemic stroke in women in India.

Result: The most common risk factors of ischemic stroke in women were hypertension, coronary artery disease, peripheral arterial disease, diabetes mellitus, dyslipidemia, previous stroke, migraine, chronic kidney disease and congestive cardiac failure. There was a significant association of peripheral arterial disease, migraine and menopause with stroke severity. Also hypertension and congestive heart failure had a significant association with stroke subtype indicating that cardiovascular disease is a strong risk factor in the development of stroke.

Conclusion: Thus, ischemic cerebral stroke is a multi-factorial disease with interplay of various risk factors in the development of the disease.

KEYWORDS : Ischemic cerebral stroke, risk factors

INTRODUCTION

Cerebral stroke is the third most common cause of death across the globe, following cardiovascular diseases and cancer and often results in acquired disability, especially in women (1). In India, it is the fourth major cause of death with an average death rate of 0.6 per thousand incidences. Mean age of stroke in Indian women is 57 years (2). The incidence, prevalence, mortality and outcome of cerebral stroke are reportedly dependent on the sex of the individual.Majority of cerebral strokes reported are ischemic in nature. These ischemic strokes occur due to the blockage of cerebral arteries, caused by an embolism or a thrombus. This is followed by a decreased blood flow, and resulting tissue death in the diseased region (3). In addition to stroke risk, the differences in etiology, symptoms, and outcomes of cerebral strokes among men and women have been reported (4).

Higher incidence risk coupled with higher rates of mortality rates (post-stroke), dementia, disability and depression have been reported for women in comparison to men. These differences of risk, mortality and post-stroke complications can be attributed to the higher life expectancy of women. Age has been perceived to be the most vital, single independent factor affecting the risk of cerebral stroke and negatively affects the clinical outcome (5).

Therefore, the work was done to study the various risk factors of ischemic cerebral stroke in women and also to study the association between types of stroke, stroke severity and risk factors.

Materials & methods

Study design: A cross sectional observational study conducted in a hospital setting.

A sample size of 96 was taken considering the prevalence of ischemic stroke in women in India.

Inclusion criteria: All female patients diagnosed to have ischemic cerebral stroke.

Exclusion criteria: All female patients with hemorrhagic stroke.

Statistical analysis

All data was analyzed with SPSS software version 21. Chi-square test or fisher's exact test was used for statistical comparison of qualitative variables and for determining the association between different variables.

A 'p' value of less than 0.05 was considered statistically significant.

RESULTS

Table 1. Baseline characteristics of female patients with ischemic stroke

Variable	Categories	No. of Patients	Percentage
Age group	Upto 45 years	14	14.6
	More than 45 years	82	85.4
Occupation	Housewife	89	92.8
	Others	7	7.2
Residence	Rural	34	35.4
	Urban	62	64.6
Dietary habits	Mixed	33	34.4
	Vegetarian	63	65.6
Smoking	No	88	91.7
	Yes	8	8.3
Tobacco chewing	No	78	81.3
	Yes	18	18.8
Socioeconomic status	Low income	42	43.75
	Middle income	43	44.79
	High income	11	11.45
Menstrual status	Pre-menopausal	10	10.04
	Post-menopausal ≤ 10 years	18	18.75
	Post-menopausal 11-20 years	26	27
	Post-menopausal >20 years	42	43.7

Majority of patients were aged more than 45 years (85.4%) and belonged to middle socioeconomic status (44.79%). Stroke was more common in urban population (64.6%) and was predominantly seen in post-menopausal age group (89.45%).

Table 2. Distribution of study subjects according to stroke subtype as per TOAST classification

Variable	Categories	No. of Patients	Percentage
Stroke Sub type	Cardioembolic stroke	13	13.5
	Large artery atherosclerosis	76	79.2
	Small vessel occlusion	7	7.3
Territory involved in brain	Anterior & middle cerebral artery	2	2.1
	Anterior cerebral artery	3	3.1
	Middle & posterior cerebral artery	3	3.1
	Middle cerebral artery	76	79.2
	Posterior cerebral artery	12	12.5

The commonest subtype of stroke was large artery atherosclerosis, followed by cardioembolic stroke and small vessel occlusion. The most common territory involved in brain imaging was middle cerebral artery territory followed by posterior cerebral artery, anterior cerebral artery, middle & posterior cerebral artery and anterior & middle cerebral artery.

Table 3. Risk factors observed among patients with ischemic stroke

Variable	No. of Patients	Percentage
Diabetes Mellitus	31	32.3
Hypertension	54	56.3
Dyslipidemia	26	27.08
CKD	2	2.1
CHF	1	1.0
CAD	38	39.6
Migraine	5	5.2
Previous Stroke	6	6.3
Peripheral Arterial Disease	36	37.5

Amongst all causes of stroke hypertension was the commonest, followed by coronary artery disease, peripheral arterial disease, diabetes mellitus, dyslipidemia, previous stroke, migraine, chronic kidney disease and congestive heart failure.

Table 4. Association of migraine with severity of stroke

Variable	Categories	Severity of stroke			P-Value
		Moderate	Moderate to Severe	Severe	
Migraine	Absent	19	70	2	0.007
	Present	4	1	0	

A significant association was seen between migraine and stroke severity.

Table5. Association of menopause with severity of stroke

Variable	Severity of stroke			P-Value
	Moderate	Moderate to severe	Severe	
Post-menopausal	16	68	2	0.011
Pre-menopausal	7	3	0	

A significant association was seen between menopause and stroke severity.

Table 6. Association of hypertension with type of stroke

Variable	Categories	Type of stroke			P-Value
		Cardioembolic stroke	Large artery atherosclerosis	Small vessel occlusion	
Hypertension	Absent	12	28	2	0.001
	Present	1	48	5	

A significant association was seen between hypertension and type of stroke.

Table 7. Association of congestive heart failure with type of stroke

Variable	Categories	Type of stroke			P-Value
		Cardioembolic stroke	Large artery atherosclerosis	Small vessel occlusion	
Congestive heart failure	Absent	12	76	7	0.04
	Present	1	0	0	

A significant association was seen between congestive heart failure and type of stroke.

Table 8. Association of migraine with type of stroke

Variable	Categories	Type of Stroke			P-Value
		Cardioembolic stroke	Large artery atherosclerosis	Small vessel occlusion	
Migraine	Absent	10	74	7	0.007
	Present	3	2	0	

A significant association was seen between migraine and type of stroke.

DISCUSSION

Stroke is described as sudden onset neurological deficit which is persistent and arises due to occlusion of a major cerebral artery by a thrombus or an embolus which is not as a result of tumor, trauma to brain or other cause. It is a major cause of disability worldwide. In the year 2013, around 6.9 million people suffered from ischemic stroke worldwide (6).

Our study recruited a total of 96 female patients with the clinical features of ischemic stroke. The main features of our study were the selection of female patients with ischemic cerebral stroke to study the risk factors and their association with types of stroke and stroke severity.

In our study, the maximum number of patients belonged to the age group of more than 45 years. According to Rathmann et al., age is the most common non-modifiable risk factor for the development of stroke. A study by Xiao-Ying et al. also showed that the risk of stroke was greater among women more than 45 years of age (7).

In our study, it was found that hypertension had a significant association with the type of stroke. It is in agreement with a study done by Arboix et al. which states that hypertension and diabetes mellitus are independently associated with small vessel occlusion (8).

Champaloux et al., Li et al. and Rambarat et al. showed that the patients of migraine with aura have a two to three fold higher risk of developing stroke than those without migraine and there was association of migraine with the severity of stroke. This is consistent with our findings (9).

There was an association between migraine and severity of stroke which was statistically significant. This is in agreement with the observations of Tzourio et al. that migraine has been most consistently associated with stroke in young women (10).

Studies by Mosek et al. and Merikangas et al. suggest that there is no association between migraine and stroke in women having age of more than 60 years. According to Abanoz al., and Peng et al., the risk of stroke is greatest in young women having migraine with aura (11).

A study by Matthews et al. suggests that during post-menopausal phase, there is an increase in the level of triglyceride and LDL cholesterol along with increase in the levels of fasting glucose and blood pressure levels whereas level of HDL cholesterol decreases. This leads to increased risk of stroke, which supports our findings that there was an association of menopause with the severity of stroke (12).

Large-scale epidemiologic studies by Bots et al. have shown an association between carotid atherosclerosis and future clinical cardiovascular events (e.g. stroke) which is consistent with our findings which showed that there is a significant association between congestive heart failure and stroke subtype (13).

Work by Sutton-Tyrrell et al. was done to study atherosclerosis of carotid arteries amongst pre and post menopausal women which suggested that risk factors amongst premenopausal women is associated with subclinical atherosclerosis which can either be present before menopause or 5 to 8 years after menopause. This contradicts our findings which showed that there is no association of menstrual cycle with the type of stroke. In our study, it was found that the maximum numbers of patients (thirty one patients) with moderate to severe stroke were in the post-menopausal phase. The association of menopause with the severity of stroke was found to be statistically significant(14).

CONCLUSION

The most common risk factors of ischemic stroke in women were hypertension, coronary artery disease, peripheral arterial disease, diabetes mellitus, dyslipidemia, previous stroke, migraine, chronic kidney disease and congestive cardiac failure.

The predisposition of stroke was high in post menopausal women. In pre menopausal woman, there was a high risk of ischemic stroke in women with a history of migraine or use of oral contraceptive pill. There was a significant association of hypertension and congestive heart failure with types of stroke indicating that cardiovascular disease

is a strong risk factor in the development of stroke.

Thus, ischemic cerebral stroke is a multi-factorial disease with interplay of various risk factors in the development of the disease.

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