



(RESEARCH ARTICLE)



Clinical and radio imaging study in posterior circulation stroke

SUNIL V RATHOD ^{1,*} and BILAL BIN ABDULLAH ²

¹ Postgraduate Resident, Department of General Medicine, Al-Ameen Medical College & Hospital, Vijayapur, Karnataka, India.

² Professor And HOD, Department of General Medicine, Al - Ameen Medical college and Hospital, Vijayapur, Karnataka, India.

International Journal of Science and Research Archive, 2025, 16(01), 1608-1616

Publication history: Received on 13 June 2025; revised on 18 July 2025; accepted on 22 July 2025

Article DOI: <https://doi.org/10.30574/ijrsra.2025.16.1.2186>

Abstract

Background Posterior circulation stroke (PCS), involving the vertebrobasilar system, accounts for nearly 20% of all ischemic strokes. Unlike anterior strokes, PCS often presents with non-specific symptoms such as dizziness, vomiting, and visual field defects, leading to frequent misdiagnosis and delayed treatment. Given its distinct vascular anatomy and symptomatology, comprehensive evaluation using both clinical and radiological parameters is essential for early detection and appropriate management.

Objectives To study the various clinical patterns and risk factors associated with posterior circulation stroke in patients presenting to a tertiary care hospital.

Methods A cross-sectional prospective study was conducted over 18 months at Al-Ameen Medical College Hospital, Vijayapur, involving 100 patients diagnosed with posterior circulation stroke. Data were collected through structured clinical evaluations, laboratory investigations, and neuroimaging. MRI and MRA were utilized to confirm the diagnosis and localize vascular involvement. Clinical variables such as symptoms, risk factors, and arterial territories involved were statistically analyzed using SPSS version 26.

Results The mean age of the patients was 55.22 ± 12.35 years, with a male predominance (63%). The most prevalent risk factor was hypertension (61%), followed by smoking (27%), dyslipidemia (24%), alcohol use (23%), and diabetes mellitus (18%). The most frequent clinical manifestations were giddiness and vomiting (58%), motor weakness (47%), cranial nerve involvement (38%), cerebellar signs (28%), and visual field defects (24%). Radiologically, the posterior cerebral artery (47%) and posterior inferior cerebellar artery (45%) were the most commonly affected vascular territories. Other significant arteries included the superior cerebellar artery (20%) and basilar artery (17%).

Conclusion Posterior circulation stroke predominantly affects males over the age of 50 and is strongly associated with hypertension and smoking. Clinical presentations are variable and often non-specific, necessitating high clinical suspicion. MRI-based imaging plays a critical role in diagnosis. Early identification and targeted interventions based on vascular territory involvement and associated risk factors can significantly improve outcomes.

Keywords: Posterior circulation stroke; Vertebrobasilar stroke; Ischemic stroke; MRI; Cerebellar infarct; Basilar artery; Giddiness; Hypertension

* Corresponding author: SUNIL V RATHOD

1. Introduction

According to the World Health Organization (WHO), stroke is defined as a rapidly developing clinical disturbance of cerebral function, lasting more than 24 hours or leading to death, with no cause other than vascular origin. Stroke is broadly classified into ischemic and hemorrhagic types, with ischemic stroke resulting from cerebral thrombosis or embolism and hemorrhagic stroke due to intra-cerebral or subarachnoid hemorrhage¹. Globally, stroke remains a major public health concern, with the World Stroke Organization reporting a 70% increase in incident cases and a 43% rise in deaths from 1990 to 2019, disproportionately affecting low- and middle-income countries².

Ischemic strokes, accounting for approximately 85% of all strokes, are primarily caused by either thrombotic or embolic events leading to decreased cerebral blood flow^{3,4}. The Trial of Org10172 (TOAST) classification system identifies five major subtypes of acute ischemic stroke: large artery atherosclerosis, cardioembolism, small vessel occlusion, other determined etiology, and undetermined etiology⁵.

Ischemic strokes can also be categorized by vascular territory as anterior circulation stroke (ACS) or posterior circulation stroke (PCS). PCS arises from vertebral or basilar artery involvement and accounts for about 20% of ischemic strokes². Compared to ACS, PCS patients tend to be younger, more often male, and may have a different risk factor profile—such as higher rates of diabetes in PCS and atrial fibrillation in ACS^{6,7,8,10}. Clinical presentations of PCS are diverse and may include vertigo, ataxia, diplopia, dysphagia, and sensorimotor deficits, frequently leading to misdiagnosis and delayed management.

PCA territory infarctions often present with homonymous hemianopia and can also cause sensory, motor, cognitive, or neuropsychological deficits^{9,10,11}, sometimes simulating MCA stroke presentations¹². Given the variability and nonspecificity of PCS symptoms, imaging plays a crucial role in diagnosis. While non-contrast CT (NCCT) is often the initial modality, its sensitivity for PCS is limited (41.8%)¹³. MRI with diffusion-weighted imaging (DWI) offers greater sensitivity but may be less accessible in many settings. CT angiography (CTA) is standard for evaluating vertebrobasilar occlusion and vessel status¹⁴, and CT perfusion (CTP) may help predict outcomes in basilar artery occlusion, though validated thresholds are lacking¹⁵. Early, accurate diagnosis with combined clinical and advanced imaging assessment is vital to improve outcomes in PCS. The primary aim of this study is to evaluate the diverse clinical presentations of posterior circulation stroke and to systematically analyze the associated risk factors in affected patients. By identifying the spectrum of clinical patterns and underlying risk factors, the study seeks to enhance diagnostic accuracy and inform better management strategies for posterior circulation stroke.

2. Methodology

This cross-sectional prospective study was conducted over 18 months (July 2023 to December 2024) at Al-Ameen Medical College Hospital, Vijayapur, Karnataka. The study included patients presenting with signs and symptoms of posterior circulation stroke, confirmed by radiological evidence, attending the outpatient or inpatient departments of the medicine department. Patients with clinical or neuro-otological features of vestibular or labyrinthine disorders, or with subarachnoid, extradural, or subdural hemorrhage, were excluded.

All eligible patients were enrolled using a structured proforma designed to capture demographic details (age, sex, occupation, income), comprehensive symptomatology (including dizziness, diplopia, dysphagia, nasal regurgitation, speech disturbances, headache, seizures, altered sensorium, unsteadiness, sensory disturbances, incoordination, and motor weakness), and a detailed assessment of risk factors such as hypertension, smoking, alcoholism, dyslipidemia, diabetes mellitus, coronary artery disease, rheumatic heart disease, peripheral vascular disease, previous anterior circulation stroke, and family history of cerebrovascular disease. A thorough clinical and neurological examination was conducted for each patient, with findings systematically documented. Laboratory investigations included routine biochemical and hematological tests, ECG, echocardiography, and chest X-ray for all participants. In patients younger than 40 years, an additional workup for hypercoagulability (including hyperhomocysteinemia, protein C and S deficiencies, and antiphospholipid antibodies) was performed. Neuroimaging, primarily MRI and magnetic resonance angiography (MRA), was utilized selectively for further vascular evaluation as needed. This comprehensive diagnostic approach enabled accurate identification and characterization of posterior circulation stroke and its underlying risk factors.

All data were compiled in Microsoft Excel and analyzed using SPSS version 26.0. Descriptive statistics summarized the data; qualitative variables were presented as frequencies and percentages, while quantitative variables were expressed

as mean and standard deviation. The chi-square test was used to compare proportions, and Student’s t-test or ANOVA was employed for comparison of mean values, with statistical significance set at 5% ($\alpha = 0.05$).

3. Results

The age distribution indicates that posterior circulation stroke predominantly affected older adults in this cohort, with 62% aged 61 years and above, and a mean age of 55.22 years. The majority of patients were male (63%), and the average BMI was 26.42, suggesting that the population was generally overweight. These demographic trends highlight the importance of age, male gender, and elevated BMI as common features among patients with posterior circulation stroke.

Hypertension emerged as the most prevalent risk factor among patients, affecting 61% of the study group. Smoking was the next most common, present in 27% of patients, followed by dyslipidemia in 24%, and alcohol use in 23%. Diabetes mellitus was seen in 18% of individuals, while ischemic heart disease was documented in 16%. A history of transient ischemic attack (TIA) was found in 6% of the cases. These findings underscore hypertension as a leading modifiable risk factor in the pathogenesis of posterior circulation stroke.

In terms of clinical presentation, the most frequently observed symptom was giddiness and vomiting, occurring in 58% of patients. Weakness was noted in 47% of the individuals, while cranial nerve involvement was seen in 38%. Cerebellar signs were present in 28%, and 24% each experienced headache and visual field defects. Hemisensory loss was reported in 19% of cases, altered sensorium in 15%, and seizures were the least common, occurring in only 7%. These findings highlight the variability in clinical manifestations, with some symptoms being more prominent than others in posterior circulation stroke.

The most commonly involved arteries in posterior circulation stroke were the posterior cerebral artery (47%) and the posterior inferior cerebellar artery (45%). The most frequent infarct locations were the cerebellum (37%) and brainstem (33%), with fewer cases involving the thalamus, medial temporal, or occipital lobes (18%). This highlights the predominance of PCA and PICA involvement, correlating with the observed distribution of infarct locations in the study population.

Table 1 Demographic Characteristics of Patients with Posterior Circulation Stroke (N = 100)

Characteristic	Category	
Age Group, N (%)	31-40	8 (8.0%)
	41-50	12 (12.0%)
	51-60	18 (18.0%)
	61-70	30 (30.0%)
	>70	32 (32.0%)
Gender, N (%)	Male	63 (63.0%)
	Female	37 (37.0%)
BMI, Mean \pm SD	26.42 \pm 4.95	

Table 2 Arterial Involvement and Infarct Location in Posterior Circulation Stroke (N = 100)

Characteristic	Category	
Arterial Involvement	Posterior Cerebral Artery (PCA)	47 (47.0)
	Posterior Inferior Cerebellar Artery	45 (45.0)
	Superior Cerebellar Artery	20 (20.0)
	Basilar Artery	17 (17.0)
	Vertebral Artery	12 (12.0)

Infarct Location	Cerebellum	37 (37.0)
	Brainstem	33 (33.0)
	Thalamus/Medial Temporal/Occipital	18 (18.0)

Table 3 Comparison of clinical symptoms across the studies

Symptom	Present Study	Indraneel et al ¹⁸	Dubey et al ¹⁹ .	Mogileswari et al ²⁰ .	Bhat et al ²¹ .
Giddiness & Vomiting	58	59	Dizziness: 52, Vomiting: 42	Dizziness: 58, Vomiting: Not specified	-
Weakness	47	48	30	-	-
Cranial Nerve Involvement	38	35	12	-	IX & X: 10 cases, III & VII: 4 cases each, Optic pathway: 2 cases
Cerebellar Signs	28	38	34	-	-
Headache	24	27	28	38	-
Visual Field Defects	24	25	30	10	-
Hemisensory Loss	19	15	-	-	-
Altered Sensorium	15	16	-	-	-
Seizures	7	9	-	8	-
Speech Problems	-	-	Dysarthria: 32	10	-

Table 4 Comparison of Vascular and Anatomical Involvement in Posterior Circulation Stroke across studies

Study	Most Affected Artery (%)	Other Arteries Involved (%)	Most Common Infarct Site (%)	Other Infarct Sites (%)	Hemorrhagic Stroke Findings
Present Study	PCA (47)	PICA (45), SCA (20), Basilar (17), Vertebral (12)	Cerebellum (37)	Brainstem (33), Thalamus/Temporal/Occipital (18)	-
Indraneel et al ¹⁸ .	PCA (45)	PICA (38), Basilar (19), SCA (17), ACA (12), Vertebral (11)	Brainstem (40)	Cerebellum (36), Thalamus/Temporal/Occipital (24)	-
Bhat et al ²¹	-	-	Cerebellum (19)	Occipital (14), Medulla (12), Pons (9), Midbrain & Temporal (6)	Lacunar infarcts in multiple

					territories (23 cases)
Kora et al ²² .	-	-	Occipital (33.3)	Cerebellum (26.6)	Pontine hemorrhage (50%), Cerebellar hemorrhage (33%)
Dubey et al ¹⁹	-	-	Cerebellum (30)	Occipital (20), Medulla (10), Pons (10)	Cerebellar (6%), Occipital (10%), Pons (2%), Medulla (0%)
Mogileswari et al ²⁰	-	-	Combined Cerebellar & Brainstem (36)	Isolated Cerebellar (32), Medulla (14), Occipital (18), Brainstem (20)	-

4. Discussion

Cerebrovascular accidents remain a major contributor to neurological morbidity and mortality, with strokes classified into anterior and posterior circulation types based on vascular territory. The posterior circulation supplies vital areas such as the brainstem, cerebellum, occipital lobe, thalamus, and parts of the parietal and temporal lobes. Given the critical nature of these regions, posterior circulation strokes (PCS) often result in severe morbidity and potentially life-threatening complications¹⁶.

PCS represent about 9.2% of all stroke cases. Their clinical presentations are often non-specific and can mimic peripheral vestibular disorders or even anterior circulation strokes, leading to frequent diagnostic delays and challenges in early management^{7, 17}.

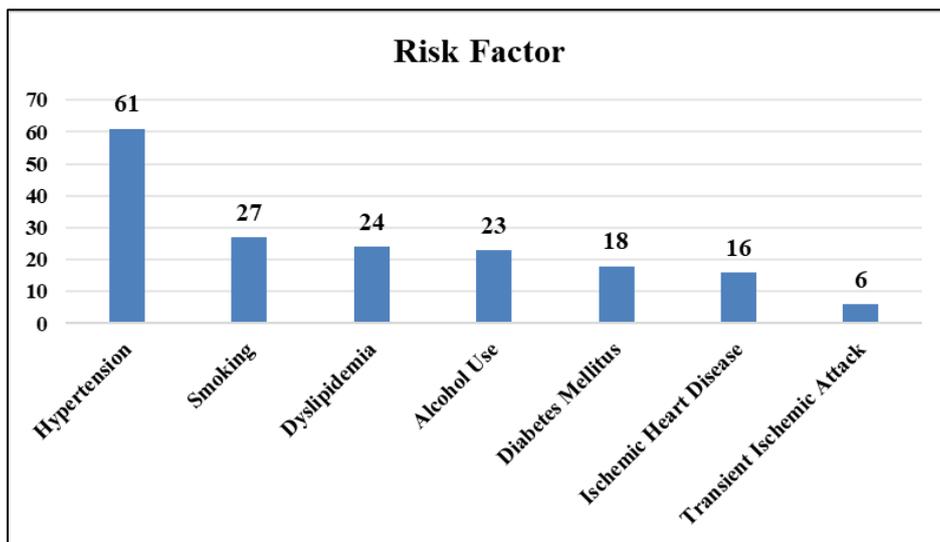


Figure 1 Risk Factor

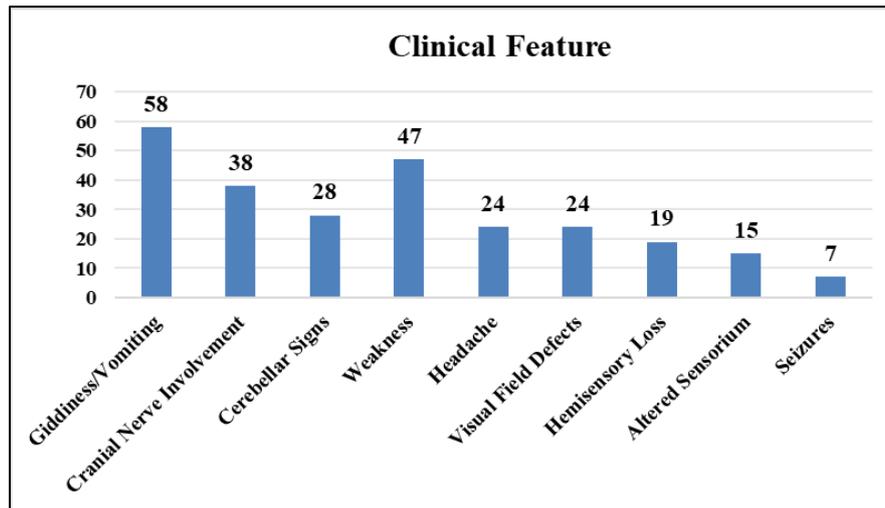


Figure 2 Clinical Patterns of Posterior Circulation Stroke

In our study of 100 patients, the majority were elderly, with 62% aged 61 years or older (mean age: 55.22 ± 12.35 years). This pattern is consistent with Indraneel et al.¹⁸, who reported a mean age of 57.8 years and 46% over 60 years. Similarly, Dubey et al.¹⁹ found that 48% of cases were aged 41–60 years and 42% were 61–80 years, while Mogileswari et al.²⁰ identified the 40–60 age group as most commonly affected (64%), followed by those above 60 years (24%). Bhat et al.²¹ also reported a mean age of 61.3 ± 14 years, with more than half of patients above 65 years, closely aligning with our findings.

Gender distribution in our study showed a male predominance (63% male, 37% female), which is consistent with previous reports. Indraneel et al.¹⁸ found similar results, while Dubey et al.¹⁹ observed an even higher male predominance (78% male), and Mogileswari et al.²⁰ and Bhat et al.²¹ both reported over 65% male cases. This pattern underscores the consistent trend of higher PCS prevalence among males across diverse study populations.

In the current study, the average BMI of the patients was 26.42 ± 4.95 kg/m². In our study, hypertension was the most prevalent risk factor, affecting 61% of patients. Smoking was observed in 27%, followed by dyslipidemia in 24% and alcohol use in 23%. Diabetes mellitus was noted in 18% of cases, while ischemic heart disease was present in 16%. A history of transient ischemic attack (TIA) was documented in 6% of the patients. Similarly, Mogileswari et al.²⁰ study identified hypertension as the most common risk factor (80%), followed by ischemic heart disease and alcohol consumption (both 68%), whereas diabetes mellitus was present in 58%, and smoking in 62% in their study.

Similar to our study, Indraneel et al.¹⁸ reported higher rates of alcohol use (33%) and smoking (32%) and hypertension more prevalent (61%) and observed a lower prevalence of ischemic heart disease (9%), while diabetes was among 17% of their cases respectively. Similar to our study, Dubey et al.¹⁹ found an even higher prevalence of 78%, significantly greater than anterior circulation strokes (68%, $p = 0.021$), 48% with DM, 46% with dyslipidemia and smoking and alcohol consumption were also more common with 24% and 18%, respectively in their study. These findings highlight hypertension as a leading modifiable risk factor contributing to posterior circulation stroke. At the same time, diabetes mellitus (53.5%) and hypertension (48.8%) were most common, followed by dyslipidemia (25.6%), ischemic heart disease (11.6%), and hypothyroidism (9.3%), whereas Smoking (48.8%) and alcohol consumption (16.3%) were the primary modifiable risk factors in the Bhat et al.²¹ study.

In this study, giddiness and vomiting were the most common presenting symptoms of posterior circulation stroke, reported in 58% of patients. Weakness was observed in 47%, cranial nerve involvement in 38%, and cerebellar signs in 28%. Headache and visual field defects were each noted in 24% of cases, while hemisensory loss, altered sensorium, and seizures were less frequent (19%, 15%, and 7%, respectively).

These findings closely parallel those of Indraneel et al.¹⁸, who also identified giddiness and vomiting as the most prevalent symptoms (59%), followed by weakness (48%), cerebellar signs (38%), and cranial nerve involvement (35%). Headache (27%), visual field defects (25%), altered sensorium (16%), hemisensory loss (15%), and seizures (9%) were observed with similar frequency. Dubey et al.¹⁹ reported dizziness in 52% and vomiting in 42%, along with ataxia (34%), visual field defects (30%), limb weakness (30%), and cranial nerve palsies in 12% of cases. Similarly,

Mogileswari et al.²⁰ found dizziness (58%) and vomiting to be most common, followed by headache (38%), vision disturbances (10%), speech problems (10%), and seizures (8%). Bhat et al.²¹ further highlighted cranial nerve involvement, with IX and X palsies in 10 cases, III and VII in 4 cases each, and optic pathway involvement in 2 patients.

In our study, the posterior cerebral artery (PCA) was the most frequently involved vessel in posterior circulation stroke, observed in 47% of cases, followed closely by the posterior inferior cerebellar artery (PICA) in 45%. The superior cerebellar artery, basilar artery, and vertebral artery were affected in 20%, 17%, and 12% of patients, respectively. This distribution underscores the predominance of PCA and PICA involvement in our cohort. These results are consistent with Indraneel et al.¹⁸, who also found the PCA as the most commonly affected vessel (45%), followed by PICA (38%), basilar artery (19%), superior cerebellar artery (17%), and vertebral artery (11%). Both studies highlight a pattern of frequent involvement of the distal arterial system in posterior circulation strokes. Regarding infarct location, our study found the cerebellum to be the most common site (37%), followed by the brainstem (33%), and the thalamus, medial temporal, or occipital lobes (18%). Indraneel et al.¹⁸ similarly reported brainstem infarcts as most frequent (40%), cerebellar involvement in 36%, and thalamic/medial temporal/occipital infarcts in 24%. Bhat et al.²¹ also observed the cerebellum as the most affected anatomical region, followed by the occipital lobe, medulla, pons, and other territories, with a notable proportion of multiple territory infarcts.

However, Kora et al.²², on the other hand, reported a high prevalence of occipital strokes (33.3%) and cerebellar strokes (26.6%) in ischemic cases, while pontine hemorrhage (50%) and cerebellar hemorrhage (33%) were the most common in hemorrhagic strokes. Also, Kora et al.²² reported that CT scan positivity was 100% in hemorrhagic strokes but only 43% in ischemic infratentorial lesions excluding the cerebellum. Also, Dubey et al.¹⁹ found ischemic strokes to be far more common (82%) than hemorrhagic strokes (18%) and reported cerebellar infarcts in 30% of cases, occipital infarcts in 20%, medulla infarcts in 10%, and pons infarcts in 10%. Hemorrhages were much less frequent, with cerebellar bleeds (6%) and occipital bleeds (10%) being the most common, while pons bleeds (2%) and medulla bleeds (0%) were rare in their study. Notably, Dubey et al.¹⁹ found a 100% detection rate for hemorrhagic strokes on CT scans. In another study by Mogileswari et al.²⁰ reported that the most common imaging findings were a combination of cerebellar and brainstem infarcts (36%), followed by isolated cerebellar infarcts (32%). Other findings included medullary infarcts (14%), occipital hemorrhage (18%), and brainstem infarcts (20%) in their study.

5. Conclusion

Our study identified that posterior circulation stroke was predominantly observed in elderly males, with hypertension being the most common risk factor. Clinical presentations were highly variable, with giddiness, vomiting, weakness, and cranial nerve involvement being the most frequently observed symptoms. Radiologically, the posterior cerebral artery and posterior inferior cerebellar artery were the most commonly affected vessels, while cerebellar and brainstem infarcts were the most frequent anatomical locations. These findings emphasize the need for early recognition and targeted management of posterior circulation strokes to improve patient outcomes

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Approved by the Institutional Ethical Committee of Al-Ameen Medical College & Hospital (Ref No: IEC/AMC/2023/104).

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

- [1] Aho K, Harmsen P, Hatano S, Marquardsen J, Smirnov VE, Strasser T. Cerebrovascular disease in the community: results of a WHO collaborative study. *Bull World Health Organ.* 1980;58(1):113-30.
- [2] Feigin VL, Brainin M, Norrving B, Martins S, Sacco RL, Hacke W, et al. World Stroke Organization (WSO): global stroke fact sheet 2022. *Int J Stroke.* 2022;17(1):18-29.

- [3] Pierik R, Algra A, van Dijk E, Erasmus ME, van Gelder IC, Koudstaal PJ, et al. Distribution of cardioembolic stroke: a cohort study. *Cerebrovasc Dis.* 2020;49(1):97–104.
- [4] Patel RA, White CJ. Acute ischemic stroke treatment: State of the art. *Vasc Med* [Internet]. 2011 Feb [cited 2025 Mar 31];16(1):19–28. Available from: <https://journals.sagepub.com/doi/10.1177/1358863X10382945>
- [5] Adams HP, Bendixen BH, Kappelle LJ, Biller J, Love BB, Gordon DL, et al. Classification of subtype of acute ischemic stroke. Definitions for use in a multicenter clinical trial. TOAST. Trial of Org 10172 in Acute Stroke Treatment. *Stroke* [Internet]. 1993 Jan [cited 2025 Mar 31];24(1):35–41. Available from: <https://www.ahajournals.org/doi/10.1161/01.STR.24.1.35>
- [6] Zürcher E, Richoz B, Faouzi M, Michel P. Differences in ischemic anterior and posterior circulation strokes: a clinico-radiological and outcome analysis. *Journal of Stroke and Cerebrovascular Diseases* [Internet]. 2019 Mar [cited 2025 Mar 31];28(3):710–8. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1052305718306542>
- [7] Kim JT, Park MS, Choi KH, Kim BJ, Han MK, Park TH, et al. Clinical outcomes of posterior versus anterior circulation infarction with low national institutes of health stroke scale scores. *Stroke* [Internet]. 2017 Jan [cited 2025 Mar 31];48(1):55–62. Available from: <https://www.ahajournals.org/doi/10.1161/STROKEAHA.116.013432>
- [8] Zeng Q, Tao W, Lei C, Dong W, Liu M. Etiology and risk factors of posterior circulation infarction compared with anterior circulation infarction. *Journal of Stroke and Cerebrovascular Diseases* [Internet]. 2015 Jul [cited 2025 Mar 31];24(7):1614–20. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1052305715001457>
- [9] Brandt T, Steinke W, Thie A, Pessin MS, Caplan LR. Posterior cerebral artery territory infarcts: clinical features, infarct topography, causes and outcome. Multicenter results and a review of the literature. *Cerebrovasc Dis.* 2000;10(3):170–82.
- [10] Kumral E, Bayulkem G, Atac C, Alper Y. Spectrum of superficial posterior cerebral artery territory infarcts. *Eur J Neurol.* 2004;11(4):237–46.
- [11] Lee E, Kang DW, Kwon SU, Kim JS. Posterior cerebral artery infarction: diffusion-weighted MRI analysis of 205 patients. *Cerebrovasc Dis.* 2009;28(3):298–305.
- [12] Maulaz AB, Bezerra DC, Bogousslavsky J. Posterior cerebral artery infarction from middle cerebral artery infarction. *Arch Neurol.* 2005;62(6):938–41.
- [13] Hwang DY, Silva GS, Furie KL, Greer DM. Comparative sensitivity of computed tomography vs. Magnetic resonance imaging for detecting acute posterior fossa infarct. *The Journal of Emergency Medicine* [Internet]. 2012 May [cited 2025 Mar 31];42(5):559–65. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0736467911011450>
- [14] Alemseged F, Shah DG, Diomedi M, Sallustio F, Bivard A, Sharma G, et al. The basilar artery on computed tomography angiography prognostic score for basilar artery occlusion. *Stroke* [Internet]. 2017 Mar [cited 2025 Mar 31];48(3):631–7. Available from: <https://www.ahajournals.org/doi/10.1161/STROKEAHA.116.015492>
- [15] Cereda CW, Bianco G, Mlynash M, Yuen N, Qureshi AY, Hinduja A, et al. Perfusion imaging predicts favorable outcomes after basilar artery thrombectomy. *Annals of Neurology* [Internet]. 2022 Jan [cited 2025 Mar 31];91(1):23–32. Available from: <https://onlinelibrary.wiley.com/doi/10.1002/ana.26272>
- [16] Martin JH, editor. Vasculature of the central nervous system and the cerebrospinal fluid. In: *Neuroanatomy: Text and Atlas*. 5th ed. New York: McGraw Hill; 2021. p.
- [17] Tao WD, Liu M, Fisher M, et al. Posterior versus anterior circulation infarction: how different are the neurological deficits? *Stroke.* 2012;43(8):2060-5.
- [18] Indraneel KS, V RK, Reddy NM. Study on posterior circulatory stroke characteristics and clinico-radiological imaging. *International Journal of Advances in Medicine* [Internet]. 2023 Apr 26 [cited 2025 Mar 31];10(5):404–8. Available from: <https://www.ijmedicine.com/index.php/ijam/article/view/3791>
- [19] Dubey TN. Clinical and radioimaging study in posterior circulation stroke patients in central india. *jmscr* [Internet]. 2017 Jun 12 [cited 2025 Mar 31];05(06):23296–302. Available from: <http://jmscr.igmpublication.org/v5-i6/83%20jmscr.pdf>
- [20] Mogileswari G, Elangovan S. A study on clinical characteristics and imaging in posterior circulation stroke. *Int J Dent Med Sci Res.* 2021 Dec;3(6):560–5.

- [21] Bhat V, Kamath PA, Shastry BA. Clinical profile of posterior circulation stroke. *J Indian Acad Clin Med.* 2023;24(3-4):171-6.
- [22] Kora SA, Pramila Devi, Malgi S, Biradar S, Ugale M. Clinical and radiological correlation of posterior circulation stroke in a tertiary care centre in southern India. *J Clin Diagn Res [Internet].* 2020 [cited 2025 Mar 15];5(4):714–7.