

## Seasonal Variations of Aneurismal Subarachnoid Hemorrhage

SUBASH KANTI DEY<sup>1</sup>, SHAKIR HUSAIN<sup>2</sup>, LIPY BAKSHI<sup>3</sup>, SUKLA DEY<sup>4</sup>, MITHUN KUMAR BAKSHI<sup>5</sup>, HABIB AHSAN<sup>1</sup>, MD SHAHIDULLAH<sup>1</sup>, KANOJ KUMAR BARMAN<sup>6</sup>, KAZI MOHIBUR RAHMAN<sup>7</sup>, SHARIFUDDIN KHAN<sup>8</sup>, UTTAM KUMAR SAHA<sup>9</sup>

### Abstract:

**Background:** Rupture of aneurysm is a vascular event, it is assumed that season exerts an influence in the incidence of rupture of aneurysm. But seasonal variation on the aneurismal subarachnoid hemorrhage (ASAH) is a subject of controversy. Some previous studies reported that changes in the biometric pressure in different season modulate the occurrence of vascular events. **Aims:** To evaluate the role of seasons of a year on the onset of aneurismal subarachnoid hemorrhage (ASAH). **Methodology:** This is a retrospective study. There were 377 patients with definite diagnosis of ASAH. Patients were evaluated in two age groups of >60 and less than 60. **Results:** The frequency of ASAH in winter and autumn was 55.4% and spring and summer was 44.6% respectively. This difference was statistically significant ( $p > 0.05$ ). The effect of hypertension and diabetes mellitus revealed no influence on subarachnoid hemorrhage (SAH) in our study. **Conclusion:** There was influence of seasonal variation on the onset of ASAH and which was predominantly during winter and autumn.

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

**Abbreviation:** ASAH –Aneurismal subarachnoid hemorrhage. SAH (subarachnoid hemorrhage) DM – Diabetes Mellitus.

### Introduction:

The seasonal variations in the incidence of hypertension, cerebrovascular accident, coronary heart disease were well reported. But seasonal variation on the aneurismal subarachnoid hemorrhage (ASAH) is a subject of controversy. Some previous studies reported that changes in the biometric pressure in different season modulate the occurrence of vascular events<sup>1-3</sup>. As rupture of aneurysm is also a vascular event, it is assumed that season exerts an influence in the incidence of rupture of aneurysm. It is well reported in some studies that season exerts an influence in the incidence of coronary heart disease, hypertension, cerebrovascular accident<sup>1-3</sup> and even nonvascular disorders such as pancreatitis.

However, the relation between season and onset of SAH was a subject of controversy till now. Some showed that a considerable increase in the occurrence of SAH if there was changes in the

blood pressure<sup>4</sup>. In a study on 761 cases of SAH by Hanken *et al.* didn't show any significant difference with blood pressure change<sup>3</sup>. These conflicting results produce a need to design more new studies in this regards. In the present study, we aimed to evaluate if there was any variations of different season of year on the onset of SAH due to rupture of aneurysm.

### Material and method:

In a retrospective study, all files of patients from year 2007 to 2010 that fulfilled the criteria for ASAH in Max Hospital, New Delhi were reviewed for appropriate data including age, sex and history of hypertension and DM. The definite diagnoses of SAH recorded from the files with patient's history and clinical findings that were confirmed by computed tomography scan (CT scan). Aneurysm is confirmed by angiographically or typical

1. Assistant professor, Department of Neurology, BSMMU, Shahbag, Dhaka.
2. Director, Interventional Neurology and Stroke programme, Max Hospital, New Delhi, India.
3. Registrar, Department of Gynae and obs, Dhaka National Medical College, Dhaka.
4. Assistant Registrar, Department of Gynae and Obs, Mymensingh Medical College Hospital, Mymensingh.
5. Indoor Medical Officer, Department of Surgery, Mymensingh Medical College Hospital, Mymensingh.
6. Associate professor, Department of Neurology, BSMMU, Shahbag, Dhaka.
7. Assistant professor, Department of Interventional Neurology, National Institute of Neuroscience, Dhaka.
8. Associate Professor, Department of Neurology, Department of Neurology, Dhaka Medical College, Dhaka
9. Associate Professor, Department of Neurology, Sir Salimullah Medical College, Dhaka

aneusymal blood in CT scan of brain. SAH due to other reasons, such as arteriovenous malformation, trauma, malignancy etc. were excluded from this study. Any history of hypertension or DM reported in the admission note was included. Finally, the patients were evaluated in two age groups of < 60 years and >60 years in relation to the seasonal variation of ASAH. The data will be processed and analyzed by computer software SPSS (Statistical Package for Social Science) version 10. Level of significance will be considered as p value less than 0.05. Chi Square test was used for comparison.

**Result:**

There were three hundred and seventy seven patients that fulfilled criteria of ASAH. The mean age of 76.4% of patients was < 60 years and for 23.6 % was >60 years. The male to female ratio was 1:1.

Moreover, the frequency of ASAH in summer, spring, winter autumn were 18.3%, 23.6%, 27.0% and 28.4% respectively( Table:I). The frequency of ASAH in winter and autumn was about 55.4% and that of spring and summer was 44.6%. This difference was statistically significant ( $P < .005$ )

However, according to the age, the seasonal frequency of ASAH was not different between <60 years and >60 years ( $P = 0.205$ ) and the difference was not statistically significant (Tables II). Also according to the gender (Table III), the seasonal frequency of ASAH was not different between males and females ( $P = 0.796$ ). Table IV showed that only 3.2% patients were diabetic and rest were nondiabetic which revealed no variation by season. Similarly table V showed that 24.4% of patients were hypertensive and rest were nonhypertensive but there were no seasonal variations. ( $P < 0.05$ ).

**Table-I**  
*Distribution of ASAH by season*

Season	Frequency	Percent
Spring	69	18.3
Summer	99	26.3
Autumn	102	27.0
Winter	107	28.4
Total	377	100.0

p value = 0.004, z test was done to measure the level of significant.

The frequency of ASAH in winter and autumn fall was about 55.4% and that of spring and summer was 44.6% and this difference was statistically significant.

**Table-II**  
*Distribution of age by seasons*

Season	Age (in year)		p value*
	<60 year	>60 year	
Spring	49 (71.0)	20 (29.0)	0.205
Summer	71 (71.7)	28 (28.3)	
Autumn	84 (82.4)	18 (17.6)	
Winter	84 (78.5)	23 (21.5)	
Total	288 (76.4)	89 (23.6)	

\*Chi-square test was done to measure the level of significance. Figure within parentheses indicates in percentage.

**Table-III**  
*Distribution of sex by seasons*

Season	Sex		p value*
	Male	Female	
Spring	32 (46.4)	37 (53.6)	0.796
Summer	53 (53.5)	46 (46.5)	
Autumn	49 (48.0)	53 (52.0)	
Winter	54 (50.5)	53 (49.5)	
Total	188 (49.9)	189 (50.1)	

\*Chi-square test was done to measure the level of significance. Figure within parentheses indicates in percentage.

**Table-IV**  
*Distribution of DM by seasons*

Season	DM		p value*
	Yes	No	
Spring	0 (.0)	69 (100.0)	0.217
Summer	2 (2.0)	97 (98.0)	
Autumn	5 (4.9)	97 (95.1)	
Winter	5 (4.7)	102 (95.3)	
Total	12 (3.2)	365 (96.8)	

\*Chi-square test was done to measure the level of significance. Figure within parentheses indicates in percentage.

**Table-V**  
*Distribution of HTN by seasons*

Season	HTN		p value*
	Yes	No	
Spring	12 (17.4)	57 (82.6)	0.428
Summer	25 (25.3)	74 (74.7)	
Autumn	29 (28.4)	73 (71.6)	
Winter	26 (24.3)	81 (75.7)	
Total	92 (24.4)	285 (75.6)	

\*Chi-square test was done to measure the level of significance. Figure within parentheses indicates in percentage.

### Discussion:

Seasonal variation of ASAH was a controversy. One study showed a definite seasonal variation of SAH in regions with tropical climate<sup>4</sup>. However, in regions with subtropical weather, this variation remained uncertain<sup>5</sup>. In that manner, in our study undertaken in Max Hospital, New Delhi with variable climate, we also found considerable difference. The rate of incidence was more in winter and autumn but less in summer and spring. On the other hand, the clear role of climate may be difficult to estimate the difference in variation of activities that may trigger the onset of ASAH more strongly than climate<sup>6</sup>.

Some previous studies demonstrated the correlation between seasonal variation and onset of SAH in patient's of >60 years old<sup>5-8</sup>, but in the present study the difference between patients who were >60 years old or less than 60 years was not significant. Moreover, changes of blood pressures which were cited as a main factor in the onset of ASAH in some studies<sup>8-10</sup>. In this study no significant relation was found between blood pressure changes and rupture of SAH with seasons. Similarly, no significant relation was found among diabetic and nondiabetic patients with seasonal variation with SAH. However, studies of larger sample groups are needed to evaluate the influence of blood pressure and diabetes with rupture of SAH and seasonal variations.

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