

SEASONAL VARIATIONS IN STROKE: A STUDY IN A TEACHING HOSPITAL OF KHYBER PAKHTUNKHWA

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ABSTRACT

Objective: To determine variations in incidence of stroke and its subtypes during summer and winter seasons and to determine the risk factors associated with it.

Material and Methods: This descriptive study was conducted in the Department of Medicine, Khyber Teaching Hospital Peshawar, Pakistan, from January 2015 to December 2016. Patients whose findings were consistent with stroke were included in the study on the basis of history, clinical examination and radiological evidence.

Results: Out of total 210 patients, 117 (55.71%) cases accounted for ischemic stroke and 93 (44.28%) cases accounted for hemorrhagic stroke. Stroke incidence was more prevalent in male than female (60.5% vs 39.5%). In summer season more patients presented with ischemic stroke than hemorrhagic stroke (58.1% vs 31.2%), while in winter season more patients presented with hemorrhagic stroke than ischemic stroke (68.8% vs 41.9%) and the seasonal variation was found to be strongly statistically significant (p value <0.001). Hypertension (42.4%) was found to be major risk factor for stroke followed by diabetes (34.3%).

Conclusion: Seasonal variation was found among patients presented with stroke. Stroke was more common in winter season. Hemorrhagic stroke was more than ischemic stroke in winter season and vice versa. Hypertension was the major risk factor among patients.

Key words: hemorrhagic stroke, ischemic stroke, seasonal variation, stroke.

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INTRODUCTION

Stroke is defined as rapid onset of focal neurological deficits lasting for more than 24 hours as a result of vascular insult¹. Stroke is a broad terminology which can be further classified into ischemic and hemorrhagic stroke². Stroke is a major cause of morbidity and mortality and about 5.7 million people die globally³.

The incidence of Stroke in United States is 200 cases/100,000 populations, while in Pakistan it is approximately 250/100,000 population; therefore, there is risk of 350,000 of new stroke patients every year⁴. Prevalence of Ischemic stroke is 85%, while hemorrhagic stroke is

15%⁵. The severity of morbidity and mortality rates are higher for hemorrhagic than ischemic stroke⁶. Ischemic stroke occurs after cessation of blood circulation to an area of the brain giving rise to focal neurological deficit, while intracerebral hemorrhage occurs secondary to rupture of blood vessels in the brain⁷.

The risk factors for stroke include hypertension, diabetes, dyslipidemia, smoking, old age, heart disease, using oral contraceptive pills, excess alcohol consumption, hyper-coagulopathies etc⁸. The major risk factor is uncontrolled hypertension as depicted in local national survey 30% people above 45-years-old suffer from uncontrolled hypertension⁴. Old age is a common risk factor for both genders, as it has showed increased incidence of both ischemic and hemorrhagic strokes with increasing age⁹. The incidence of ischemic and hemorrhagic stroke varies in different seasons. To establish this relationship a number of studies were carried out in different countries in different seasons¹⁰⁻¹⁷. Some studies favoured the relationship while others negated it¹⁸⁻²².

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Pakistan is a tropical country and has different seasons, but summer and winter are the two main seasons that are extreme and are present for extended period of time. It may influence the incidence of ischemic and hemorrhagic stroke. The aim of this study was to determine the relationship between the seasonal variation and the stroke subtypes. It will help us to strategize and alter our management plans to counteract strokes in different seasons effectively.

MATERIAL AND METHODS

This descriptive study was conducted in the Department of Medicine, Khyber Teaching Hospital, Peshawar, Pakistan. The time period of the study was from January 2016 to December 2016.

Total number of 210 stroke patients presented to our department in one year. Stroke was confirmed and sub-classified into ischemic and hemorrhagic stroke on the basis of physical examination and Computed Tomography of brain. The whole year was divided into two seasons i.e. winter (October, November, December, January, February and March) and summer (April, May, June, July, August and September), as these are the two main seasons that exist for extended period of time in our country and affect lifestyles of the people.

All age groups patients with ischemic and hemorrhagic strokes regardless of gender were included in the study after formal consent. After approval from the ethical committee those patients who fulfilled the inclusion criteria, a detailed history was taken about the symptoms, especially risk factors like hypertension, diabetes, dyslipidemia, smoking, family history of stroke and contraceptive pills. Stroke was confirmed on neurological examination and neuroimaging (Computed Tomography) of the brain. Finally, data was analysed on SPSS software (SPSS version 16, Inc., Chicago, IL), and chi square test was applied to find out statistically significant association (p value <0.05) of stroke types and seasons of a year.

RESULTS

A total of 210 cases were included in the study. Of 210, males were 127 (60.5%) and females were 83 (39.5). Table 1 illustrates the information that age groups were divided among 6 groups (<40, 40-49, 50-59, 60-69, 70-79 and ≥ 80). The incidence of both ischemic and hemorrhagic stroke was more common in 60-69 age groups in genders, while the lowest incidence was found in age group < 40 in both genders.

Table 2 shows that the incidence of stroke is more common in males as compared to females (60.5% vs 39.5%). Moreover, ischemic stroke was common in both genders than hemorrhagic stroke in both genders (55.7% vs 44.3%).

The incidence of ischemic stroke in summer season was more common than hemorrhagic stroke. As total of 97 cases (46.2%) presented with stroke, of which 68 cases (58.1%) were ischemic stroke and 29 cases (31.2%) were hemorrhagic stroke, while in winter season the incidence of ischemic stroke was more common than hemorrhagic stroke. On the other hand in winter season the incidence of hemorrhagic stroke was more common than ischemic stroke. As total of 113 cases (53.8%) presented with stroke, of which 64 cases (68.8%) were hemorrhagic stroke and 49 cases (41.9%) were ischemic stroke. This seasonal variation of stroke subtypes were analysed on SPSS by applying chi square test. The value of chi square test was 14.147 and it was statistically strongly significant (p value <0.0001).

The Figure I show the risk factors associated with stroke. Hypertension (42.4%) was found to be major risk factor followed by diabetes (34.3%) and dyslipidemia (7.6%).

DISCUSSION

In our study a significant relationship was found between seasonal variation and the type of the stroke. There are many studies reported in the literature which

Table 1 Distribution of Gender, Season and type of stroke with respect to Age groups

		Age Groups in years						Total
		<40	40-49	50-59	60-69	70-79	≥ 80	
Gender	Male	12(5.7%)	14(6.7%)	20(9.8%)	38(18.1%)	25(11.9%)	18(6.6%)	127(60.5%)
	Female	5(2.4%)	12(5.7%)	12(5.7%)	22(10.5%)	20(9.5%)	12(5.7%)	83(39.5%)
Season	Summer	9(4.3%)	16(7.6%)	10(4.8%)	27(12.9%)	16(7.6%)	19(9.0%)	97(46.2%)
	Winter	8(3.8%)	10(4.8%)	22(10.5%)	33(16.7%)	29(18.8%)	11(5.2%)	113(53.8%)
Type of Stroke	Ischemic	10(4.8%)	16(7.6%)	19(9.0%)	29(13.8%)	24(11.4%)	20(9.5%)	117(55.7%)
	Hemorrhagic	7(3.3%)	10(4.8%)	13(6.2%)	31(14.8%)	21(10.0%)	10(4.8%)	93(44.3%)

Table 2 Gender wise distribution of Type of Stroke

		Ischemic	Hemorrhagic	Total
Gender	Male	75(64.1%)	52(55.9%)	127(60.5%)
	Female	42(35.9%)	41(44.1%)	83(39.5%)
Total		117(100%)	93(100%)	210(100%)

Table 3 Season wise Distribution of Type of Stroke

		Ischemic	Hemorrhagic	Total	Chi Square Value	p Value
Season	Summer	68(58.1%)	29(31.2%)	97(46.2%)	14.174	0.0001
	Winter	49(41.9%)	64(68.8%)	113(53.8%)		
Total		117(100%)	93(100%)	210(100%)		

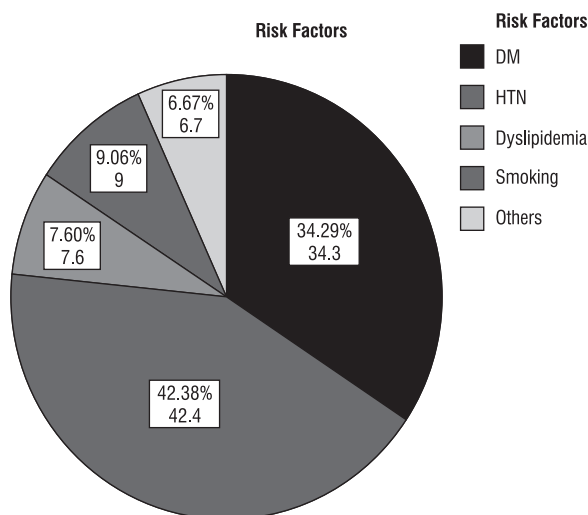


Figure 1: Percentages of Risk Factors associated with Stroke

advocates this significance^{12,16,23-26}.

In our study it was found that the incidence of stroke was more common in males than females (60.5% vs 39.5%), this observation was in correlation with the studies conducted by Ziauddin et al⁷ (60.7% vs 39.3%), Soomro MA et al²⁷ (58% vs 42%), Syed NA et al²⁸ (58% vs 42%) and Vohra EA et al²⁹ respectively.

The highest incidence of stroke was found in the age group 60-69, which correlates with other various studies²²⁻²⁷. The incidence was found to be 8.1% in age group <40 years, which was in accordance with previous studies^{27,28} (11%), but the incidence was reported high in studies conducted in Western society^{29,30}.

The study illustrated that the incidence of stroke, ischemic and hemorrhagic, was more common in winter season than the summer (53.8% vs 46.2%). Other studies conducted by Capon et al¹⁵, 23% in November and

December, while 10% in July and August and Ziauddin et al⁷ (58.6% vs 41.4%) showed the same results. The main finding of the study was that hemorrhagic stroke was more common in winter season (68.8% vs 31.2%). Miah et al¹³ conducted a study which showed the incidence of hemorrhagic stroke was 62.2% in winter, while 37.6% in summer. Fang CW et al¹⁷ also found significant association of winter season and hemorrhagic stroke ($p = 0.002$). On the other hand, study also revealed that ischemic stroke was more common in summer season than winter (58.1% vs 41.9%). This finding was in accordance by study conducted by Kumar P et al while it contradicted the findings of the study conducted by Jakovljević D³².

The increase risk of stroke in winter season may be due to increase in the blood pressure levels as compared to the summer seasons. The factors responsible for the high blood pressure levels may be vasoconstriction secondary to low temperature, additionally; increase in blood viscosity may account for it as well³⁴⁻³⁶.

CONCLUSION

Winter season was associated with increased risk of stroke, ischemic and hemorrhagic, as compared to the summer season. Moreover, incidence of hemorrhagic stroke was much higher than ischemic stroke in winter season and vice versa. The study observed hypertension to be the biggest risk factor for stroke.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

- Khan WM:** Concept & design, literature
Khan M: Data analysis manuscript & data collection data revise
Shah F: Compilation, critical appraisal & proof reading

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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