

FREQUENCY OF SUBARACHNOID HEMORRHAGE IN PATIENT PRESENTING WITH ACUTE STROKE

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ABSTRACT

Background: Acute stroke is a leading neurological emergency, and rapid identification of underlying pathology is essential for appropriate management. Subarachnoid hemorrhage (SAH) is a less common but life-threatening cause of acute stroke, requiring urgent diagnosis and intervention. Evaluating its frequency in stroke presentations can support early detection and improved outcomes. **Objective:** To determine the frequency of subarachnoid hemorrhage in patients presenting with acute stroke. **Study Design:** Cross-sectional study. **Setting:** Department of General Medicine, DHQ Teaching Hospital, Dera Ismail Khan, Pakistan. **Duration of Study:** From January 2025 to July 2025. **Methods:** A total of 203 patients aged 40 years or older of either gender presenting with acute stroke within 48 hours of onset were enrolled. SAH was diagnosed based on radiological confirmation of blood in the subarachnoid space on CT scan and classified using the Fisher scale. Data were analyzed using SPSS version 25. Descriptive statistics were applied to determine SAH frequency and grading distribution. **Results:** The mean age of patients was 52.96 ± 9.62 years, with 58.1% males and 41.9% females. Subarachnoid hemorrhage was identified in 12 patients (5.9%). Among SAH cases, Fisher grade I was observed in 1 patient (8.3%), grade II in 3 patients (25%), grade III in 4 patients (33.3%), and grade IV in 4 patients (33.3%). **Conclusion:** SAH accounted for 5.9% of acute stroke presentations in the studied population. Most cases were categorized as Fisher grade III and IV, highlighting the importance of immediate radiological evaluation for severe SAH to guide timely management and improve patient outcomes.

Keywords: Acute Stroke, Subarachnoid Hemorrhage, Fisher Grading Scale, Ischemic Stroke

INTRODUCTION

Stroke is a neurological condition defined by the obstruction of the blood vessels. Clots accumulate within the brain, hindering blood flow, narrowing arteries, and rupturing blood vessels, which may lead to haemorrhage. The rupturing of arteries that supply the brain throughout a stroke results in an abrupt lack of oxygen, which leads to the immediate demise of brain cells. Stroke can result in the development of depression. Stroke ranks as the 2nd most common cause of mortality worldwide (1, 2). Roughly 13.7 million individuals are impacted, leading to an annual mortality rate of approximately 5.5 million. Ischaemic infarctions constitute approximately 87% of strokes, a substantial increase observed from 1990 to 2016, attributed to reduced mortality rates along with advancements in clinical interventions. Primary haemorrhages, which occur for the first time, constitute the majority of strokes, while secondary haemorrhages, which occur subsequently, are projected to represent 25% (3, 4). Subarachnoid haemorrhage (SAH) describes the occurrence of bleeding that develops between the arachnoid and the pia mater within the central nervous system (CNS). SAH can be divided into two types: traumatic, which has to do with a particular inciting event, and spontaneous, which occurs without an obvious cause. Traumatic (tSAH) refers to the presence of blood in the subarachnoid space that results from head trauma, which can occur due to multiple events (5-8). Spontaneous (sSAH) describes non-traumatic bleeding, mainly resulting from rupture of a cerebral aneurysm. The latest report from WHO indicates that aSAH occurrence is ten times greater in Asia when compared to Europe (9-11). Additionally, countries with low to middle incomes face a significantly bigger burden, roughly double that of higher-income nations (12, 13). The preliminary assessment plays a crucial role in the evaluation and categorization of stroke. A swift and comprehensive assessment is essential to stabilise vital signs and ascertain whether the stroke is ischaemic, a parenchymal bleed, or

SAH. CT of the brain serves as the primary neurological imaging technique for distinguishing between different kinds of stroke; nevertheless, a normal CT brain scan does not rule out the potential of SAH (14).

This study's outcomes will yield new local statistics regarding subarachnoid haemorrhage and its distinction from different stroke subtypes. The concept for this study emerged from analysing the global prevalence of SAH in stroke and juxtaposing it with my local observations. Furthermore, a significant number of SAH cases are overlooked following a normal CT brain report, which, in my view, diminishes the true extent of SAH. Furthermore, my research findings may also enhance the stroke registry in Pakistan.

METHODOLOGY

This cross-sectional descriptive study was conducted in the General Medicine department, DHQ Teaching Hospital, Dera Ismail Khan, from January 2025 to July 2025. We obtained ethical approval from the hospital. Consecutive non-probability sampling was used for this study.

Patients were included if they were 40 years or older, of either gender, and presented with an acute stroke event within 48 hours of symptom onset. Stroke was defined as the rapid onset of a focal cerebral deficit, specifically sudden unilateral hemiplegia, confirmed through history and clinical examination. The Diagnosis and subtype of stroke were verified through neuroimaging, with a non-contrast CT scan of the brain demonstrating either hypodense or hyperdense lesions. In cases where the Diagnosis remained uncertain, further investigations, including MRI brain with DWI/ADC sequences or cerebrospinal fluid studies, were performed to reach a definitive conclusion. Participants were excluded if their CT scan revealed a space-occupying lesion, if there was a history of head injury, or if cerebrospinal fluid

examination indicated meningitis. Patients with a recurrent history of cerebrovascular accidents were also excluded.

Patients presenting to the outpatient or accident and emergency departments with symptoms of acute stroke and focal or global neurological deficits lasting more than 24 hours were assessed. A detailed history and thorough physical examination were conducted for each patient. Consent was taken from each patient or their relatives.

A non-contrast CT brain scan was performed immediately for all patients in the emergency setting. An experienced radiologist interpreted the scans with at least 5 years of experience in the field. Subarachnoid hemorrhage was defined as the extravasation of blood into the subarachnoid space between the pial and arachnoid membranes, diagnosed on clinical suspicion and radiological confirmation. The severity of subarachnoid hemorrhage was classified using the Fisher grading scale, where Grade I indicated no blood detected on CT, Grade II represented diffuse subarachnoid blood less than 1 mm thick, Grade III indicated a localized clot or vertical layers measuring 1 mm or more, and Grade IV was assigned for intracerebral or intraventricular clots with diffuse or no subarachnoid hemorrhage. All acquired data were recorded on predesigned proformas and entered into SPSS 25. Age and BMI were analyzed using mean and standard deviation. Gender, comorbidities, stroke type, bleeding pattern, and Fisher grade were presented as frequencies and percentages.

RESULTS

This study had 203 patients who presented with stroke. Their mean age was 52.96 years (SD = 9.62). The patients' BMI was 27.13 Kg/m² (SD = 2.25). Gender distribution showed that 118 (58.1%) were male and 85 (41.9%) were female patients. Hypertension was observed in 61 (30%) patients, and diabetes in 49 (24.1%). Around 41 (20.2%) patients were smokers (Table 1). The table presents the type of stroke; in this study, SAH accounted for 12 cases (5.9%) (Table 2).

Table 1: Baseline profile

Baseline profile		n	%
Gender	Male	118	58.1%
	Female	85	41.9%
Hypertension	Yes	61	30.0%
	No	142	70.0%
Diabetes	Yes	49	24.1%
	No	154	75.9%
Smoking status	Yes	41	20.2%
	No	162	79.8%

Table 2: Type of stroke

Type of stroke	n	%
Ischemic	148	72.9%
SAH	12	5.9%
Parenchymal Hemorrhage	43	21.2%

Table 3 presents the clinical characteristics of SAH; the majority of patients had an Aneurysmal bleeding type 9 (75%). The majority of patients had Fisher Grade III (33.3%) and Grade IV (33.3%).

Table 3: Clinical presentation of SAH

Clinical presentation of SAH		n	%
Bleeding type	Aneurysmal	9	75.0%
	Non aneurysmal	3	25.0%
Fisher scale for SAH	Grade I	1	8.3%
	Grade II	3	25.0%
	Grade III	4	33.3%
	Grade IV	4	33.3%

DISCUSSION

The findings from this study provide valuable insights into the stroke population, revealing distinct patterns in demographics and stroke subtype distribution.

Beginning with demographic characteristics, the mean age of our stroke population was 52.96 years. This falls between the younger ages reported for spontaneous subarachnoid haemorrhage (SAH) in Pakistani studies, which were 39.52 and 42.51 years, and the older age of 58.7 years for a haemorrhagic stroke cohort (15-17). This intermediate age is expected in a general stroke population, which is predominantly composed of older ischemic stroke patients but tempered by the inclusion of younger haemorrhagic stroke patients. The gender distribution showed a male predominance of 58.1%, consistent with the broader stroke literature, which often indicates a higher incidence in men. This aligns with the findings of Sana et al. and Malik et al., who reported male proportions of 80.1% and 68.4%, respectively, in their Pakistani cohorts (15, 17). However, it contrasts with the female preponderance reported by Alam et al. in a spontaneous SAH group, highlighting that gender distribution can vary significantly across stroke subtypes.¹⁶ The mean Body Mass Index (BMI) was 27.14 kg/m², categorising the population as overweight. This finding is similar to the mean BMI of 29.63 kg/m² reported by Sana et al., suggesting that elevated BMI is a common and significant comorbidity among patients presenting with cerebrovascular events in the local population (15).

Regarding comorbidities, hypertension was present in 30.0% of patients. This is a critical finding, as it is considerably lower than the 50% prevalence noted at presentation by Souter et al. in a dedicated neurocritical care review (18). This discrepancy may be attributed to different study settings or may indicate a significant portion of the cohort had normotensive stroke mechanisms, such as cardioembolism. Similarly, diabetes mellitus was identified in 24.1% of patients. While this is a substantial proportion, it is widely recognised as a key risk factor for ischemic stroke specifically. Smoking was reported in 20.2% of the cohort. This is a recognised potent risk factor for both ischemic and haemorrhagic stroke, particularly for aneurysm formation and rupture, as noted across the reviewed papers (18, 19). The distribution of stroke subtypes showed that ischemic stroke was found in the majority at 72.9%. Parenchymal haemorrhage, or intracerebral haemorrhage (ICH), was found in 21.2% of patients. This elevated rate may reflect a higher prevalence of uncontrolled hypertension or other local risk factors in the population. Subarachnoid haemorrhage (SAH) represented 5.9% of strokes. This figure is consistent with the 3-6% cited by Souter et al and 5% noted by Lv et al (20).

Delving into the specifics of the SAH patients, the data show that 75.0% of cases were aneurysmal in origin. This finding is consistent with the rates of 75.63% and 81.3% reported by Alam et al. and Sana et al., respectively, reinforcing the notion that a ruptured cerebral aneurysm is the predominant cause of spontaneous SAH. The application of the Fisher scale revealed that the majority of SAH cases were of high grade, with Grades III and IV each 33.3%. This is a notable observation, as the modified Fisher scale is a well-validated tool for predicting the risk of vasospasm and delayed cerebral ischemia, with higher grades carrying a worse prognosis. The high percentage of severe grades in this small subgroup suggests a population at considerable risk for secondary neurological insults.

The findings of this study suggest that the local stroke population carries a significant burden of modifiable risk factors, particularly overweight and smoking. Public health initiatives focused on lifestyle modifications could potentially impact stroke incidence. The higher-than-typical proportion of parenchymal haemorrhage warrants further investigation into its underlying causes, such as hypertension control rates or other regional factors. The high Fisher grades among SAH

patients underscore the need for dedicated neurocritical care services to manage these complex cases and mitigate complications.

CONCLUSION

We conclude that the frequency of subarachnoid hemorrhage in patients presenting with stroke in this study was 5.9%; the majority of patients had Fisher grade III and grade IV subarachnoid hemorrhage.

DECLARATIONS

Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRB)

Consent for publication

Approved

Funding

Not applicable

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

AISHA ESSA (Post Graduate Resident)

Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, and final approval of manuscript.

SUMMAIYA JAVED (Post Graduate Resident)

Study Design, Review of Literature.

DEEN WALI (House Officer)

Manuscript revisions, critical input.

IKHLAQ AHMED SHAH (FCPS II)

Conception of Study, Final approval of manuscript.

ROOH UL HAYAT (Post Graduate Resident)

Manuscript drafting.

IJAZ UL HAQ (Post Graduate Resident)

Data entry, data analysis, and drafting an article.

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