



## Epidemiological Factors of Non-traumatic Subarachnoid Hemorrhage and Complications during Hospitalization in Kermanshah's Educational Hospitals

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### ABSTRACT

Subarachnoid hemorrhage (SAH) is one of the diseases with high mortality and morbidity rate. Herein, the study aimed to evaluate epidemiology factors of non-traumatic SAH and complications during hospitalization in Kermanshah's educational hospitals. From 255 patients with non-traumatic SAH, we checked epidemiologic factors and complications. Two hundred and fifty-five patients with non-traumatic SAH had the mean age of 57 years (range, 11-85 years) and 44.3% were men. The patients with 50-59 years had maximum percentage and 10-29 years with minimum percentage. Among all patients, 32.9% and 6.7% had a history of hypertension and diabetes, respectively. Also, 43.9% patients had aneurysm. Complications during hospitalization occurred in 9% patients that rebleeding and seizure were the most complications in the patients. The results showed that the mean age of SAH was more than 55 years. Approximately 50% SAH patients had aneurysm that size of less than 10 mm was the more prevalent in these patients. Diabetes, smoking and hypertension could be considered as the most important factors in SAH patients. In addition, rebleeding, vasospasm, and seizures were the most complications in SAH patients.

**Key words:** Subarachnoid Hemorrhage, Brain Aneurysm, Brain Angiography, Complications

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### INTRODUCTION

The worldwide incidence of SAH is around 6–10 cases per 100000 persons per year [1]. SAH is the cause of 5% to 10% of strokes annually in the United States [2]. In 2003 in USA, there were an estimated 31476 discharges for non-traumatic SAH among patients aged 17 years or older [3]. SAH is a significant problem in the geriatric population that the most common causes of non-traumatic SAH in elderly patients are ruptured aneurysms or arteriovenous malformations [4, 5]. Other causes include tumors and infection [5, 6]. SAH is mainly caused by ruptured cerebral

aneurysms, but in up to 15% of patients with SAH no bleeding source could be identified [7]. The risk for women is 1.6 times that of men [8]. Non-aneurysmal and especially perimesencephalic SAH is associated with favorable outcome compared to aneurysmal SAH [5, 9]. The aim of this study was to assess epidemiology factors of non-traumatic SAH and complications during hospitalization.

### MATERIALS AND METHODS

This study was approved by the Ethics Committee of Kermanshah University of Medical Sciences, Kermanshah, Iran. In this study, all cases that were hospitalized for non-traumatic SAH in educational hospitals of Kermanshah province were entered into the study. Patient information on age, sex, hypertension, smoking, diabetes, familial history of SAH, and *Glasgow coma scale* in admission, as

well as information obtained from brain angiography in patients, selected treatment, the complications and the final outcome of the patient was extracted from each patient. The information was extracted from the time of admission to the time of discharge or death of the patient and patients were excluded after leaving the hospital. Information was recorded in a checklist.

**Data analysis**

Data analyzed into SPSS software version 16. Descriptive statistics including calculation of numerical indices (mean) for quantitative traits and percentage for qualitative traits were used for summarizing.

**Ethical View**

All personal information is considered confidential and information is entered into the checklist according to the file's code. No need for a person's first name.

**RESULTS**

The mean age at diagnosis of 255 patients with non-traumatic SAH was 57 years (range, 11-85 years) and 44.3% were men (Table 1). Among all patients, 84 (32.9%) and 17 (6.7%) had a history

of hypertension and diabetes, respectively. Thirty patients had a familial history of SAH and 30 (11.8%) were smoker. *Glasgow coma scale* was divided to four groups that 13 (5.1%), 23 (9%), 66 (25.9%), and 153 (60%) had 3, 4-8, 9-14, and 15 scores, respectively. Out of 255 patients with non-traumatic SAH, 91 patients didn't have angiography information and therefore among 164 other patients, 43.9% had aneurysm. Size of brain aneurysm was divided to three groups among 72 patients with aneurysm that 69 (95.8%) and 3 (4.2%) had small and large sizes, respectively, without giant size in these patients. Out of 72 patients with aneurysm, number of brain aneurysm in 65 (90.2%) and 7 (9.6%) was 1 and 2, respectively. Location of brain aneurysm was divided to five locations, internal carotid artery (ICA), middle cerebral artery (MCA), anterior cerebral artery (ACA), anterior communicating artery (ACOM), and posterior fossa with 13.9%, 33.4%, 8.3%, 34.7%, and 9.7% patients, respectively. Treatment methods among 164 patients with angiography information were 56.1% medical and 43.9% surgical treatments. Complications during hospitalization occurred in 23 (9%) patients and during follow-up, 29 (11.4%) patients died.

**Table 1: Characteristics of non-traumatic subarachnoid hemorrhage patients (n=255)**

Variable	Value	Variable	Value
<b>Age (year)</b>		<b>Aneurysm (n=164), n (%)</b>	
Mean	57	Yes	72 (43.9)
Range	11-85	No	92 (56.1)
<b>Sex, n (%)</b>		<b>Size of brain aneurysm (mm) (n=72), n (%)</b>	
Male	113 (44.3)	Small (≤10)	69 (95.8)
Female	142 (55.7)	Large (10-25)	3 (4.2)
<b>History of hypertension, n (%)</b>		Giant (>25)	0
Yes	84 (32.9)	<b>Number of brain aneurysm (n=72), n (%)</b>	
No	171 (67.1)	1	65 (90.2)
<b>History of diabetes, n (%)</b>		2	7 (9.6)
Yes	17 (6.7)	<b>Location of brain aneurysm (n=72), n (%)</b>	
No	238 (93.3)	Internal carotid artery (ICA)	10 (13.9)
<b>Familial history of SAH, n (%)</b>		Middle cerebral artery (MCA)	24 (33.4)
Yes	2 (0.8)	Anterior cerebral artery (ACA)	6 (8.3)
No	253 (99.2)	Anterior communicating artery (AcomA)	25 (34.7)
<b>Smoking, n (%)</b>		Posterior fossa	7 (9.7)
Yes	30 (11.8)	<b>Treatment method (n=164), n (%)</b>	
No	225 (88.2)	Medical	92 (56.1)
<b>GCS in admission, n (%)</b>		Surgical	72 (43.9)
3	13 (5.1)	<b>Complications during hospitalization, n (%)</b>	
4-8	23 (9)	No	232 (91)
9-14	66 (25.9)	Yes	23 (9)
15	153 (60)	<b>Mortality, n (%)</b>	
		Alive	226 (88.6)
		Death	29 (11.4)

**Abbreviations:** GCS, Glasgow coma scale; SAH, subarachnoid hemorrhage

The prevalence of the patients with non-traumatic SAH based on age group is shown in Figure 1. We divide the patients to eight groups. The patients with 50-59 years had maximum percentage and 10-29 years with minimum percentage.

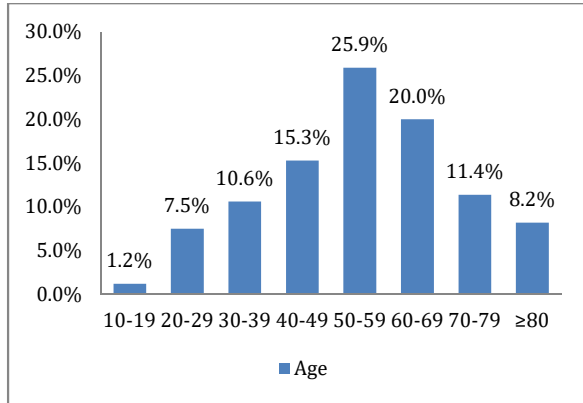


Figure 1: Prevalence of the patients with non-traumatic subarachnoid hemorrhage based on age group.

Among 255 patients with non-traumatic SAH, 23 (9%) had complications during hospitalization (Figure 2). Rebleeding, vasospasm, seizure, hemiplegia, and hydrocephalus were the highest complications with 6 (26.1%), 4 (17.4%), 3 (13.1%), 2 (8.8%), and 2 (8.8%) patients, respectively, followed by myocardial infarction, pulmonary thromboembolism, renal failure, adult respiratory distress syndrome, dysarthria, and ventriculitis, each one (4.3%) patients.

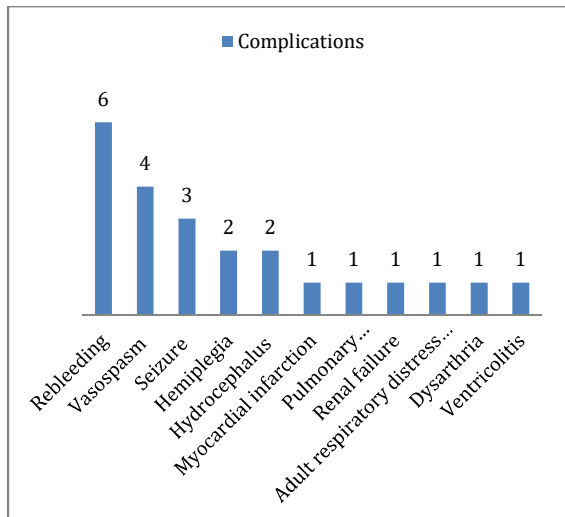


Figure 2: Complications during hospitalization among the patients

DISCUSSION

This study evaluated a number of epidemiological factors of non-traumatic SAH and complications during hospitalization in the Western Iran. The mean age at presentation is approximately 55 years [9]. The present study showed the mean age of non-traumatic SAH patients was 57 years. One study in USA reported the in-hospital mortality rate associated with non-traumatic SAH continues to exceed 25% [3]. The average case mortality rate for SAH is around 50% [10] that this rate was 11.4% in non-traumatic SAH of the present study. Intracranial aneurysms account for approximately 85% of cases of non-traumatic SAH [11]. In the present study, 43.9% SAH patients had aneurysm.

Smoking, alcohol abuse, hypertension [12-14], and personal or family history of aneurysm or hemorrhagic stroke [14] are considered as the most important risk factors for SAH. Type 2 diabetes is a risk factor for other forms of stroke, but its association with SAH [15]. Another study [16] reported patients with aneurysmal SAHs had a lower or equivalent prevalence of diabetes mellitus than the general population and therefore diabetic patients were not at increased risk for aneurysmal SAH. A significantly important number of patients with first episode non-traumatic SAH presented a history of hypertension as compared to controls subjects (odds ratio: 4.73) [17].

A retrospective study of 110 Filipino patients with non-traumatic SAH treated reported that aneurysms were the source of hemorrhage in 48%, arteriovenous malformation in 9%, and "other SAH" (hypertension/undetermined causes) in 43%. Fifty-seven (52%) patients were initially seen by a general practitioner, 44 (40%) by a neurologist, and only nine (8%) were seen directly by the neurosurgeon [18]. Shea *et al.*, [3] showed less than one-third of patients hospitalized for SAH received surgical or endovascular treatment. In the present study, treatment method for 56.1% was medical and 43.9% surgical treatments.

Ohashi *et al.*, [19] on 280 patients with SAH indicated the mean diameter of ruptured aneurysms in this series was 7.6 mm that 135 (48.2%) ranged between 5 and 10 mm; 73 (26.1%) were smaller than 5 mm. In another research [20], 90% of all cerebral aneurysms are less than 10 mm in size that in the present study 95.8% aneurysmal non-traumatic SAH had small aneurysms ( $\leq 10$  mm). Therefore, small aneurysms

(< 5 mm) can be a common cause of aneurysmal SAH [21]. An analysis on 185 cases of aneurysmal SAH showed that the location of aneurysms were internal carotid artery in 60 cases (32.5%), anterior cerebral artery in 65 cases (35.1%), middle cerebral artery in 37 cases (20%), and posterior circulation in 23 cases (12.4%) [22]. In the present study on 72 aneurysmal SAH patients, the location of aneurysms in 34.7%, 33.4%, 13.9%, 9.7%, and 8.3% was anterior communicating artery, middle cerebral artery, internal carotid artery, posterior fossa, and anterior cerebral artery.

Among 547 SAH patients, 83 patients (15.2%) had at least one seizure following aneurysmal SAH [23]. In the present study on 23 patients that had complications during hospitalization, rebleeding and vasospasm, and seizure were the most prevalent complications.

Glasgow Coma Scale-based scale has been developed to predict patient outcome in subarachnoid hemorrhage [24]. Two studies [24, 25] showed that score of 15 had the most prevalent among SAH patients similar to the result of the present study.

#### Limitations

Considering the fact that during recent years, the records in the medical records department of Imam Reza Hospital have changed from paper to electronics, some information of patients during the scan have not done. Also, there was no the endovascular center in Kermanshah province and therefore some patients have left the Kermanshah's hospitals with their own consent or have been sent to other centers.

#### CONCLUSIONS

The results showed that mean age of SAH was more than 55 years. Approximately 50% SAH patients had aneurysm that size of less than 10 mm was the more prevalent in these patients. Diabetes, smoking and hypertension could be considered as the most important factors in SAH patients. In addition, rebleeding and vasospasm, and seizures were the most complications in SAH patients.

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#### Conflict of interest

The authors declare no conflict of interest.

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