

## Original Research Article

# THE CLINICAL PROFILE OF PATIENTS WITH POSTERIOR CIRCULATION ISCHEMIC STROKE IN A TERTIARY CARE CENTRE

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### ABSTRACT

**Background:** Posterior circulation ischemic stroke (PCIS) accounts for approximately 20% of all ischemic strokes and involves infarction within the vertebrobasilar arterial territory, including the cerebellum, brainstem, thalamus, and occipital and temporal lobes. Due to its varied and often nonspecific clinical manifestations, PCIS is frequently underdiagnosed, resulting in delayed management and increased morbidity. Objectives: To describe the clinical profile of patients with posterior circulation ischemic stroke and assess associated risk factors, anatomical areas involved, and functional outcomes at discharge.

**Material and Methods:** This descriptive study was conducted among patients admitted to the Medicine and Neurology departments, including intensive care units, at Government TD Medical College, Alappuzha. Eligible patients diagnosed with PCIS were evaluated using a structured clinical proforma. Detailed history, neurological examination, laboratory investigations, and neuroimaging findings (CT/MRI) were recorded. Risk factors assessed included age, sex, hypertension, diabetes mellitus, dyslipidemia, coronary artery disease, smoking, and alcohol consumption. Anatomical territories involved were identified using neuroimaging, and functional outcomes at discharge were assessed using the Functional Independence Measure (FIM) score.

**Results:** Posterior circulation ischemic stroke was more common among males (60.7%) and predominantly affected individuals aged over 55 years. Hypertension was the most frequent risk factor, present in 66.7% of patients, followed by diabetes mellitus and dyslipidemia. More than half of the patients had a history of smoking. Vertigo was the most common presenting symptom, occurring in 62% of cases. Cerebellar signs were frequently observed, and the cerebellum was the most commonly involved anatomical structure, followed by the brainstem, thalamus, and occipital and temporal cortices. MRI demonstrated greater sensitivity than CT in identifying the affected territories.

**Conclusion:** PCIS predominantly affects older males and is strongly associated with hypertension. Vertigo and cerebellar involvement are common clinical features. MRI is superior to CT for lesion detection. Most patients showed favorable functional outcomes with only mild disability at discharge.

**Keywords:** Posterior circulation ischemic stroke, Vertebrobasilar stroke, Clinical profile, Risk factors, Cerebellum, Functional outcome.

## INTRODUCTION

World Health Organisation in 1971 defined “stroke as rapidly developing signs of focal or global

disturbance of cerebral function with symptoms lasting for one day or longer or leading to death due to vascular cause”.<sup>[1]</sup> Cerebrovascular disease is the third most common cause of mortality. While

considering neurological cases in a healthcare system cerebrovascular accident contributes nearly half of the burden.

The clinical presentation of stroke may be symptomatic or asymptomatic, transient or permanent. The symptoms may be higher mental function abnormality, cranial nerve involvement, motor dysfunction, sensory dysfunction, cerebellar signs, bowel impairment or bladder dysfunction according to the anatomical structure involved.<sup>[2]</sup>

Onset of stroke may be acute is usually acute. Stroke is classified as arterial or venous, depending on the vasculature involved. Arterial stroke is more common than venous stroke. Cerebrovascular diseases of arterial origin are ischemic and haemorrhagic. Ischemic stroke comprises 80 percentage of arterial stroke, whereas 20 percentage are haemorrhagic.<sup>[1,2]</sup>

A posterior circulation ischemic stroke is classically defined as infarction occurring within the vascular territory supplied by the vertebrobasilar system. Majority of ischemic stroke are involving anterior circulation. Only 20 percentages are posterior circulation stroke, involving vertebrobasilar system.<sup>[3]</sup> Clinical presentations of vertebrobasilar stroke ranging from nonspecific giddiness to death. The variability in presentation is the hallmark of posterior circulation stroke. So, they are commonly misdiagnosed or undiagnosed. Better understanding of clinical presentation of posterior circulation stroke is very important as they can be devastating and some forms are having high rates of death. Better understanding and analysis of risk factors of posterior circulation stroke is mandatory to prevent the incidence and complications.

Taking a proper history from the patient and detailed neurological and other system clinical examination precedes the investigations in posterior circulation stroke. Elaborated cardiac or vascular evaluation is essential in posterior circulation stroke. Always there exist a lacunae in the understanding and evaluation of vertebrobasilar territory ischemia.<sup>[4]</sup> Thus, the clinical profile of posterior circulation stroke needed to be

looked into for reducing morbidity and mortality of posterior circulation stroke.

## MATERIALS AND METHODS

This descriptive, hospital-based study was conducted over a one-year period in the Medical Wards, Neurology Ward, Medical ICU, and Stroke ICU of Government TD Medical College, Alappuzha, after obtaining Institutional Ethics Committee approval.

Adult patients (>18 years) with neuroimaging-confirmed posterior circulation ischemic stroke were consecutively enrolled after providing informed consent. Patients with intracranial hemorrhage, anterior circulation or watershed infarcts, recurrent stroke, coma, global aphasia, or those requiring ventilatory support were excluded. A total of 108 patients were included in the study.

Data were collected using a structured clinical proforma. Detailed history regarding demographic characteristics, vascular risk factors (hypertension, diabetes mellitus, dyslipidemia, coronary artery disease, smoking, and alcohol consumption), and presenting symptoms was recorded. All patients underwent comprehensive neurological examination, including assessment of higher mental functions, cranial nerves, motor and sensory systems, cerebellar function, and gait.

Laboratory investigations included complete blood count, fasting blood glucose, renal and liver function tests, lipid profile, electrocardiography, and blood pressure measurement. Neuroimaging findings from computed tomography (CT) and/or magnetic resonance imaging (MRI) were reviewed to determine the anatomical territory involved. Functional outcome at discharge was assessed using the Functional Independence Measure (FIM) score.

Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) software. Categorical variables were expressed as frequencies and percentages. Ethical standards were maintained throughout the study, and patient confidentiality was ensured.

## RESULTS

**Table 1: Gender Distribution**

Sex	Frequency	Percent
Male	71	60.7
Female	46	39.3
Total	117	100

Out of 117 patients presented with posterior circulation ischemic stroke 71 were males (60.7%) and 46 were females (39.3%).

**Table 2: Comorbidities present in patients presented with posterior circulation ischemic stroke**

	Yes		No	
	Frequency	Percent	Frequency	Percent
DM	59	50.4	58	49.6
HT	78	66.7	39	33.3
CAD	28	23.9	89	76.1
DLP	56	47.9	61	52.1

The patients enrolled for the study was evaluated for the existing comorbidities, to find the correlation as the possible risk factor for posterior circulation ischemic stroke. Systemic hypertension was found to be most common risk factor (66.7%). 78 patients had

systemic hypertension. 59 patients had Diabetes mellitus (50.4%) and 56 patients had dyslipidaemia (47.9%). 28 patients had coronary artery disease (23.9%).

**Table 3: Additive Habits**

	Yes	No
Smoker	51	66
Alcoholic	26	91

Among 117 posterior circulation ischemic stroke patients enrolled in the study 51 were smokers (43.6%) and 26 were alcoholic (22.2%).

**Table 4: Clinical Features**

	Yes		No	
	Frequency	Percent	Frequency	Percent
Vertigo	62	53	55	47
Vomiting	42	35.9	75	64.1
Cerebellar signs	64	54.7	53	45.3
Ataxia	18	15.4	99	84.6

	Yes	No
Visual defect	6	111
CN palsy	23	94
Hemiplegia	21	96
Sensory loss	37	80
Cerebellar signs	64	53

Among 117 patients presented with posterior circulation ischemic stroke 62 were having vertigo (53%) as presenting symptom. 42 patients were having vomiting (35.9%) and 18 patients were having ataxia (15.4%). 6 patients were having visual

impairment (5.1%), 23 patients were presented with cranial nerve palsy (19.7%), 21 patients presented were having hemiplegia (17.9). On examination 64 patients had cerebellar signs and 37 were having sensory impairment (31.6%).

**Table 5: Anatomical site involved in posterior circulation ischemic stroke**

INFARCT SITE	Frequency	Percent
Occipital and temporal cortex	5	4.3
Cerebellum	76	65
Brainstem	19	16.2
Thalamus	17	14.5
Total	117	100

Cerebellum was the most common site involved in 117 patients enrolled in the study. 76 patients had infarct in the cerebellum (65%). Brainstem was the second most common site. 19 patients were having

brainstem infarct (16.2%). 17 patients had infarct in the thalamus (14.5%) and 5 were having infarct in the occipital and temporal cortex (4.3%).

**Table 6: Outcome assessed by using functional independent measure score**

Outcome	Frequency	Percent
No symptoms	14	12.0
No significant disability able to carry out usual activities despite some symptoms	49	41.9
Slight disability, unable to carry out all previous activities	34	29.1
Moderate disability requires some help but able to walk unassisted	11	9.4
Moderate disabilities unable to walk unassisted	3	2.6
Severe disabilities	3	2.6
Dead	3	2.6
Total	117	100.0

Among 117 patients 49 were without significant disability and they were able to carry out usual activities despite some symptoms (41.9%). 34 were with slight disability, and they were unable to carry out the day-to-day activities (29.1%). 14 patients were discharge with no symptoms (12%). 11 patients were having moderate disability (9.4%) were able to

walk without assistance. 3 were having moderate disability and unable to walk unassisted (2.6%). 3 patients (2.6%) patients died during the hospital stay.

## DISCUSSION

Posterior circulation ischemic stroke was more common in male gender in the age group more than 55 years. In the study 60.7 % were males and 46 % were females this was accordance with the previous studies, where a male gender predominance of ischemic stroke was found.

Hypertension was the most common comorbidity associated with posterior circulation ischemic stroke 66.7 percentage of the patients in our study had hypertension. Fifty percentage patients had diabetes mellitus and 28 percentage had dyslipidaemia. Which was similar to the study by Hillemand,<sup>[5]</sup> 51 percentage of the patients had history of smoking and 26 percentage had history of intake of alcohol.

Vertigo, the sense of spinning was the most common clinical symptom. Vertigo was presented in 62 percentage of the patients. Other nonspecific symptom was vomiting it was present in 43 percentage of patients. The study conducted by Foix et al,<sup>[6]</sup> was revealed similar results. 31 percentage of the patients had headache associated with onset of posterior circulation ischemic stroke. Which was 22 percentage in stroke study of Madras Medical College. Non contrast CT was the primary choice of imaging but majority of the patients underwent MRI for better understanding of anatomy and pathology.

Cerebellum was the most common anatomical structure involved in our study. 65 percentage of the patients were having cerebellar infarct. Second most common site involved was brainstem. 19 patients were having brainstem infarct. The study revealed the outcome of patients as 41 Percentage with no significant disability, 29.1 percentage of the patients were with minor disability, 9.4 percentage were with major disability and death due to other causes were 2.6 percentage which correlates with NEJM posterior circulation registry.<sup>[7-10]</sup>

The present study has few limitations as follows: All patients who were included into this study were those who had access to healthcare at a tertiary medical centre, which may under estimate the burden of disease. Though majority of the recruited patients resided in and around Alappuzha, the hospital- based population selection has its inherent biases of extrapolation of the results to the community. However, doing a community based study of stroke was not feasible. The information received from patients or relatives, which can have reporter bias and recall bias.

## CONCLUSION

The present study highlights the clinical profile of patients with posterior circulation ischemic stroke presenting to a tertiary care center. Posterior circulation ischemic stroke was observed more

frequently among males, with the highest prevalence in the 55–65-year age group, indicating that advancing age and male sex are important demographic characteristics associated with this condition.

Among the vascular risk factors evaluated, systemic hypertension emerged as the most common risk factor, followed by diabetes mellitus and dyslipidemia. More than half of the study participants had a history of smoking, emphasizing the significant contribution of modifiable cardiovascular risk factors in the development of posterior circulation ischemic stroke.

Vertigo was the most frequent presenting symptom, and cerebellar signs were observed in the majority of patients. These findings underscore the importance of maintaining a high index of suspicion for posterior circulation stroke in patients presenting with acute vestibular symptoms and cerebellar dysfunction.

Neuroimaging revealed that the cerebellum was the most commonly affected anatomical territory, followed by the brainstem, thalamus, occipital cortex, and temporal cortex. Magnetic resonance imaging was found to be more sensitive than computed tomography in identifying posterior circulation infarcts and delineating the involved vascular territory.

Overall, patients with posterior circulation ischemic stroke demonstrated favorable functional outcomes at discharge, with most experiencing only mild disability. Compared with anterior circulation stroke, posterior circulation ischemic stroke was associated with better recovery, highlighting the importance of early recognition, prompt diagnosis, and appropriate management to optimize patient outcomes.

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