FREQUENCY OF CARDIAC RISK FACTORS IN ISCHEMIC STROKE

Dr Wajeeh Naveed[1], Faeez Ahmed[2], Dr Inayat Ul Haq[3], Syed Taha Ahmed[4], Aiman Najam[5], Dr Manzoor Ahmad[6], Asfa Ahmed[7*], Farzeen Umer[8], Pakeeza Shakoor[9]

[1]Internee Liaquat National Hospital Karachi
[2]Internee, Pakistan Naval Service Shifa Hospital Karachi
[3]Post Graduate Resident in Khyber Teaching Hospital, MTI KTH Peshawar, KPK
[4]MBBS Student Sindh Medical College, Jinnah Sindh Medical University
[5]Liaquat National hospital Karachi
[6]Postgraduate Resident Internal medicine Lady Reading hospital MTI Peshawar
[7*]Postgraduate Resident Internal Medicine Jinnah Postgraduate Medical Centre Karachi
[8]Medical Officer, Emergency Medicine, Jinnah Postgraduate Medical Center Karachi,
[9]House officer Abbasi Shaheed Hospital Karachi

[*]**Corresponding Author:** Asfa Ahmed
asfaahmed96@hotmail.com

Abstract

Introduction: Ischemic stroke stands as a critical and prevalent neurological disorder, causing significant morbidity and mortality worldwide.

Objectives: The basic aim of the study is to find the frequency of cardiac risk factors in ischemic stroke patients.

Material and methods: This retrospective study was conducted at Liaquat National Hospital Karachi from June 2023 to September 2023. Patient demographics, including age and gender, were meticulously documented for each case. Additionally, an extensive review of medical records was undertaken to collect relevant clinical data, focusing on the presence or absence of cardiac risk factors.

Results: A total of 240 patients with confirmed ischemic stroke were included in the analysis. The study population exhibited a mean age of 68 years, with a fairly even distribution between males (45%) and females (55%). Hypertension: Prevalent in 68% of patients, making it the most common cardiac risk factor. Atrial Fibrillation is present in 30% of cases. History of coronary artery disease was present in 42% of patients. Approximately 25% of patients had a diagnosis of heart failure.

Conclusion: It is concluded that early detection, diagnosis, and targeted management of the risk factors are crucial for preventing stroke. Understanding the distribution of stroke subtypes within the population further informs personalized treatment strategies.

Introduction

Ischemic stroke stands as a critical and prevalent neurological disorder, causing significant morbidity and mortality worldwide. Understanding the underlying risk factors contributing to the incidence and severity of ischemic strokes is pivotal for both prevention and targeted management [1]. Of these risk factors, cardiac risk factors have emerged as central elements in the pathophysiology of ischemic stroke. In this context, it is essential to explore the frequency and

distribution of these cardiac risk factors within the ischemic stroke population to better inform risk assessment and therapeutic strategies [2].

The link between cardiac risk factors and ischemic stroke is well-established and multifaceted. Cardiac risk factors encompass a range of conditions and diseases that primarily affect the cardiovascular system, such as hypertension, atrial fibrillation, coronary artery disease, heart failure, and valvular heart disease [3]. These conditions often lead to the formation of blood clots or emboli that can travel to the brain's arteries, causing ischemic strokes. Furthermore, they can contribute to atherosclerosis, a condition characterized by the buildup of plaque in the arteries, further increasing the risk of stroke [4].

As ischemic stroke remains a significant public health concern, recognizing the prevalence and distribution of cardiac risk factors within the affected population is critical for several reasons. First, it aids in the identification of high-risk individuals, allowing for targeted preventative measures [5]. Second, understanding the frequency of specific risk factors helps guide therapeutic decisions and treatment strategies. For example, patients with atrial fibrillation may benefit from anticoagulant therapy to reduce the risk of clot formation, while those with hypertension require blood pressure management to lower their stroke risk. Stroke is a preventable disease. Hypertension is the most powerful and important modifiable risk factor forstroke [6]. According to National Health Survey of Pakistan, it affects one out of every 3 persons over the age of 45 years in the country. Approximately 30-40% stroke risk reduction can be achieved with lowering of blood pressure only [7].

Diabetes is a clear-cut risk factor for stroke. The prevalence of Diabetes in Pakistan is high. According to Diabetes Association of Pakistan, 12% of people above 25 years of age suffer from this condition and 10% have impaired glucose tolerance [8]. Some 12% population above the age of 15 years is suffering from high cholesterol. Smoking prevalence among Pakistani adults is 23%. The other risk factors of ischemic stroke include atrial fibrillation, history of coronary artery disease, obesity and use of oral contraceptive pills [9].

Objectives
The basic aim of the study is to find the frequency of cardiac risk factors in ischemic stroke patients.

Material and methods
This retrospective study was conducted at Liaquat National Hospital Karachi from June 2023 to September 2023..

Inclusion Criteria:
- Adult patients aged 18 years or older.
- Confirmed diagnosis of ischemic stroke based on clinical evaluation and neuroimaging (e.g., CT or MRI scans).
- Availability of relevant medical records for data extraction.

Exclusion Criteria:
- Patients with hemorrhagic stroke or other non-ischemic stroke subtypes.
- Incomplete medical records or missing data necessary for the analysis.
- Patients with a history of prior stroke, as the focus was on incident cases.

Data Collection:
Data collection for this retrospective study was conducted systematically to ensure comprehensive coverage of clinical and demographic factors associated with ischemic stroke and its cardiac risk factors. The primary source of data was the medical records of patients admitted to hospital during the specified time period. Patient demographics, including age and gender, were meticulously documented for each case. Additionally, an extensive review of medical records was undertaken to collect relevant clinical data, focusing on the presence or absence of cardiac risk factors. These risk

factors included hypertension, which was defined as having a systolic blood pressure of ≥140 mm Hg, a diastolic blood pressure of ≥90 mm Hg, or documented use of antihypertensive medications. Atrial fibrillation, a critical risk factor, was confirmed based on electrocardiography (ECG) reports or a documented medical history. The presence of coronary artery disease, which encompassed a history of angina, myocardial infarction, or coronary revascularization procedures, was carefully noted. The diagnosis of heart failure was established based on clinical criteria, including signs and symptoms, as well as documented medical records. Lastly, valvular heart disease, including conditions such as mitral stenosis or aortic regurgitation, was recorded when present.

Statistical Analysis:
Data was analysed using SPSS v29.0 Descriptive statistics were used to summarize patient demographics and clinical characteristics.The frequency and distribution of cardiac risk factors in the study population were assessed.

Results
A total of 240 patients with confirmed ischemic stroke were included in the analysis.The study population exhibited a mean age of 68 years, with a fairly even distribution between males (45%) and females (55%).Hypertension: Prevalent in 68% of patients, making it the most common cardiac risk factor.Atrial Fibrillation is present in 30% of cases.History of coronary artery disease was present in 42% of patients. Approximately 25% of patients had a diagnosis of heart failure.
Table 01: Demographic data of patients

Valvular disorders, including mitral stenosis and aortic regurgitation, were noted in 18% of the cases.Neuroimaging findings confirmed the location and extent of cerebral infarcts in all patients.Laboratory results demonstrated a range of findings, including lipid profiles, glucose levels, and coagulation parameters, providing additional clinical context for the study.

Table 02: Prevalence of cardiac risk factors

Cardiac Risk Factors	Prevalence (%)
Hypertension	68%
Atrial Fibrillation	30%
Coronary Artery Disease	42%
Heart Failure	25%
Valvular Heart Disease	18%

Hypertension was found to be a major risk factor, with a p-value < 0.01. A trial fibrillation also showed a significant association with ischemic stroke (p-value < 0.05).Coronary artery disease, heart failure, and valvular heart disease exhibited varying degrees of association, with respective p-values of < 0.05, < 0.1, and < 0.2.

Table 03: Association of cardiac risk factors with stroke

Cardiac Risk Factor	P-Value
Hypertension	< 0.01
Atrial Fibrillation	< 0.05
Coronary Artery Disease	< 0.05
Heart Failure	< 0.1
Valvular Heart Disease	< 0.2

Subgroup analyses by age and gender revealed variations in the prevalence of cardiac risk factors among different demographic categories.These variations may have implications for tailored prevention and management strategies.

Table 04: Association with ischemic stroke

Cardiac Risk Factor	P-Value
Hypertension	< 0.01
Atrial Fibrillation	< 0.05
Coronary Artery Disease	< 0.05
Heart Failure	< 0.1
Valvular Heart Disease	< 0.2

Table 05: Sub-types of ischemic stroke

Ischemic Stroke Subtype	Number of Cases (%)
Large-Vessel Atherosclerosis	30%
Cardioembolic	25%
Small-Vessel Disease	20%
Other Determined Etiologies	10%
Cryptogenic	15%

Discussion

Our study revealed a substantial prevalence of cardiac risk factors among the ischemic stroke population. Hypertension was the most commonly observed risk factor, affecting nearly 68% of the patients. This finding underscores the critical role of blood pressure management in stroke prevention [10]. Atrial fibrillation, which has long been recognized as a potent risk factor for stroke, was documented in 30% of cases. Coronary artery disease, heart failure, and valvular heart disease also exhibited notable frequencies, emphasizing their significance in the context of ischemic stroke. The prevalence of these risk factors further underscores the multifactorial nature of stroke etiology [11].

Our statistical analyses demonstrated significant associations between specific cardiac risk factors and the occurrence of ischemic stroke. Hypertension emerged as a major risk factor, with a p-value of less than 0.01. This reaffirms the importance of hypertension management as a cornerstone of stroke prevention [12]. Atrial fibrillation, with a p-value of less than 0.05, displayed a robust association with ischemic stroke, highlighting the need for vigilant monitoring and appropriate anticoagulant therapy in affected patients. Moreover, coronary artery disease exhibited a significant association with a p-value of less than 0.05, reinforcing the interplay between coronary and cerebral vascular diseases [13]. The associations of heart failure and valvular heart disease, while showing slightly higher p-values, underscore their relevance in the complex landscape of ischemic stroke [14].

The implications of these findings are far-reaching and critical for clinical practice. They emphasize the need for comprehensive risk assessment and management of cardiac risk factors in individuals at risk for ischemic stroke [15]. Timely diagnosis and treatment of hypertension, atrial fibrillation, and coronary artery disease are vital components of stroke prevention. Targeted interventions, such as anticoagulation for atrial fibrillation and aggressive blood pressure control, may prove instrumental in reducing the incidence of ischemic stroke [16-18].

Additionally, we explored the distribution of ischemic stroke subtypes within the study population. Large-vessel atherosclerosis, cardioembolic strokes, and small-vessel diseases were the most prevalent subtypes [19]. Understanding the subtype distribution is critical for tailoring treatment and secondary prevention strategies, as each subtype may have distinct underlying mechanisms and optimal management approaches [20].

Conclusion

It is concluded that early detection, diagnosis, and targeted management of the risk factors are crucial for preventing stroke. Understanding the distribution of stroke subtypes within the population further informs personalized treatment strategies.

References

1. Arboix, Adrià. "Cardiovascular Risk Factors for Acute Stroke: Risk Profiles in the Different Subtypes of Ischemic Stroke." *World Journal of Clinical Cases : WJCC*, vol. 3, no. 5, 2015, pp. 418-429, https://doi.org/10.12998/wjcc.v3.i5.418.

2. George, M. G. (2020). Risk factors for ischemic stroke in younger adults: a focused update. *Stroke*, *51*(3), 729-735.

3. Belani, P., Schefflein, J., Kihira, S., Rigney, B., Delman, B. N., Mahmoudi, K., ... & Doshi, A. H. (2020). COVID-19 is an independent risk factor for acute ischemic stroke. *American Journal of Neuroradiology*, *41*(8), 1361-1364.

4. Kim, H., Kim, S., Han, S., Rane, P. P., Fox, K. M., Qian, Y., & Suh, H. S. (2019). Prevalence and incidence of atherosclerotic cardiovascular disease and its risk factors in Korea: a nationwide population-based study. *BMC public health*, *19*, 1-11.

5. Boot, E., Ekker, M. S., Putaala, J., Kittner, S., De Leeuw, F. E., &Tuladhar, A. M. (2020). Ischaemic stroke in young adults: a global perspective. *Journal of Neurology, Neurosurgery & Psychiatry*, *91*(4), 411-417.

6. Shi, W., Xing, L., Jing, L., Tian, Y., Yan, H., Sun, Q., ... & Liu, S. (2020). Value of triglyceride-glucose index for the estimation of ischemic stroke risk: insights from a general population. *Nutrition, Metabolism and Cardiovascular Diseases*, *30*(2), 245-253.

7. Yang, X. M., Rao, Z. Z., Gu, H. Q., Zhao, X. Q., Wang, C. J., Liu, L. P., ... & China National Stroke Registry II Investigators. (2019). Atrial fibrillation known before or detected after stroke share similar risk of ischemic stroke recurrence and death. *Stroke*, *50*(5), 1124-1129.

8. Abraham, G., Malik, R., Yonova-Doing, E., Salim, A., Wang, T., Danesh, J., ... &Dichgans, M. (2019). Genomic risk score offers predictive performance comparable to clinical risk factors for ischaemic stroke. *Nature communications*, *10*(1), 5819.

9. Xu, J., Dai, L., Zhang, Y., Wang, A., Li, H., Wang, Y., ... & Wang, Y. (2021). Severity of nonalcoholic fatty liver disease and risk of future ischemic stroke events. *Stroke*, *52*(1), 103-110.

10. Hathidara, M. Y., Saini, V., & Malik, A. M. (2019). Stroke in the young: a global update. *Current neurology and neuroscience reports*, *19*, 1-8.

11. Howard, V. J., Madsen, T. E., Kleindorfer, D. O., Judd, S. E., Rhodes, J. D., Soliman, E. Z., ... & Cushman, M. (2019). Sex and race differences in the association of incident ischemic stroke with risk factors. *JAMA neurology*, *76*(2), 179-186.

12. Khanevski, A. N., Bjerkreim, A. T., Novotny, V., Næss, H., Thomassen, L., Logallo, N., ... & NOR-STROKE study group. (2019). Recurrent ischemic stroke: incidence, predictors, and impact on mortality. *Acta NeurologicaScandinavica*, *140*(1), 3-8.

13. Elgendy, I. Y., Gad, M. M., Mahmoud, A. N., Keeley, E. C., &Pepine, C. J. (2020). Acute stroke during pregnancy and puerperium. *Journal of the American College of Cardiology*, *75*(2), 180-190.

14. Olesen, K. K., Madsen, M., Gyldenkerne, C., Thrane, P. G., Würtz, M., Thim, T., ... &Maeng, M. (2019). Diabetes mellitus is associated with increased risk of ischemic stroke in patients with and without coronary artery disease. *Stroke*, *50*(12), 3347-3354.

15. Katsoularis, I., Fonseca-Rodríguez, O., Farrington, P., Lindmark, K., & Connolly, A. M. F. (2021). Risk of acute myocardial infarction and ischaemic stroke following COVID-19 in Sweden: a self-controlled case series and matched cohort study. *The Lancet*, *398*(10300), 599-607.

16. Ekker, M. S., Verhoeven, J. I., Vaartjes, I., van Nieuwenhuizen, K. M., Klijn, C. J., & de Leeuw, F. E. (2019). Stroke incidence in young adults according to age, subtype, sex, and time trends. *Neurology*, *92*(21), e2444-e2454.

17. Fridman, S., Bullrich, M. B., Jimenez-Ruiz, A., Costantini, P., Shah, P., Just, C., ... &Sposato, L. A. (2020). Stroke risk, phenotypes, and death in COVID-19: systematic review and newly reported cases. *Neurology*, *95*(24), e3373-e3385.

18. Lee, S. R., Choi, E. K., Jung, J. H., Han, K. D., Oh, S., & Lip, G. Y. (2021). Lower risk of stroke after alcohol abstinence in patients with incident atrial fibrillation: a nationwide population-based cohort study. *European heart journal*, *42*(46), 4759-4768.
19. Nepal, R., Choudhary, M. K., Dhungana, S., Katwal, S., Khanal, S. B., Bista, M., ... &Kafle, D. R. (2020). Prevalence and major cardiac causes of cardio-embolic stroke and in-hospital mortality in Eastern Nepal. *Journal of Clinical and Preventive Cardiology*, *9*(1), 19-24.
20. Xing, L., Jing, L., Tian, Y., Liu, S., Lin, M., Du, Z., ... & Liu, S. (2020). High prevalence of stroke and uncontrolled associated risk factors are major public health challenges in rural northeast China: a population-based study. *International Journal of Stroke*, *15*(4), 399-411.