ORIGINAL PROF-1152

STROKE;
SEASONAL VARIATION IN ETIOLOGY

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ABSTRACT...umair_592@yahoo.com. ansarm@netscape.net. **Objective:** To document seasonal variations in various types of stroke and to identify possible precipitating/aggravating factors. **Design:** Analytical. **Place and Duration of Study:** Military Hospital Rawalpindi and Combined Military Hospital Rawalpindi, for one year, from Ist October 2001 to 30th September 2002. **Patients and Methods:** 116 adult stroke patients diagnosed on the basis of history, clinical examination and CT Scan and admitted during this period were included in the study. The findings were documented and analyzed using SPSS and frequency of stroke in relation to seasons was calculated. Chi square test was used to determine significance of differences in frequency of different types of stroke in the winter and summer. **Results:** The age of the patients ranged from 20-87 years.83 were males while 33 were females. Sixty-nine out of 116 cases presented in summer and the rest 47 in winter. In summer out of 69 subjects, 48(69.56%) had ischaemic strokes and 21(30.44%) had hemorrhagic strokes, of which 19 had Intra Cerebral Hemorrhage (ICH) and 2 subarachnoid hemorrhage (SAH). In winter, out of 47 subjects, 28(59.57%) had ischaemic strokes and 19(40.43%) had haemorrhagic strokes (all ICH). Two definite seasonal peaks one in extreme summer (June, July) and the other in extreme winter (December, January) were seen. **Conclusions:** There is a significant variation in frequency of stroke and its different types in different seasons of the year with higher occurrence in peak summer (June, July) and extreme winter (December, January).

Key words: Cerebrovascular accident, Seasons, Variation

INTRODUCTION

Most cerebrovascular diseases[1,2,3] present as, an abrupt onset of a focal neurological deficit. The deficit may remain fixed, rapidly improve or progressively worsen. It is this abrupt onset of a non-convulsive and focal neurologic deficit that is referred to as a Stroke, a Cerebrovascular Accident (CVA), or Apoplexy. Stroke occurs in conjunction with at least one of four events

thrombosis, embolism, spasm of the arteries or the sledging of the blood as it passes through segments of vessels that have been narrowed by arteriosclerosis, or Haemorrhage.

Stroke is the second leading cause of death worldwide and the leading cause of long-term disability[4]. Strategies for stroke prevention, including the control of hypertension, treatment of atrial fibrillation, and smoking cessation, have reduced the disease burden, but stroke still remains an important public health challenge. A better understanding of the risk factors for stroke is needed to develop additional preventive strategies. Approximately 400 persons per 100,000 population over the age of 45 years have a first stroke each year in the United States, Europe, and Australia. Stroke is the most frequent cause of adult-onset disability among people in the United States, and the cost of related care is among the fastest-growing expenses for Medicare[5].

Cerebrovascular diseases[6,7,8] predominate in the middle and late years of life. They can prove fatal or can cause considerable neurologic disability. The incidence of stroke increases with age and affects many people in their "golden years," a rapidly growing segment of the population. Cerebral ischaemia leading to infarction constitutes 85 to 90 percent of the total cases of stroke while 10 to 15 percent are intra cranial hemorrhages. The morbidity and mortality from cerebrovascular diseases has been diminishing in recent years but still poses a large threat to health of human race in terms of functional disability.

Although public knowledge of stroke has increased, significant gaps continue to exist, with lack of knowledge most apparent in the elderly, blacks, and men—groups that have higher incidence rates of stroke. In a study of 152 patients seeking emergency department care for stroke like symptoms, median delay in hospital arrival was less in cases where a witness recognized the seriousness of the symptoms[9]. Today, there is a wealth of information available on the cause, prevention, risk, and treatment of stroke. Although there is no cure, most stroke victims now have a good chance for survival and recovery. Immediate treatment, supportive care, and rehabilitation can all improve the quality of life for stroke victims. Since it has been observed that there is evidence of seasonal variations in the occurrence of stroke, there was a need to evaluate its relevance in our set-up[10-19].

OBJECTIVES

This study was done to identify and document possible precipitating/aggravating factors on the relative frequency of different types of stroke.

MATERIALS AND METHODS

The study was carried out on cases of CVA (stroke) admitted to Military Hospital, Rawalpindi and Combined Military Hospital, Rawalpindi during the course of one year, from 1st October 2001 to 30th September 2002. They were diagnosed on the basis of history, clinical examination and CT-scan brain. The sampling was of convenience type. Patients of either sex, aged 15 years and above suffering from stroke with evidence of infarct of haemorrhage on CT scan brain were selected.

Patients with intra cranial space-occupying lesions, recent myocardial infarction, and those having chronic debilitating illnesses like chronic renal failure, chronic liver disease and congestive cardiac failure were excluded. The period of the study was divided into winter (October to March) and summer (April to September). The temperature during winter ranged from -2 Celsius to 32 Celsius. However during peak winter (December, January) the temperature ranged from -2 Celsius to 15 Celsius. In summer, the temperature ranged from 34 Celsius to 48 Celsius. In extreme hot weather (June, July) the temperature ranged from 38 C to 48 C. History and physical examination were recorded according to the following performa.

PERFORMA

Name: _____ Age _____
Sex: _____
Address: _____
Date of admission: _____

Season: Winter /Summer

: °C

Ambient Temp:

CLINICAL DATA

Signs/symptoms	Yes	No
Hemiplegia		
Aphasia/Dysphasia		
Coma		

RISK FACTORS

Factors	Yes	No	
Hypertension			BP: mmHg
Diabetes mellitus			BSF: mmol/L
Smoking			
Oral contraceptives			
Dehydration			

INVESTIGATIONS

In all cases, Blood complete picture, Serum cholesterol level, ESR, Blood glucose level, Urinalysis, X-ray chest PA view, and ECG were advised along with CT scan brain. In selected cases 2-D echocardiography and MRI scan brain were carried out.

Tests	Results	
Blood complete picture	Hb: Gm/L	ESR: mm/1st hors
Serum cholesterol		mmol/L
X-ray chest PA view		
ECG		
2-D Echocardiography		
CT scan - brain	Infarct	Hemorrhage

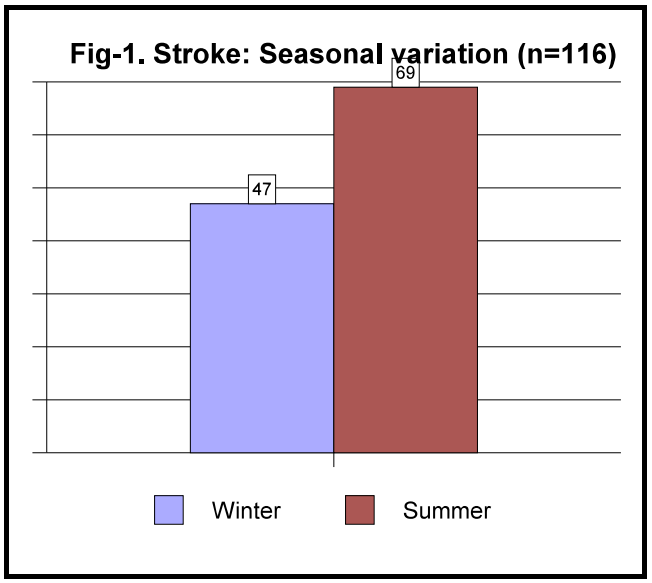
STATISTICAL METHODS

Data was entered in SPSS version 10. Descriptive statistics were used to calculate the frequency.

RESULTS

The total cases of stroke in the study were 116.Sixty nine out of 116 cases presented in summer and 47 in winter (Table-I, Figure–1).

Table-I. Stroke: Seasonal variation (n=116)		
Seasons	No. of pts	%age
Summer	69	59%
Winter	47	41%



In summer out of 69 patients, 48(69.56%) were ischaemic strokes and 21(30.44%) were haemorrhagic strokes, of which 19 were ICH and 2 SAH (Figure-2). In winter, out of 47 subjects, 28(59.57%) were ischaemic stroke and 19(40.43%) were haemorrhagic stroke (all ICH) (Figure-3). The age of the patients ranged from 20-87 years. Males had a higher incidence 83(71.55%) as compared with females 33(28.45%) (Table-III, Figure-4).

DISCUSSION

This study demonstrated a higher number of stroke patients (69) in summer (April to September), than in

winter (October to March) in which 47 stroke patients were admitted.

Table-II. Seasonal variation in type of stroke (n=116)				
Seasons	No of pts		%age	
	Ischaemic stroke	Hemorr. stroke	Ischaemic stroke	Hemorr. stroke
Summer	48	21	69.56%	30.44%
Winter	28	19	59.57%	40.43%

Fig-2. Seasonal variation in type of stroke (n=116)

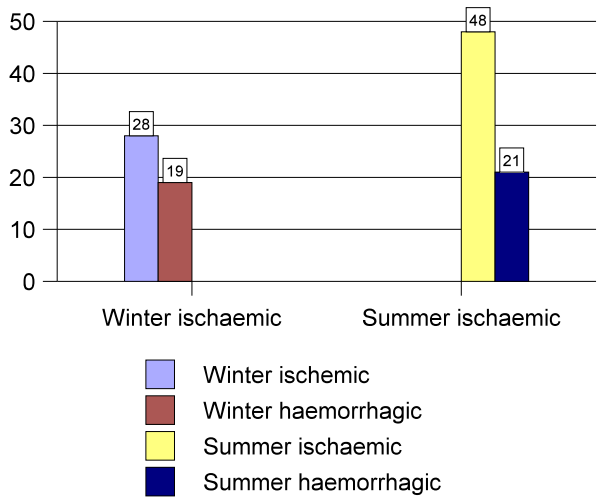


Table-III. Seasonal variation in male to female ration (n=116)				
Seasons	No of pts		%age	
	Male	Female	Male	Female
Summer	52	17	45%	31%
Winter	36	11	15%	9%

This variation may indicate an actual increase in the number of strokes in summer or may be coincidental due to more patients seeking treatment and being admitted during summer. However, a clear seasonal variation in the occurrence of ischaemic stroke and intracerebral hemorrhage was seen, while a significant association between season and subrachnoid haemorrhage could not be ascertained. Our results were similar to a study carried out by Hannan et al in Bangladesh[10]. However, a study of Finnish population by Salmi K et al[11], found the opposite, suggesting that incidence of stroke was more in winter. Whereas a study of the Grecian population did not come up with a significant difference, here the number of cases in summer were 119 and in winter 111[20]. The similarity of our results to that of the Bangladesh Medical Research Council may be due to the racial and climatic similarities with the Bangladeshi population.

Fig-3. Seasonal variation in sex distribution of stroke patients (n=116)

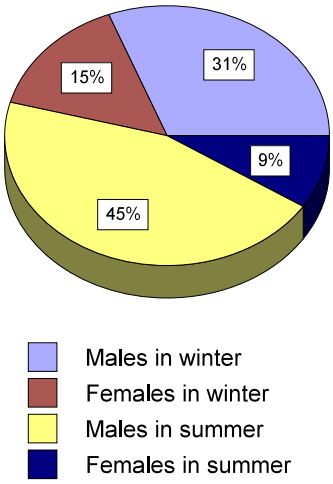
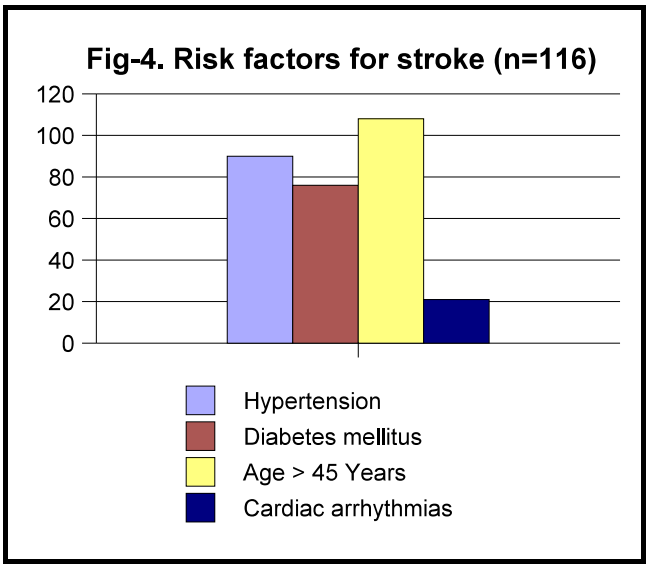
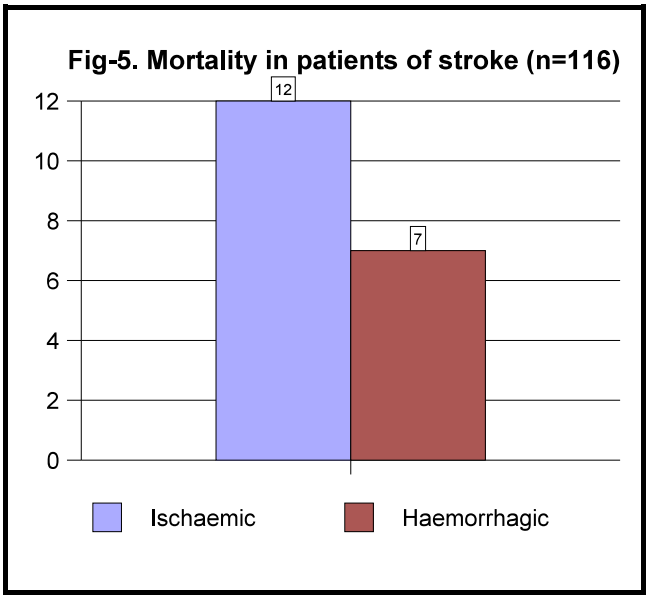


Table-IV. Risk factors for stroke (n=116)		
Rick factors	No. of pts	%age
Hypertension	90	77.59%
Diabetes mellitus	76	65.52%
Age> 45 years	108	93.11%
Cardiac arrhythmia	21	18.11%

Table-V. Mortality in patients of stroke (n=116)			
No of pts		%age	
Ischaemic stroke	Hemorrhagic stroke	Ischaemic stroke	Hemorrhagic stroke
12	7	15.79%	17.5%





In the study, the seasonal differences in the occurrence of ischaemic stroke were most prominent among men aged 35 to 70 years and less significant in older men and women. Our results showed that the chance of having a stroke more than doubles over each decade of life after age 55.Our results matched those of a study carried out by Ansari AK, Akhund IA,Shaikh AQ at Ayub Medical College[21] . It is likely that men in this age group work outdoors more and are thus exposed to extremes of weather.

Our data showed that, overall, the incidence and prevalence of stroke are greater for men than women. Hart CL,hole DJ,Smith GD[22] carried out a study which showed similar results. A study on gender differences in stroke subtypes in relation to age by Malarcher AM et al[23] showed the incidence of stroke as being more in elderly women than men.

Our results clearly demonstrated that hypertensives are more prone to have stroke at any age and that the stroke risk varies directly with blood pressure. This is more important as regards intra-cerebral bleed in hot weather. Similar results have been shown by different studies all over the world[24 -31].

The incidence of ischaemic stroke was found to be more in diabetics than non-diabetics, independent of season. A study carried out by Basir F,Ali S and Aziz H[32,33,34] showed similar results.

Most of our patients belonged to the low-income group[35]. In addition we found that in the affluent group stroke was commoner in summer (April to September) whereas in low socioeconomic group it was commoner in winter (October to March).

Ischaemic vascular events have been reported repeatedly to have a relation with the circadian rhythm[26,36,37,38]. Most of these reports deal with myocardial ischaemia, acute myocardial infarction, and sudden cardiac death. There are many factors that may contribute to circadian periodicity of the onset of stroke. Blood pressure decreases during sleep and this occurs even when a nap is taken during the day. The rapid physiological increase in blood pressure, after awakening

in the morning, may lead to over responsiveness of auto regulation and may provoke a fragmentation of an existing carotid plaque. In fact, in our study, the major peak of stroke onset was seen to occur during that period. Nevertheless, this observation was not borne out in other studies we consulted; these show no difference in the timing of onset of stroke between normotensive and treated or untreated hypertensive patients.

CONCLUSION

It was noted that there is a higher incidence of strokes during extremes of weather (both hot and cold) with a greater peak in summer than winter. The higher incidence of Ischaemic Stroke was prominent in middle-aged men and women.

Larger, geographically demarcated and ethnically demarcated studies should be done, to help clarify the difference in the aetiology due to these variables. Some degree of prevention may be possible by educating the public and especially patients at risk for stroke.

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