



Research Article

Section: Radiodiagnosis

Evaluation of Carotid Artery Doppler & Its Correlation with Non-Contrast Computed Tomography Head in Ischemic Stroke Patients

Ashish Kumar Bharati^{1*}, Indra Kumar Batham¹, Arvind Gupta² & Akshara Gupta¹

¹Department of Radiodiagnosis, Gajra Raja Medical College & Jaya Arogya Hospital, Gwalior, India

²Department of Neurology, Gajra Raja Medical College & Jaya Arogya Hospital, Gwalior, India

HIGHLIGHTS

- Carotid stenosis was common
- MCA territory predominated
- Echogenic plaques predominated
- Risk factors increased stenosis.
- ASPECTS inversely correlated with stenosis

Key Words:

Ischemic stroke
 Carotid Doppler
 Carotid stenosis
 NCCT head
 ASPECTS

ABSTRACT

Introduction: Ischemic stroke is a major cause of mortality and long-term neurological disability. Carotid atherosclerosis is an important and potentially treatable contributor, while non-contrast computed tomography (NCCT) demonstrates cerebral ischemic injury. Combined assessment may improve etiological evaluation, vascular characterization, and risk stratification in affected patients. **Aim & Objective:** The study aimed to assess the correlation between carotid artery Doppler and non-contrast CT findings in ischemic stroke, identify commonly involved vascular territories, and evaluate major risk factors for carotid artery stenosis. **Materials & Methods:** This prospective study was conducted in the Department of Radiodiagnosis, G.R. Medical College, Gwalior, Madhya Pradesh, among 96 clinically suspected stroke patients with ischemic stroke on CT. Patients with head injury, space-occupying lesions, demyelinating disorders, stroke mimics, or refusal of consent were excluded. Carotid Doppler parameters, plaque characteristics, stenosis severity, vascular territories, and NCCT findings were analyzed and correlated statistically. **Results:** Mean age was 60.91 ± 8.32 years; 56.3% were males. Carotid stenosis was detected in 74.0%, most commonly <50% stenosis (47.9%), while complete occlusion occurred in 2.1%. Echogenic plaque was most frequent (34.38%). Right and left ICA peak systolic velocities and bilateral ICA/CCA ratios were significantly higher in stenosis. MCA territory predominated, with right MCA infarction in 22.9% and left MCA in 20.8%. Hypertension, diabetes, smoking, and hyperlipidemia were significantly associated with stenosis. ASPECTS correlated inversely with stenosis percentage ($r = -0.764$) and ICA Doppler parameters. **Conclusion:** Carotid Doppler and NCCT are complementary modalities for evaluating ischemic stroke. Increasing carotid stenosis is associated with greater cerebral ischemic burden, supporting combined imaging for diagnosis, vascular risk assessment, risk stratification, clinical management and secondary prevention.



* Corresponding Author: Ashish Kumar Bharati, e-mail: ashishbharati78@gmail.com

Article History: Received 28 July 2026; Received in Revised form 13 September 2026; Accepted 20 September 2026

How To Cite: Ashish Kumar Bharati, Indra Kumar Batham, Arvind Gupta & Akshara Gupta. Evaluation of Carotid Artery Doppler & Its Correlation with Non-Contrast Computed Tomography Head in Ischemic Stroke Patients. *IJMHR: International Journal of Medicine & Health Research*. 2026;14(2):1-8.

DOI: <https://doi.org/10.71393/encz1k30>

This publication is licensed under CC-BY 4.0. Copyright © 2026 The Authors. Published by International Medical Publishing Group.

INTRODUCTION

Stroke is one of the most important causes of death and long-term neurological disability worldwide and remains a major challenge for health-care systems because of its sudden onset, high treatment urgency, and substantial burden of residual functional impairment [1]. The World Stroke Organization reported that almost 12 million new strokes occur globally each year and that approximately one in four adults older than 25 years is expected to experience a stroke during their lifetime [2]. Ischemic stroke constitutes the major pathological category of stroke and results from interruption of cerebral arterial blood flow, producing a spectrum of tissue injury from potentially reversible ischemia to irreversible cerebral infarction. Recent global estimates indicate that more than 7.8 million incident ischemic strokes occurred in 2021, demonstrating the continuing importance of strategies directed toward rapid diagnosis, etiological assessment, and prevention of recurrent vascular events [3].

The pathogenesis of ischemic stroke is heterogeneous and includes large-artery atherosclerosis, cardioembolism, small-vessel occlusion, and several less common or undetermined mechanisms [4]. Among these, atherosclerotic disease of the extracranial carotid arteries is particularly important because the carotid circulation supplies a large proportion of the anterior cerebral circulation and because clinically relevant carotid stenosis represents a potentially treatable source of cerebral ischemia [5]. Atherosclerotic plaque formation may progressively narrow the carotid lumen, alter local hemodynamics, or become unstable and generate artery-to-artery emboli. Plaque morphology and increasing stenotic severity may therefore influence the likelihood and pattern of downstream cerebral ischemic injury. Current stroke prevention guidelines recognize symptomatic extracranial carotid stenosis as an important therapeutic target in appropriately selected patients [6].

Carotid duplex Doppler ultrasonography provides a practical method for evaluating extracranial carotid atherosclerosis. It combines B-mode structural imaging with color and spectral Doppler assessment, allowing evaluation of carotid intima-media thickness, plaque presence and morphology, luminal narrowing, and blood-flow characteristics [7]. Measurements such as peak systolic velocity, end-diastolic velocity, and velocity ratios assist in estimating the hemodynamic severity of internal carotid artery stenosis. Contemporary validation studies continue to refine velocity criteria for clinically important stenosis, reflecting the central role of duplex ultrasound in non-invasive vascular assessment [8]. The technique is widely available, comparatively inexpensive, repeatable, free from ionizing radiation, and suitable for bedside use. Recent prospective evidence has also shown that carotid Doppler-derived hemodynamic indices, including resistive and pulsatility indices, are related to stroke severity and clinical outcome, suggesting that Doppler evaluation can provide information beyond simple anatomical measurement of stenosis [9].

Neuroimaging, however, is essential for demonstrating the cerebral consequence of vascular occlusion. Non-contrast computed tomography of the head remains a fundamental first-line investigation in patients presenting with suspected acute stroke because it can be acquired rapidly and is highly effective for identifying or excluding intracranial hemorrhage, an essential distinction before reperfusion therapy is considered [10]. In ischemic stroke, NCCT may demonstrate early changes such as loss of gray-white matter differentiation, obscuration of the lentiform nucleus or insular ribbon, focal hypoattenuation, sulcal effacement, cerebral edema, or a hyperdense arterial sign. With progression of infarction, the affected vascular territory and extent of tissue damage become more clearly defined. Nevertheless, early ischemic changes may be subtle or absent

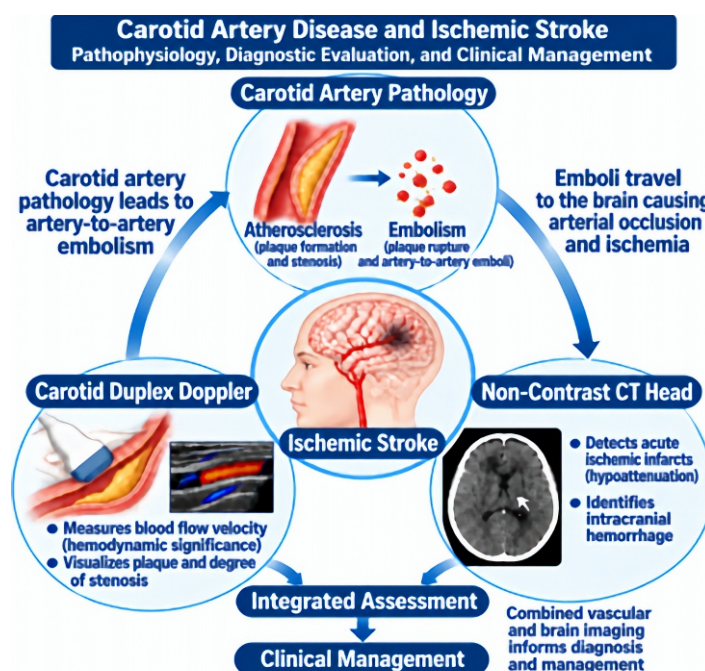


Figure 1: Carotid artery disease: pathophysiology, diagnosis, and management of ischemic stroke.

during the initial hours, so NCCT should be interpreted within the clinical and vascular context [11].

The information obtained from carotid Doppler and NCCT is therefore complementary rather than interchangeable. NCCT identifies the site, distribution, and structural extent of cerebral infarction, whereas carotid Doppler assesses a major extracranial arterial pathway capable of producing or contributing to that infarction [12]. Correlating the degree of carotid stenosis, plaque characteristics, and Doppler flow parameters with the side, territory, and extent of ischemic changes on NCCT may help clarify whether extracranial carotid disease is associated with the observed cerebral lesion. Studies evaluating stroke patients with color Doppler have demonstrated a substantial burden of carotid plaque and stenotic disease, supporting systematic carotid assessment as part of etiological evaluation [13]. At the same time, the absence of significant carotid disease does not exclude ischemic stroke, because cardiac embolism, intracranial atherosclerosis, and small-vessel disease may produce similar clinical and radiological presentations [14].

An integrated assessment is particularly relevant in settings where advanced vascular imaging such as CT angiography or MR angiography may not be immediately available for every patient. Combining a rapid NCCT head examination with an accessible carotid Doppler study can provide simultaneous information about cerebral injury and extracranial vascular pathology. Such correlation may improve etiological classification, identify patients requiring further vascular evaluation, support secondary prevention planning, and help determine the clinical significance of detected carotid atherosclerosis. Accordingly, evaluation of carotid artery Doppler findings in relation to NCCT head abnormalities in patients with ischemic stroke is clinically meaningful and may strengthen understanding of the relationship between extracranial carotid disease and the anatomical pattern of cerebral infarction. This approach may be especially valuable for establishing a coherent diagnostic pathway from initial brain imaging to targeted vascular assessment and preventive management [6]. **Figure 1.** Pathophysiology, diagnostic evaluation, and clinical management of carotid artery disease-associated ischemic stroke.

The aim of this study was to determine the correlation between carotid artery Doppler findings and non-contrast computed tomography head findings in patients with ischemic stroke. The objectives were to identify the most commonly involved vascular territories in ischemic stroke and to evaluate major risk factors associated with carotid artery stenosis among the affected patients in the overall study population.

MATERIAL & METHODS

This prospective study was conducted in the Department of Radiodiagnosis, G.R. Medical College, Gwalior, Madhya Pradesh, to evaluate carotid artery Doppler findings and correlate them with NCCT head findings in ischemic stroke patients. A sample size of 96 was calculated using a 5% significance level

and 8% absolute precision. Clinically suspected stroke patients with ischemic stroke on CT were included. Patients with head injury, brain space-occupying lesions, demyelinating disorders, stroke mimics, or those refusing consent were excluded. Written informed consent was obtained before enrolment, ethical approval was secured, and carotid Doppler findings were correlated with NCCT head findings for analysis.

RESULTS

The study population comprised 96 ischemic stroke patients with a mean age of 60.91 ± 8.32 years, indicating predominance of older adults. Most patients belonged to the 61–70-year age group (42.7%), followed by 51–60 years (34.4%), showing clustering around the sixth and seventh decades. Males constituted 56.3% of patients compared with 43.8% females, demonstrating a modest male predominance. Overall, the demographic profile suggests that ischemic stroke in this cohort was more frequent among older individuals, particularly males.

Carotid Doppler demonstrated <50% stenosis as the most common finding, present in 47.9% of ischemic stroke patients, while 26.0% showed no stenosis. Moderate stenosis of 50–69% was observed in 14.6%, whereas >70% stenosis was present in 9.4% of patients. Complete carotid occlusion was relatively uncommon, occurring in only 2.1% of cases. These findings indicate that carotid atherosclerotic narrowing, predominantly of mild degree, was frequently detected among patients with ischemic stroke (**Table 1**). **Figure 2** shows that echogenic plaques were most common (34.38%), followed by calcified plaques (28.13%), while hypoechoic plaques accounted for 11.46%. No plaque was detected in 26.04% of patients. Overall, the graph indicates a substantial burden of carotid atherosclerotic plaque among ischemic stroke patients.

Table 2 shows significantly higher ICA PSV in the stenosis group on both right ($p=0.0086$) and left sides ($p=0.0028$). The ICA/CCA ratio was also significantly increased bilaterally (right $p=0.0160$; left $p=0.0210$). In contrast, CCA PSV showed no significant difference between stenosis and non-stenosis groups. These findings indicate that elevated ICA velocity and ICA/CCA ratio are important Doppler indicators of carotid stenosis.

Table 3 shows that the right MCA was the most commonly involved vascular territory (22.9%), followed by the left MCA (20.8%). ACA involvement was less frequent, while PCA and watershed infarcts were comparatively uncommon. A normal NCCT study was observed in 26.0% of patients. Overall, MCA territory involvement predominated among ischemic stroke cases. **Table 4** shows that hypertension was present in 60.57% of patients with carotid stenosis compared with only 20% in the non-stenosis group. This difference was highly statistically significant ($p<0.0001$). Thus, hypertension showed a strong association with carotid artery stenosis among ischemic stroke patients. These findings suggest that hypertension is an important vascular risk factor linked with carotid atherosclerotic narrowing.

Figure 3 shows that diabetes was more frequent in patients with carotid stenosis (69%) than in those without stenosis (44%). Conversely, absence of diabetes was higher in the non-stenosis group (56%) compared with the stenosis group (31%). Overall, the graph suggests a greater burden of carotid stenosis among diabetic ischemic stroke patients. **Figure 4** shows that smoking was more frequent among patients with carotid stenosis (70.4%) compared with the non-stenosis group (48%). In contrast, non-smokers were more common in the non-stenosis group (52%) than in the stenosis group (29.6%). This pattern indicates a higher occurrence of carotid stenosis among smokers. Overall, smoking appears to be an important vascular risk factor associated with carotid atherosclerotic narrowing in ischemic stroke patients.

Table 5 shows that hyperlipidemia was present in 76.06% of patients with carotid stenosis compared with 40% in the non-stenosis group. This association was statistically significant ($p=0.0011$). Patients without hyperlipidemia were more common in the non-stenosis group (60%) than in the

stenosis group (23.94%). Overall, hyperlipidemia showed a significant association with carotid stenosis in ischemic stroke patients. **Table 6** shows a significant association between carotid stenosis severity and vascular territory involvement. MCA infarction predominated in severe ($>70\%$) stenosis, occurring in 100% of patients ($p=0.0012$), while ACA infarction was most frequent with 50–69% stenosis (57.14%, $p<0.0001$). Normal CT findings decreased with increasing stenosis severity and were absent in the $>70\%$ group ($p=0.0238$). Overall, increasing carotid stenosis was significantly associated with greater anterior circulation ischemic involvement.

Table 7 demonstrates significant negative correlations between ASPECTS and all carotid Doppler parameters ($p<0.01$). The correlations were moderate for right ICA PSV ($r=-0.518$), left ICA PSV ($r=-0.449$), and bilateral ICA/CCA ratios ($r\approx-0.43$). Carotid stenosis percentage showed the strongest negative correlation with ASPECTS ($r=-0.764$). Thus, increasing carotid stenosis and Doppler velocities were associated with lower ASPECTS, indicating a greater ischemic burden on NCCT.

Table 1: Carotid Stenosis

Stenosis group	Frequency	Percent
<50%	46	47.9
50-69%	14	14.6
>70%	9	9.4
Complete Occlusion	2	2.1
No stenosis	25	26.0
Total	96	100.0

Table 2: Carotid arteries based on stenosis

Parameter	Non-Stenosis	Stenosis	p-value
RIGHT CCA PSV (cm/s)	77.72±9.92	75.93±11.65	0.4951
RIGHT ICA PSV (cm/s)	90.92±12.86	115.67±45.32	0.0086
LEFT CCA PSV (cm/s)	75.52±6.9	79.03±9.93	0.1063
LEFT ICA PSV (cm/s)	86.48±8.09	118.29±51.35	0.0028
RIGHT ICA/CCA Ratio	1.16±0.05	1.53±0.74	0.0160
LEFT ICA/CCA Ratio	1.1±0.07	1.51±0.86	0.0210

Table 3: Involved vascular territory

Involved vascular territory	Frequency	Percent
Normal Study	25	26.0
Right ACA	9	9.4
Left ACA	5	5.2
Left ACA/MCA (Watershed)	5	5.2
Left MCA	20	20.8
Left PCA	4	4.2
Right ACA/MCA (Watershed)	1	1.0
Right MCA	22	22.9
Right MCA/PCA (Watershed)	1	1.0
Right PCA	4	4.2
Total	96	100

Table 4: Hypertension based on carotid stenosis

Hypertension	Non Stenosis	Stenosis	Total	p-value
No	20 (80)	28 (39.44)	48 (50)	<0.0001
Yes	5 (20)	43 (60.57)	48 (50)	
Total	25 (100)	71 (100)	96 (100)	

Table 5: Hyperlipidemia based on carotid stenosis

Hyperlipidemia	Non Stenosis	Stenosis	Total	p-value
No	15 (60)	17 (23.94)	32 (33.33)	0.0011
Yes	10 (40)	54 (76.06)	64 (66.67)	
Total	25 (100)	71 (100)	96 (100)	

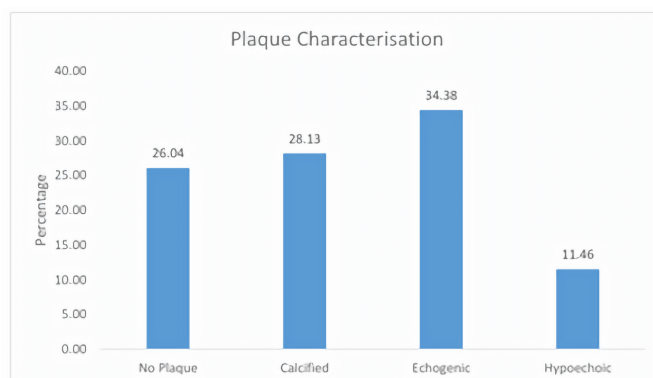


Figure 2: Plaque characterization

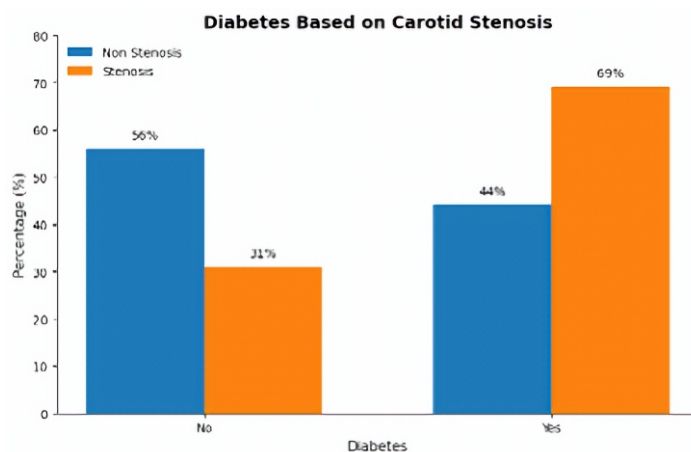


Figure 3: Diabetes Based on Carotid Stenosis

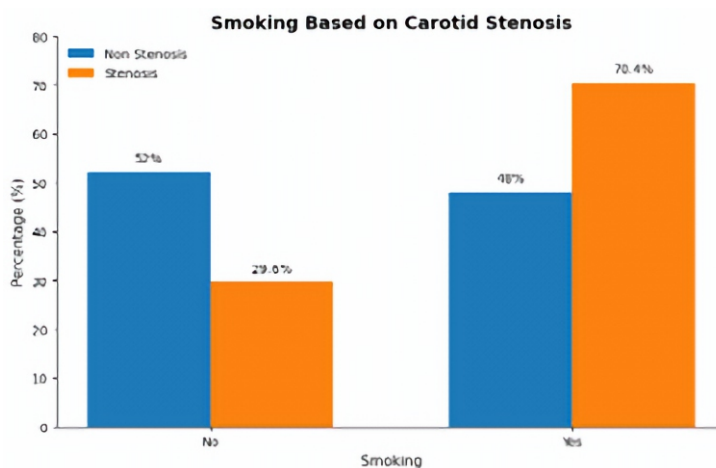


Figure 4: Smoking Based on Carotid Stenosis

Table 6: Vascular territory involvement with carotid stenosis

Vascular territory	Normal (N=25)	<50% (N=46)	50-69% (N=14)	>70% (N=11)	p-value
MCA Infarct	10 (40)	18 (39.13)	4 (28.57)	11 (100)	0.0012
ACA Infarct	0 (0)	6 (13.04)	8 (57.14)	0 (0)	<0.0001
PCA Infarct	5 (20)	2 (4.35)	1 (7.14)	0 (0)	0.0922
Normal CT study	10 (40)	14 (30.43)	1 (7.14)	0 (0)	0.0238
ACA / MCA Watershed infarct	0 (0)	5 (10.87)	0 (0)	0 (0)	-
MCA / PCA Watershed infarct	0 (0)	1 (2.17)	0 (0)	0 (0)	-

Table 7: Pearson Correlation factor between ASPECT score and carotid Doppler parameter

ASPECTS	Parameter	RIGHT ICA PSV (cm/s)	LEFT ICA PSV (cm/s)	RIGHT ICA/CCA RATIO	LEFT ICA/CCA RATIO	STENOSIS (%)
ASPECTS	Pearson Correlation	-0.518	-0.449	-0.429	-0.428	-0.764
Interpretation	Sign Relationship	Negative Moderate	Negative Moderate	Negative Moderate	Negative Moderate	Negative Strong
Correlation is significant at the 0.01 level (2 -tailed)						

DISCUSSION

The demographic profile demonstrated that ischemic stroke predominantly affected older adults, with a mean age of 60.91 ± 8.32 years and the largest proportion belonging to the 61–70-year age group (42.7%). These observations were comparable with Raghuwanshi et al. [15], Sehrawat et al. [16], and Bollipo and Rao [17], who also reported predominance of stroke and carotid atherosclerotic changes among older patients. Males constituted 56.3% and females 43.8%, consistent with Raghuwanshi et al. [15], Haq et al. [13], and Gaur et al. [18], who similarly observed male predominance. Carotid stenosis was detected in 74% of patients, comprising <50% stenosis in 47.9%, 50–69% in 14.6%, >70% in 9.4%, and complete occlusion in 2.1%. Haq et al. [13] reported carotid stenosis in 62% of ischemic stroke patients, while Gaur et al. [18] and Ahmed et al. [19] also documented a substantial burden of carotid stenosis.

Plaque morphology demonstrated echogenic plaques in 34.4%, calcified plaques in 28.1%, hypoechoic plaques in 11.5%, and no plaque in 26%. Haq et al. [13] likewise found echogenic plaques to be the commonest morphology, whereas Gaur et al. [18] and Sehrawat et al. [16] reported greater proportions of hypoechoic plaques, suggesting variation in plaque composition across populations. Doppler assessment showed significantly higher right and left ICA peak systolic velocities in the stenosis group than in the non-stenosis group ($p=0.0086$ and $p=0.0028$, respectively), together with significantly higher right and left ICA/CCA ratios ($p=0.0160$ and $p=0.0210$). Conversely, CCA PSV showed no significant difference between groups, consistent with Pisimisis et al. [20]. Raghuwanshi et al. [15] also supported the relationship between elevated ICA Doppler parameters and carotid stenosis.

NCCT demonstrated predominant MCA involvement, with right MCA infarction in 22.9% and left MCA infarction in 20.8%. Haq et al. [13] reported comparable left and right MCA involvement of 22% and 20%, respectively. Hypertension ($p<0.0001$), diabetes ($p=0.048$), smoking ($p=0.0449$), and hyperlipidemia ($p=0.0011$) were significantly associated with carotid stenosis. Comparable associations were reported by Garg et al. [21], Gaur et al. [18], Haq et al. [13], and Sehrawat et al. [16], while Su et al. [22] identified hypertension as an important determinant of carotid atherosclerosis. All patients with >70% stenosis had MCA infarction, whereas 57.14% of patients with 50–69% stenosis had ACA infarction, demonstrating an association between stenosis severity and vascular territory. ASPECTS

showed significant inverse correlations with percentage stenosis ($r=-0.764$), right ICA PSV ($r=-0.518$), left ICA PSV ($r=-0.449$), right ICA/CCA ratio ($r=-0.429$), and left ICA/CCA ratio ($r=-0.428$). Thus, increasing carotid stenosis and higher ICA hemodynamic parameters were associated with lower ASPECTS, supporting the complementary value of carotid Doppler and NCCT for characterizing both carotid vascular disease and the extent of cerebral ischemic change.

CONCLUSION

The study concludes that carotid artery Doppler and non-contrast CT head are complementary imaging modalities in the evaluation of ischemic stroke. Carotid Doppler effectively identifies carotid atherosclerosis, plaque morphology, stenosis severity, and hemodynamic abnormalities, while NCCT demonstrates infarct location, vascular territory, and extent of ischemic changes. Significant associations of carotid stenosis with hypertension, diabetes, smoking, hyperlipidemia, and higher ICA Doppler parameters emphasize the role of vascular risk assessment. The strong inverse correlation between carotid stenosis severity and ASPECTS indicates that increasing carotid disease is associated with greater cerebral ischemic involvement, supporting combined imaging for diagnosis, risk stratification, and management.

LIMITATIONS & FUTURE PERSPECTIVES

The study was limited by its single-centre design, relatively small sample size, and short duration, which may restrict generalizability. Future research could focus on multi-center studies with larger cohorts to validate findings, evaluate long-term outcomes, and explore innovative diagnostic & management strategies for appendicular perforation, improving patient prognosis and reducing complications.

CLINICAL SIGNIFICANCE

The clinical significance of this study lies in its potential to bridge the gap between research findings and practical healthcare applications. It emphasizes the importance of translating scientific observations into meaningful improvements in patient care, diagnosis, and treatment outcomes. By highlighting real world relevance, the study contributes to evidence based medical practice and supports informed clinical decision making. Ultimately, the findings aim to enhance patient quality of life, optimize therapeutic strategies, and promote better disease management in clinical settings.

ABBREVIATIONS

ICA: Internal Carotid Artery

CCA: Common Carotid Artery

MCA: Middle Cerebral Artery

NCCT: Non-Contrast Computed Tomography

ASPECTS: Alberta Stroke Program Early CT Score

CT: Computed Tomography

Doppler: Doppler Ultrasonography

AUTHOR INFORMATION

Dr. Ashish Kumar Bharati: MD, Senior Resident,

<http://orcid.org/0009-0002-3351-2208>

Dr. Indra Kumar Batham: MD, Associate Professor

Dr. Arvind Gupta: DM, Associate Professor

Dr. Akshara Gupta: MD, Professor & HOD

AUTHOR CONTRIBUTIONS

All authors significantly contributed to the study conception and design, data acquisition, or data analysis and interpretation. They participated in drafting the manuscript or critically revising it for important intellectual content, consented to its submission to the current journal, provided final approval for the version to be published, and accepted responsibility for all aspects of the work. Additionally, all authors meet the authorship criteria outlined by the International Committee of Medical Journal Editors (ICMJE) guidelines

ACKNOWLEDGEMENT

The authors sincerely acknowledge the seniors of the Department of Radiodiagnosis, Gajra Raja Medical College & Jaya Arogya Hospital, Gwalior, India. We are grateful to our college for providing the necessary resources to carry out this work. We also extend our heartfelt thanks to our colleagues and technical staff for their valuable assistance during the study.

CONFLICT OF INTEREST

Authors declared that there is no conflict of interest.

FUNDING

None

ETHICAL APPROVAL & CONSENT TO PARTICIPATE

All necessary consent & approval was obtained by authors.

CONSENT FOR PUBLICATION

All necessary consent for publication was obtained by authors.

DATA AVAILABILITY

All data generated and analyzed are included within this research article. The datasets utilized and/or analyzed in this study can be obtained from the corresponding author upon a reasonable request.

USE OF ARTIFICIAL INTELLIGENCE (AI) & LARGE LANGUAGE MODEL (LLM)

The authors confirm that no AI & LLM tools were used in the writing or editing of the manuscript, and no images were altered or manipulated using AI & LLM.

AUTHOR'S NOTE

This article serves as an important educational tool for the scientific community, offering insights that may inspire future research directions. However, they should not be relied upon independently when making treatment decisions or developing public health policies.

PUBLISHER'S NOTE

All statements made in this article are the sole responsibility of the authors and do not necessarily reflect the views of the publisher, editors, or reviewers. The journal maintains a neutral stance regarding jurisdictional claims in institutional affiliations presented in published work.

ARCHIVING INFORMATION

-  zenodo
- Self-archiving on Google and Amazon Web Services (AWS) cloud servers, as well as on three dedicated in-house servers
- PKP Preservation Network

MANAGING & PUBLISHING EDITOR

Dr. Vinay Kumar Yadav^{1,2,3}

¹CSIR-Indian Institute of Toxicology Research (IITR), Lucknow, India

²Academy of Scientific and Innovative Research (AcSIR), Ghaziabad, U.P., India

³Biological E Ltd, Hyderabad, Telangana, India

HANDLING EDITOR

Dr. Karan Singh Saini^{1,2,3}

¹Ph.D. in Cancer Research from CDRI-JNU New Delhi, India & ²Post-Doctoral Fellow from University of Illinois at Chicago, USA

³Department of Zoology, P.M. College of Excellence, Government Postgraduate College in Sheopur, Madhya Pradesh, India

REFERENCES

1. Singh RJ, Chen S, Ganesh A, Hill MD. Long-term neurological, vascular, and mortality outcomes after stroke. *Int J Stroke*. 2018;13(8):787-796. <https://doi.org/10.1177/1747493018798526>
2. Feigin VL, Owolabi MO, Abd-Allah F, Akinyemi RO, Bhattacharjee NV, Brainin M, et al. Pragmatic solutions to reduce the global burden of stroke: a World Stroke

- Organization-Lancet Neurology Commission. Lancet Neurol. 2023;22(12):1160-1206. <https://doi.org/10.1159/000535377>
3. Hou S, Zhang Y, Xia Y, Liu Y, Deng X, Wang W, et al. Global, regional, and national epidemiology of ischemic stroke from 1990 to 2021. Eur J Neurol. 2024;31(12):1-14.
4. Campbell BC, De Silva DA, Macleod MR, Coutts SB, Schwamm LH, Davis SM, et al. Ischaemic stroke. Nat Rev Dis Primers. 2019;5(1):1-11. <https://doi.org/10.1038/s41572-019-0118-8>
5. Maida CD, Norrito RL, Daidone M, Tuttolomondo A, Pinto A. Neuroinflammatory mechanisms in ischemic stroke: focus on cardioembolic stroke, background, and therapeutic approaches. Int J Mol Sci. 2020;21(18):1-33. <https://doi.org/10.3390/ijms21186454>
6. Kleindorfer DO, Towfighi A, Chaturvedi S, Cockcroft KM, Gutierrez J, Lombardi-Hill D, et al. 2021 guideline for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline from the American Heart Association/American Stroke Association. Stroke. 2021;52(7):364-467. <https://doi.org/10.1161/str.0000000000000375>
7. Costanzo L, Failla G, Aluigi L, Baroncelli TA, Bua C, De Marchi S, et al. Operative procedures for ultrasound assessment of extracranial artery disease: a narrative review by the Italian Society for Vascular Investigation (SIDV). J Clin Med. 2025;14(19):1-47. <https://doi.org/10.3390/jcm14197050>
8. Polak JF, Alexandrov AV. Accuracy of the Society of Radiologists in Ultrasound (SRU) carotid Doppler velocity criteria for grading North American Symptomatic Carotid Endarterectomy Trial (NASCET) stenosis: a meta-analysis. J Ultrasound Med. 2023;42(7):1423-1435. <https://doi.org/10.1002/jum.16150>
9. Karn AK, Narayan S, Qavi A, Maurya PKK, Singh A, Kulshreshtha D. Sequential carotid Doppler study in acute stroke and its clinical correlation: a prospective study. J Neurosci Rural Pract. 2024;15(1):42-46. <https://doi.org/10.25259/jnprp.342.2023>
10. De La Paz R, Wippold F, Cornelius R. American College of Radiology ACR Appropriateness Criteria: cerebrovascular disease. Reston (VA): American College of Radiology; 2012:1-23. <https://doi.org/10.1016/j.jacr.2009.02.008>
11. Abdalkader M, Siegler JE, Lee JS, Yaghi S, Qiu Z, Huo X, et al. Neuroimaging of acute ischemic stroke: multimodal imaging approach for acute endovascular therapy. J Stroke. 2023;25(1):55-71. <https://doi.org/10.5853/jos.2022.03286>
12. Nowinski WL, Walecki J, Półtorak-Szymczak G, Sklinda K, Mruk B. Ischemic infarct detection, localization, and segmentation in noncontrast CT human brain scans: review of automated methods. PeerJ. 2020;8:1-26. <https://doi.org/10.7717/peerj.10444>
13. Haq S, Mathur M, Singh J, Kaur N, Sibia RS, Badhan R. Colour Doppler evaluation of extracranial carotid artery in patients presenting with acute ischemic stroke and correlation with various risk factors. J Clin Diagn Res. 2017;11(3):1-4. <https://doi.org/10.7860/jcdr/2017/25493.9541>
14. Reddy RH, Diggikar P, Mundada M, Oommen A, Pancholi T, Yammanuru B, et al. A comprehensive study of risk factors, etiology, and infarction patterns in cerebrovascular accidents at a tertiary care hospital in India. Cureus. 2024;16(9):1-10. <https://doi.org/10.7759/cureus.68433>
15. Raghuwanshi SK, Kadwey S, Kaushal L. Correlation of carotid Doppler with non-contrast computed tomography head and magnetic resonance imaging brain in patients of acute cerebral ischemia. Int J Sci Stud. 2021;9(1):69-76.
16. Sehrawat S, Thind SS, Singh V, Kuber R, Naware S, Shrotri H. Colour Doppler evaluation of extracranial carotid artery in patients presenting with features of cerebrovascular disease: a clinical and radiological correlation. Med J Dr DY Patil Vidyapeeth. 2012;5(2):137-143. <https://doi.org/10.4103/0975-2870.103344>
17. Bollipo JP, Rao PB. Color Doppler assessment of extracranial carotid arteries in carotid artery disease with correlation of risk factors in predicting cerebrovascular accident in patients with carotid atheromatous disease. 2018:1402-1406. <https://doi.org/10.18203/2349-3933.ijam20184718>
18. Gaur A, Modi B. Colour Doppler evaluation of carotid arteries in ischemic stroke patients. Int J Sci Res. 2022;41-44. <https://doi.org/10.36106/ijsr/2401385>
19. Ahmed L, Noori FA. Carotid Doppler study in patients with cerebral infarction. J Fac Med Baghdad. 2011;53(4):363-366.
20. Pisimisis GT, Katsavelis D, Mandviwala T, Barshes NR, Koungias P. Common carotid artery peak systolic velocity ratio predicts high-grade common carotid stenosis. J Vasc Surg. 2015;62(4):951-957. <https://doi.org/10.1016/j.jvs.2015.05.009>
21. Garg S, Kashikar SV, Phatak S. Colour Doppler evaluation of extracranial carotid arteries: a clinical and radiological correlation. J Clin Diagn Res. 2016;10(1):6-9. <https://doi.org/10.7860/jcdr/2016/15426.7130>
22. Su TC, Jeng JS, Chien KL, Sung FC, Hsu HC, Lee YT. Hypertension status is the major determinant of carotid atherosclerosis: a community-based study in Taiwan. Stroke. 2001;32(10):2265-2271. <https://doi.org/10.1161/str.32.10.2265>

Cite this article : Ashish Kumar Bharati, Indra Kumar Batham, Arvind Gupta & Akshara Gupta. Evaluation of Carotid Artery Doppler & Its Correlation with Non-Contrast Computed Tomography Head in Ischemic Stroke Patients. *IJMHR: International Journal of Medicine & Health Research*. 2026;14(2):1-8.