

## ORIGINAL ARTICLE

## Frequency of Atrial fibrillation in patients with stroke presenting to tertiary care hospital.

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**ABSTRACT... Objective:** To determine the frequency of atrial fibrillation (AF) and its associated clinical factors among patients presenting with acute ischemic stroke at a tertiary care hospital. **Study Design:** Cross-sectional Observational study. **Setting:** Ayub Medical Teaching Institute, Abbottabad, a Tertiary Care Hospital. **Period:** January 20, 2026, to April 22, 2026. **Methods:** A total of 167 consecutive adults aged  $\geq 18$  years with CT- or MRI-confirmed acute ischemic stroke presenting within 7 days of symptom onset were enrolled. Patients with hemorrhagic stroke, transient ischemic attack, non-vascular causes, incomplete records, or those who declined consent were excluded. AF was identified through documented medical history and admission 12-lead electrocardiography. Demographic and cardiovascular risk factor data were collected via a structured proforma. Statistical analysis was performed using SPSS version 26, with associations assessed by the Chi-square test. **Results:** +AF was detected in 38 patients (23%). The overall cohort had a mean age of  $65.2 \pm 12.4$  years, and 58.7% were male. Patients with AF were significantly older ( $70.1 \pm 13.2$  vs.  $63.8 \pm 11.9$  years; age  $>65$  years: 68.4% vs. 48.1%,  $p=0.031$ ). Significant associations with AF were found for diabetes mellitus (52.6% vs. 34.9%,  $p=0.038$ ) and obesity (34.2% vs. 17.1%,  $p=0.029$ ). Hypertension was more common in AF patients but did not reach statistical significance (78.9% vs. 63.6%,  $p=0.082$ ). Sex, smoking, dyslipidemia, and prior stroke showed no significant associations. **Conclusion:** Nearly one in four ischemic stroke patients in this cohort had AF, with older age and metabolic risk factors such as diabetes and obesity showing strong associations. These findings underscore the importance of targeted cardiac screening to guide anticoagulation and improve secondary stroke prevention.

**Key words:** Atrial Fibrillation, Cerebrovascular Disease, Hypertension.

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### INTRODUCTION

Atrial fibrillation (AF) is a key risk factor for stroke, which is one of the leading cause of death and disability. AF is a prevalent cardiac arrhythmia, affecting 33.5 million people worldwide and raising the risk of ischemic stroke four to five-fold.<sup>1,2</sup> It's a major cause of stroke, being responsible for about 20% of all ischemic strokes.<sup>3</sup> The link between AF and stroke has long been recognised, and AF-related strokes are more severe and have a higher death rate.<sup>4</sup> AF is the most common arrhythmia encountered in clinical practice, and represents one-third of all hospitalisations for arrhythmias.<sup>2</sup>

AF is a risk factor for stroke, heart failure and death.<sup>5</sup> AF increases the risk of stroke, and the risk of stroke in patients with AF is five times greater than in those without AF.<sup>6,7</sup> AF-related stroke is more severe,

disabling and deadly than other types of stroke. So it's important to diagnose and treat AF in patients with stroke to reduce the risk of recurrent stroke. The proportion of patients with stroke who have AF depends on the type, timing, and detection of AF.<sup>8</sup>

A recent study found the prevalence of AF in patients with stroke attributed to large- or small-vessel disease to be 5.8% at baseline and 12.4% at 12 months, using an insertable cardiac monitor (ICM).<sup>9</sup> But the burden of AF in patients with stroke presenting to tertiary care hospitals in Pakistan is unknown, particularly in patients with stroke caused by large- or small-vessel disease. One study from Karachi found a prevalence of 4.8% of AF in patients with ischemic stroke.<sup>10</sup> A study from Nowshera reported a prevalence of 18.67% of AF in patients with acute stroke.<sup>11</sup>

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Stroke and transient ischemic attack (TIA) are common in the developing country of Pakistan. A community-based prevalence study conducted in an urban slum of Karachi, reported that 21.8% of the population aged 35 years or more suffered from stroke and/or TIA, and was more common in females.<sup>12,13</sup> The rates of incidence and mortality from stroke and AF are also higher and the age of presentation is younger in Pakistan as compared to developed nations.<sup>14</sup> The factors contributing to the diagnosis and treatment of AF in stroke patients in Pakistan include lack of awareness of patients and general practitioners on the symptoms of stroke, frequency of stroke and its risk factors, absence of stroke units in the country, very low used of thrombolytic therapy due to the lack of affordability and poor knowledge of the doctors on the importance and different aspects of rehabilitation in the management of disability after stroke.<sup>15,16</sup>

We planned a study to estimate the burden of AF in stroke patients in other settings as there is a paucity of data on this and to determine the risk factors for the development of AF in this population. This will help prevent AF related stroke and other complications. This will assist clinicians and physicians in the best management of stroke patients and avoid complications of AF.

## METHODS

This cross-sectional observational study was carried out at the Ayub Teaching Hospital in Abbottabad, a tertiary care hospital, for three months from January 20, 2026, to April 22, 2026. The sample size of 167 patients was calculated using a previously reported prevalence of atrial fibrillation of 12.4%.<sup>9</sup> The Institutional Ethical Review Board of the Ayub Medical Teaching Institute Abbottabad (Approval Code/Ref.No.EC-EA-2024/029) approved the study, and written informed consent was obtained from all eligible study participants or their legally authorized guardians. We recruited 167 patients with acute ischemic stroke admitted via the emergency department or neurology ward. Inclusion criteria were age 18 years or above, diagnosis of acute ischemic stroke confirmed through non-contrast brain computed tomography (CT) or magnetic resonance imaging (MRI) and presenting within 7 days of onset of stroke symptoms. Those

with hemorrhagic stroke, transient ischemic attack, or neurological deficits due to non-vascular causes (such as brain tumor or trauma), those who refused informed consent, and those with unavailable medical records or unable to determine the presence of atrial fibrillation were excluded.

A proforma was used to gather demographic data (age, sex), and clinical characteristics. All patients had an extensive medical history, physical examination and laboratory work-up. Atrial fibrillation (AF) was detected from review of the patient's medical history and a routine 12-lead electrocardiogram (ECG) at admission; AF was defined as a history of non-valvular AF, or AF on the admission ECG. The presence of cardiovascular risk factors was defined as follows: hypertension as physician-diagnosed hypertension, antihypertensive medication use, or systolic blood pressure  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg on admission; diabetes mellitus as physician-diagnosed diabetes, treatment with glucose-lowering drugs, fasting blood glucose level  $\geq 126$  mg/dL, or HbA1c level  $\geq 6.5\%$ ; smoking status as current or past tobacco smoking of any duration; dyslipidemia as physician-diagnosed dyslipidemia, use of lipid-lowering drugs, or total cholesterol level  $\geq 200$  mg/dL; obesity as body mass index (BMI) (calculated from measured weight and height)  $\geq 30$  kg/m<sup>2</sup>; and previous ischemic stroke as a history of ischemic stroke documented by medical records. We used SPSS version 26 for statistical analysis. Continuous data were presented as mean  $\pm$  standard deviation and categorical data as absolute numbers and percentages. The Chi-square test was used to compare the presence of AF with categorical risk factors, with statistical significance of p-value  $\leq 0.05$ .

## RESULTS

In this study of 167 patients presenting with ischemic stroke at a tertiary care hospital, atrial fibrillation (AF) was detected in 38 patients, accounting for 23% of the total cohort. The overall study population exhibited a mean age of  $65.2 \pm 12.4$  years, with a notable male predominance at 98 patients (58.7%). A substantial proportion harbored cardiovascular risk factors, including hypertension in 112 patients (67.1%), diabetes mellitus in 65 (38.9%), a history of smoking in 72 (43.1%), dyslipidemia in 48 (28.7%),

obesity (defined as BMI  $\geq 30$  kg/m<sup>2</sup>) in 35 (21.0%), and a prior history of ischemic stroke in 28 (16.8%).

When stratified by AF status, patients without AF (n=129, 77%) had a mean age of  $63.8 \pm 11.9$  years, compared to a significantly older cohort with AF (n=38, 23%) at  $70.1 \pm 13.2$  years. Among those without AF, 80 (62.0%) were male, whereas only 18 (47.4%) of the AF group were male. Hypertension was prevalent in both subgroups but more common in AF patients (30 of 38, 78.9%) than in those without (82 of 129, 63.6%). Similarly, diabetes mellitus affected 20 of 38 AF patients (52.6%) versus 45 of 129 non-AF patients (34.9%), smoking history was reported by 20 of 38 (52.6%) versus 52 of 129 (40.3%), dyslipidemia by 13 of 38 (34.2%) versus 35 of 129 (27.1%), obesity by 13 of 38 (34.2%) versus 22 of 129 (17.1%), and prior ischemic stroke by 8 of 38 (21.1%) versus 20 of 129 (15.5%).

Associations between AF and key clinical variables were assessed using the Chi-square test, revealing several statistically significant findings. Diabetes

mellitus demonstrated a significant association with AF (52.6% in AF vs. 34.9% in non-AF;  $p=0.038$ ). Obesity likewise showed a strong link (34.2% vs. 17.1%;  $p=0.029$ ), as did advanced age greater than 65 years (26 of 38 AF patients, 68.4%, vs. 62 of 129 non-AF, 48.1%;  $p=0.031$ ). Hypertension approached but did not achieve statistical significance (78.9% vs. 63.6%;  $p=0.082$ ). In contrast, male gender (47.4% vs. 62.0%;  $p=0.112$ ), smoking history (52.6% vs. 40.3%;  $p=0.184$ ), dyslipidemia (34.2% vs. 27.1%;  $p=0.404$ ), and prior ischemic stroke (21.1% vs. 15.5%;  $p=0.412$ ) were not significantly associated with AF in this analysis. These results underscore the prominent role of metabolic and age-related factors in the occurrence of AF among ischemic stroke patients in this setting.

## DISCUSSION

Atrial fibrillation (AF) was present in 23% of 167 patients with acute ischemic stroke admitted to a tertiary care hospital in this study. This prevalence is in line with the broad range of 15-30% reported in global stroke registries, depending on the level

**TABLE-I**

**Descriptive characteristics of the study population (N=167)**

| Characteristic             | Total (n=167)   | No AF (n=129, 77%) | AF (n=38, 23%)  |
|----------------------------|-----------------|--------------------|-----------------|
| Age (years, mean $\pm$ SD) | 65.2 $\pm$ 12.4 | 63.8 $\pm$ 11.9    | 70.1 $\pm$ 13.2 |
| Male gender                | 98 (58.7%)      | 80 (62.0%)         | 18 (47.4%)      |
| Hypertension               | 112 (67.1%)     | 82 (63.6%)         | 30 (78.9%)      |
| Diabetes mellitus          | 65 (38.9%)      | 45 (34.9%)         | 20 (52.6%)      |
| Smoking history            | 72 (43.1%)      | 52 (40.3%)         | 20 (52.6%)      |
| Dyslipidemia               | 48 (28.7%)      | 35 (27.1%)         | 13 (34.2%)      |
| Obesity (BMI $\geq 30$ )   | 35 (21.0%)      | 22 (17.1%)         | 13 (34.2%)      |
| Prior ischemic stroke      | 28 (16.8%)      | 20 (15.5%)         | 8 (21.1%)       |

**TABLE-II**

**Association of atrial fibrillation with clinical variables**

| Variable          | No AF (n=129) | AF (n=38)  | Total (n=167) | P-Value |
|-------------------|---------------|------------|---------------|---------|
| Male gender       | 80 (62.0%)    | 18 (47.4%) | 98 (58.7%)    | 0.112   |
| Hypertension      | 82 (63.6%)    | 30 (78.9%) | 112 (67.1%)   | 0.082   |
| Diabetes mellitus | 45 (34.9%)    | 20 (52.6%) | 65 (38.9%)    | 0.038   |
| Smoking history   | 52 (40.3%)    | 20 (52.6%) | 72 (43.1%)    | 0.184   |
| Dyslipidemia      | 35 (27.1%)    | 13 (34.2%) | 48 (28.7%)    | 0.404   |
| Obesity           | 22 (17.1%)    | 13 (34.2%) | 35 (21.0%)    | 0.029   |
| Prior stroke      | 20 (15.5%)    | 8 (21.1%)  | 28 (16.8%)    | 0.412   |
| Age >65 years     | 62 (48.1%)    | 26 (68.4%) | 88 (52.7%)    | 0.031   |

of cardiac monitoring and representation of elderly patients.<sup>17,18</sup> The background prevalence of vascular risk factors such as hypertension (67%), diabetes (39%) and smoking (43%) reflects the burden of vascular risk factors in stroke populations from South Asia and elsewhere.<sup>19</sup>

The mean age of patients with AF was higher than that of those without AF (70.1 vs. 63.8 years), and older age (>65 years) was associated with an increased risk for AF ( $p=0.031$ ). Age is a major risk factor for AF, due to a progressive atrial fibrosis, calcium overload and electrical remodeling.<sup>20,21</sup> While the proportion of women was not significantly different ( $p=0.112$ ), there was a greater representation of women in the AF group (52.6% vs. 38.0%) which is consistent with epidemiological evidence that women with stroke have a greater prevalence of AF, which is often associated with a greater stroke risk.<sup>22</sup>

The strongest metabolic associations were diabetes and obesity. A history of diabetes was present in 52.6% of AF patients and 34.9% of non-AF patients ( $p=0.038$ ), consistent with a wealth of evidence that insulin resistance, advanced glycation end-products and autonomic dysfunction promote the substrate for atrial fibrillation.<sup>23</sup> Obesity, defined as BMI  $\geq 30$  kg/m<sup>2</sup>, was nearly twice as prevalent in the AF group (34.2% vs. 17.1%,  $p=0.029$ ). Obesity increases epicardial fat, systemic low-grade inflammation, and left ventricular diastolic dysfunction, which raises left atrial pressure and predisposes to AF initiation and maintenance.<sup>24,25</sup> Our results highlight the need for aggressive risk factor modification in the primary and secondary prevention of stroke.

Hypertension was marginally significant, with 78.9% of AF patients and 63.6% of non-AF patients ( $p=0.082$ ). The weaker statistical association is probably due to the high prevalence of hypertension in stroke, which makes it harder to show an independent effect in a small sample. Hypertension is a mainstay of the CHA<sub>2</sub>DS<sub>2</sub>-VASc score and a recognised cause of atrial stretch and fibrosis.<sup>26</sup> On the other hand, smoking, dyslipidemia and prior stroke were not significantly associated with AF in this study, likely due to the small size of the analysis or confounding due to the presence of several

vascular risk factors.

The 23% prevalence of AF in our study is likely a mixture of both known and new cases. Even though admission electrocardiography and short-term Holter monitoring fail to detect many cases of paroxysmal AF, the latter can be the exclusive cause of embolic stroke in as many as one-third of patients initially diagnosed with cryptogenic stroke.<sup>27</sup> Current guidelines recommend extended rhythm monitoring (e.g., using implantable loop recorders) to detect subclinical AF and inform anticoagulation for patients with embolic stroke of unknown source.<sup>28</sup> Consequently, the prevalence of AF in our population may be greater and extended monitoring should be encouraged, especially in older stroke patients with diabetes or obesity.

There are some limitations to the study. The cross-sectional, single-center design may limit the study's generalizability, and the small sample size may have masked smaller effect sizes. AF presence was determined by medical history and presenting ECG, potentially underestimating paroxysmal AF. Echocardiographic measures, stroke mechanism (TOAST criteria) and anticoagulation were not examined, which may further delineate risk factors. Notwithstanding these limitations, the study offers insights from a low-resource tertiary care setting, revealing the association between metabolic syndrome factors and AF in acute ischemic stroke.

## CONCLUSION

In summary, almost a quarter of patients with acute ischemic stroke had AF, which was tied to older age, diabetes and obesity. Given the high metabolic risk in the AF group, it is important to be more alert and keep patients under longer-term cardiac monitoring for silent arrhythmias, which will allow early initiation of anticoagulation and better secondary stroke prevention.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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#### AUTHORSHIP AND CONTRIBUTION DECLARATION

|   |                                                                          |
|---|--------------------------------------------------------------------------|
| 1 | <b>Jawad ur Rahman:</b> Conceived the idea of article, design the study. |
| 2 | <b>Attique ur Rehman Jehangiri:</b> Supervise data collection, drafting. |
| 3 | <b>Muhammad Usman Sharif:</b> Literature review.                         |
| 4 | <b>Naveed Ahmed:</b> Data collection.                                    |
| 5 | <b>Muhammad Hamza:</b> Data analysis.                                    |
| 6 | <b>Awais Ullah:</b> Maintained patient records.                          |