

SEASONAL AND DIURNAL VARIATIONS OF ANEURYSMAL SUBARACHNOID HEMORRHAGE

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Abstract- The seasonal and diurnal variations in the incidence of hypertension, cerebrovascular accident, coronary heart disease were well documented, but the relation between season and daytime on the onset of aneurysmal subarachnoid hemorrhage (ASAH) was a subject of controversy. In the present study we aimed to evaluate the role of season of year and diurnal changes on the onset of ASAH. The time was categorized into two intervals of daytime and night time. Also patients were evaluated in two age groups of ≥ 60 and under 60. There were 107 files of patients with definite diagnosis of ASAH. The main common symptom was headache (88.8%). 52.2% of patients were referred to the hospital in day time and 45.8% were in night time, and the difference was not statistically significant. Moreover, the frequency of ASAH in winter and falls was about 51.4% and that of summer and spring was 45.6% and the difference was not significant. Seasonal frequency in patients with or without hypertension, cigarette smoking or both was not also statistically different. seasonal and diurnal variation didn't show considerable effect on the onset of ASAH in our study. Even this effect was not observed in hypertensive patients. However, we need other researches on a larger sample of patients considering the influence of hypertension in relation to season and daytime in the onset of ASAH.

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Key words: Seasonal, diurnal, variation, aneurysm, subarachnoid hemorrhage

INTRODUCTION

Aneurysmal subarachnoid hemorrhage (ASAH) was considered in some previous studies investigating the correlation of vascular events with season and time of day. They reported that changes in biometric blood pressure would lead to daily and seasonal variations which could modulate the occurrence of vascular events (1-3). It is well documented that season exerts an influence in the incidence of coronary heart disease, hypertension, cerebrovascular accident (1-3) and even nonvascular disorders such as pancreatitis. However, the relation between season, daytime and onset of

SAH was a subject of controversy up to now. A considerable increase in the occurrence of SAH pertained to the blood pressure changes have been shown (4). Other studies such as the study on 761 cases of SAH by Hanken *et al.* didn't show significant difference in this relation (3). These conflicting results produce a need to design more new studies on this subject. In the present study, we aimed to evaluate the effect of season of year and diurnal variation on the onset of SAH due to rupture of aneurysm.

MATERIALS AND METHODS

In a retrospective study, all files of patients from year 1996 through 2004 that fulfilled the criteria for ASAH in Nemazee Hospital of Shiraz University of Medical Sciences in Shiraz, Southern Iran were reviewed for appropriate data including time of onset

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of symptoms, date, age, sex and any history of hypertension or smoking. Definite diagnoses of SAH recorded in the files were evidence of patient's history and clinical findings confirmed by computed topography scan (CT scan) or spinal cord fluid analysis. ASAH was diagnosed if an aneurysm was seen on angiography or, in patients without angiography if CT scan showed a typical aneurysmal pattern of hemorrhage.

SAH due to other reasons other than brain aneurysm such as arterio venous malformation, trauma, infection, malignancy and etc. were excluded from this study. The time of onset of symptoms was reported in the admission note according to the patient history and in cases of depressed level of consciousness according to the relative or eyewitness one. We categorized time in two intervals daytime (8 AM to 7.59 PM) and night time (8 PM to 7.59 AM). Any history of hypertension or smoking reported in the admission note was included. Finally, the patients were evaluated in two age groups of < 60 and ≥ 60 in relation to the seasonal and diurnal presentation of ASAH.

All data were analyzed with Info 6.4 and EPI softwares. Chi Square test was used for comparison.

RESULTS

There were one hundred and seven files that fulfilled criteria of ASAH. The mean age of 67.35% of patients was < 60 years and for 32.65% was ≥ 60

years. The male to female ratio was 1.3 to 1. Headache was found to be the most common symptom (88.8%) at the onset of ASAH while diplopia was reported only in 4.6% of patients. According to the risk factors, 44% of patients had a history of hypertension, 15% had a history of smoking and 5% had both. The two-time interval didn't have statistically significant difference in the onset of ASAH as 52.2% of patients referred to the hospital in day time and 45.8% referred in night time (Tables 1-3).

Moreover, the frequency of ASAH in winter and fall was about 51.4% and that of spring and summer was 48.6%; however, the difference was not statistically significant (Tables 2, 3). Subsequently; 32.7% of patients without history of hypertension or smoking and also 31.35% and 32% with history of smoking and hypertension, respectively were presented in fall. As a result, seasonal frequency in patients with or without risk factor was not significant ($X^2=2.78$, $P = 0.42$). 53.2% of patients with history of hypertension developed ASAH in daytime and the remainder presented in night time, but the difference was not significant ($X^2 = 0.42$, $P = 0.05$) (Table 3).

According to the gender, the seasonal frequency of ASAH was not different between males and females ($X_2=2.7$, $P = 0.44$) (Table 3). However, the difference in the diurnal presentation of this problem was considerable only in females ($X_2 = 3.47$, $P = 0.04$), as 61.9% of females referred to the hospital in day time (Table 4).

Table 1. Frequency of patients in relation to age and daily hours*

Age (year)	Season				Total
	Spring	Summer	Autumn	Winter	
60 >	19 (17.8)	19 (17.8)	13 (12.15)	21 (19.6)	72 (67.35)
60 ≤	5 (4.6)	9 (8.4)	12 (11.25)	9 (8.4)	35 (32.65)
Total	24 (22.4)	28 (26.6)	25 (23.4)	30 (28)	107 (100)

*Data are given as number (percent).

Table 2. Frequency of patients in relation to age and seasons

Age (Year)	8 AM -7.59 PM		8 PM -7.59 AM		Total	
	Number	Percent	Number	Percent	Number	Percent
60 >	43	40.2	29	27.15	72	67.35
60 <	15	14	20	18.65	35	32.65
Total	58	54.2	49	45.8	107	100

Table 3. Frequency of patients in relation to sex and seasons

Season	Male (n = 46)		Female (n = 61)		Total
	Number	Percent	Number	Percent	
Spring	13	28.5	11	18	24
Summer	13	28.5	15	24.7	28
Autumn	8	17	17	27.8	25
Winter	12	26	18	29.5	30
Total	46	100	61	100	107

Table 4. Frequency of patients in relation to sex and daily hours

Hour	Male		Female		Total
	Number	Percent	Number	Percent	
8.00 AM- 7.59 PM	20	43	38	61.9	58
7.50 AM- 8.00 PM	26	57	23	38.1	49
Total	46	100	61	100	107

DISCUSSION

Seasonal and diurnal variation of ASAH was a conflicting subject up to now (4) seasonal variation of SAH was reported in regions with tropical climate where one experiences a definite variable season. However, in regions with subtropical weather, this relation remained uncertain (6). In that manner, in our study undertaken in Shiraz, Southern Iran with nearly monotonous climate, we didn't find considerable difference. On the other hand, the clear role of climate may be difficult to be estimated as strenuous activities may trigger the onset of ASAH more strongly than climate (5).

Other prospective studies would be desirable omitting factors which can produce confounding effects. Some previous researches demonstrated the correlation between seasonal and diurnal variation and onset of SAH in patients ≥ 60 years old, (5-8) but in the present study the difference between patients who were ≥ 60 years old or under 60 years was not significant. Moreover, circadian changes of blood pressure which were cited as a main factor in the onset of ASAH in some studies (8-10), didn't show considerable role in the present study.

However, the possible influence of hypertension on ASAH in relation to the seasonal and diurnal variation should be considered in other studies on larger sample groups.

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Conflict of interests

The authors declare that they have no competing interests.

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