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To Determine the Spectrum of Cardiac Rhythm Disturbances in Acute Ischemic Stroke Using 24-Hour Holter Monitoring

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ABSTRACT

Background: Cardiac arrhythmias are frequently observed in patients with acute ischemic stroke and may significantly impact prognosis. Early detection of arrhythmias, particularly paroxysmal atrial fibrillation (AF), can guide timely anticoagulation and reduce the risk of recurrent strokes. This study aimed to evaluate the spectrum and prevalence of cardiac rhythm abnormalities detected by 24-hour Holter monitoring in acute ischemic stroke patients. Acute stroke leads to an imbalance of central autonomic control. It can cause overactivity of sympathetic or parasympathetic control, myocardial injury, ECG abnormalities, cardiac arrhythmias, and even sudden death. This study aimed to determine the spectrum of cardiac rhythm disturbances in patients with acute ischemic stroke using 24-hour Holter monitoring. **Material and Methods**: This cross-sectional observational study included 130 patients admitted with acute ischemic stroke at SGRDIMSR Amritsar, between 1 August 2023 and 28 February 2025. Patients underwent clinical evaluation, neuroimaging, 12-lead ECG, and 24-hour Holter monitoring. Arrhythmias were classified as significant based on predefined thresholds. Stroke severity was assessed using the NIH Stroke Scale (NIHSS) score, and etiology was classified using the TOAST criteria. **Results**: Of 130 patients (mean age: 61.3 years; 56.9% male), significant arrhythmias were identified in 56.15% through 24-hour Holter monitoring. Among the 73 patients with significant cardiac arrhythmias, the most common finding was supraventricular ectopic beats (34.25%), followed by supraventricular tachycardia (19.18%) and paroxysmal atrial fibrillation (13.70%). Bradyarrhythmias (13.70%) and ventricular ectopics (10.96%) were also notable. Less common were supraventricular runs and bigeminy, each seen in 4.11% of patients. Supraventricular tachyarrhythmias were significantly associated with moderate stroke severity (p=0.002), while bradyarrhythmias were more prevalent in severe strokes. **Conclusion**: A significant proportion of acute ischemic stroke patients exhibited cardiac rhythm abnormalities on 24-hour Holter monitoring, especially PAF. These findings support the use of Holter ECG for early risk stratification and secondary stroke prevention.

Keywords: Acute ischemic stroke, arrhythmia, Holter monitoring, atrial fibrillation, supraventricular ectopics, paroxysmal AF.

INTRODUCTION

Stroke remains a leading cause of death and long-term disability worldwide. Ischemic stroke, caused by interruption of cerebral blood flow, constitutes the majority of cases. Beyond traditional vascular risk factors such as hypertension, diabetes, and dyslipidemia, cardiac arrhythmias, especially atrial fibrillation (AF), have emerged as critical contributors to stroke pathogenesis and recurrence. Cardiac arrhythmias may arise during or after a stroke due to neurogenic cardiac injury, autonomic dysregulation, or pre-existing undiagnosed conditions. While standard 12-lead electrocardiography (ECG) is often part of routine stroke workup, its sensitivity is limited, particularly in detecting paroxysmal arrhythmias. Holter monitoring allows continuous ECG recording and can capture transient, asymptomatic rhythm disturbances that are missed on standard ECGs.

This study aimed to assess the prevalence and types of arrhythmias detected by 24-hour Holter monitoring in acute ischemic stroke patients and evaluate their correlation with stroke characteristics.[1]

Significant Arrhythmias-

- **Supraventricular Ectopic:** ≥30 PACs/hour, >100 PACs/24 h, or episodes of ≥20 consecutive PACs 1
- **Supraventricular Tachycardia:** >150 beats/min with narrow QRS complex
- **Ventricular Ectopic:** beats >30/h2. Ectopy burden is categorized as none (0%), rare (>0–5%), moderate (>5–10%), and frequent (>10%).
- **Paroxysmal atrial fibrillation:** AF episodes lasting at least 30 s.
- **SV Runs:** episodes of SVT with >=5 consecutive QRS complexes.
- **Bigeminy:** ≥42 episodes of bigeminy or bigeminy constituting ≥36.1% of total PVCs in 24 hours.
- Bradyarrhythmia**: A sinus pause exceeding 3 seconds, a second-degree atrioventricular block non Wenckebach** pattern, or a complete (third-degree) AV block.

Table 1: National Institutes of Health Stroke Scale (NIHSS)

Category	Score Options	Score
1a. Level of Consciousness (LOC) (Alert, drowsy, etc.)	0 = Alert 1 = Drowsy 2 = Stuporous 3 = Coma	
1b. LOC Questions (Month, age)	0 = Answers both correctly 1 = Answers one correctly 2 = Incorrect	
1c. LOC Commands (Open/close eyes, make fist & let go)	0 = Obeys both correctly 1 = Obeys one correctly 2 = Incorrect	
2. Best Gaze (Eyes open – pt follows examiner's fingers or face)	0 = Normal 1 = Partial gaze palsy 2 = Forced deviation	
3. Visual (Introduce visual stimulus/threat to pt's visual field quadrants. Cover 1 eye and hold up fingers in all 4 quadrants.)	0 = No visual loss 1 = Partial hemianopsia 2 = Complete hemianopsia 3 = Bilateral hemianopsia	
4. Facial Palsy (Show teeth, raise eyebrows and squeeze eyes tightly shut.)	0 = Normal 1 = Minor 2 = Partial 3 = Complete	
5a. Motor Arm – Left (Elevate extremity to 90°, count to 10, score drift/movement.)	0 = No drift 1 = Drift 2 = Can't resist gravity 3 = No effort against gravity 4 = No movement NT = Amputation, joint fusion (Explain)	
5b. Motor Arm – Right (Same as 5a)	0 = No drift 1 = Drift 2 = Can't resist gravity 3 = No effort against gravity 4 = No movement NT = Amputation, joint fusion (Explain)	
6a. Motor Leg – Left (Elevate to 30°, count to 5, score drift/movement.)	0 = No drift 1 = Drift 2 = Can't resist gravity 3 = No effort against gravity 4 = No movement	

	NT = Amputation, joint fusion	
6b. Motor Leg – Right (Same as 6a)	0 = No drift 1 = Drift 2 = Can't resist gravity 3 = No effort against gravity 4 = No movement NT = Amputation, joint fusion (Explain)	
7. Limb Ataxia (Finger to nose, heel down shin)	0 = Absent 1 = Present in one limb 2 = Present in two limbs	
8. Sensory (Pin prick to face, arms, trunk, and legs - compare sharpness side to side, or no feeling at all)	0 = Normal 1 = Partial loss 2 = Severe loss	
9. Best Language (Name items, describe picture, and read sentence. Don't forget glasses if normally used.)	0 = No aphasia 1 = Mild to moderate aphasia 2 = Severe aphasia 3 = Mute	
10. Dysarthria (Evaluate speech clarity by pt reading or repeating words on list)	0 = Normal articulation 1 = Mild to moderate dysarthria 2 = Near to unintelligible or worse NT = Intubated or other physical barrier	
11. Extinction and Inattention (Use information from prior testing or double simultaneous stimulation)	0 = No neglect 1 = Partial neglect 2 = Complete neglect	
NT= Not testable acceptable as noted above		
TOTAL SCORE:		

Table 2: NIH Stroke Scale (NIHSS) Score Interpretation and Brain Impact Severity

NIHSS Score	Stroke Severity	Impacted Brain Density
0	No Stroke	
0 – 4	Minor Stroke	
5 – 15	Moderate Stroke	
16 – 20	Moderate to Severe Stroke	
21 – 42	Severe Stroke	

Table 3: TOAST Classification for Ischemic Stroke Subtypes

Category	Description
Large-artery atherosclerosis	Embolus/Thrombosis
Cardioembolism	High-risk/Medium-risk
Small-vessel occlusion	Lacune
Stroke of other determined etiology	Specific known causes
Stroke of undetermined etiology	—
a. Two or more causes identified	Multiple potential causes identified
b. Negative evaluation	No cause identified after evaluation
c. Incomplete evaluation	Evaluation incomplete or insufficient

MATERIALS AND METHODS

This was an observational cross-sectional study conducted in the Departments of Emergency Medicine and Medicine at Sri Guru Ramdas Institute of Medical Sciences and Research, Amritsar. The study included all subjects with acute ischemic stroke confirmed by brain imaging who fulfilled both the inclusion and exclusion criteria between August 1, 2023, and February 28, 2025. A total of 130 patients diagnosed with acute ischemic stroke were included in this study.

Informed and written consent was obtained in the participants' vernacular language. All subjects then underwent a detailed history-taking process along with neurological and cardiological examination and a comprehensive panel of investigations, which included complete blood count, renal function tests, serum electrolytes, lipid profile, cardiac markers, non-contrast CT (NCCT) head, MRI brain, 12-lead ECG, 2D echocardiography, carotid Doppler, and 24-hour Holter monitoring.

Materials Used:

- 12-lead ECG machine
- 24-hour Holter monitor (BPL Machine)

Inclusion Criteria:

- Patients aged more than 18 years and less than 90 years.
- Patients with sinus rhythm on ECG at admission.

Exclusion Criteria:

- Patients with hemorrhagic stroke.
- Patients with prior structural heart disease.
- Patients with known AF or other rhythm disturbances.
- Patients on medications such as digoxin, lithium, tricyclic antidepressants, or phenothiazines.

All enrolled subjects underwent a thorough history, general physical, and neurological examination. Stroke severity was assessed using the NIHSS. Patients were questioned about conventional stroke risk factors, including hypertension, diabetes mellitus, coronary artery disease, and hyperlipidemia. Laboratory investigations included complete blood count, blood sugar levels, renal function tests, serum electrolytes, and fasting lipid profile.

Each patient underwent a CT scan or an MRI of the brain after stabilization. A resting 12-lead ECG was performed upon arrival in the emergency department. A 2D echo was done. Subsequently, all patients were subjected to 24-hour Holter monitoring.[2,3]

Scores and Investigations Included:

NIHSS– A systematic quantitative tool used to assess stroke-related neurological deficits.
Laboratory tests– CBC, blood glucose, serum electrolytes, lipid profile, and cardiac markers.
Radiological investigations– NCCT head, MRI 2D brain, echocardiography, and carotid duplex scan (If needed)

Cardiac monitoring – 12-lead ECG and 24-hour Holter monitoring.

Statistical Analysis: Data collected during the study were compiled using Microsoft Excel and analyzed using SPSS version 26. Categorical variables, such as gender, risk factors, stroke type, and cardiac arrhythmias, were reported as frequencies and percentages. In contrast, continuous variables, such as age and heart rate, were reported as mean ± standard deviation. The association between categorical variables (e.g., type of arrhythmia and stroke severity, artery involved, and rhythm abnormality) was assessed using the Chi-square test or Fisher's exact test, as appropriate. For comparison of means across multiple groups, Analysis of Variance was used. A p-value less than 0.05 was considered statistically significant.

RESULTS

Most of the patients (31.54%) belonged to the 61- 70 years age group. This suggests that stroke incidence is higher in older people. Only 2.31% of patients were under 30 years old. Of the 130 acute ischemic stroke patients, 56.92% were males and 43.08% were females; thus, males were more affected. The most common presenting complaint was weakness of one side of the body, observed in 66.92% of patients. This was followed by speech slurring and upper limb weakness, observed in 31.54%, while spinning sensation (vertigo) was a feature in 25.38%. The rarely reported symptoms were abnormal body movements or loss of consciousness (27.69%), loss of vision (4.62%), and isolated lower limb weakness (2.31%).

Table 4: Baseline characteristics

Age Group(years)	**Number**	**Percent**
<30	3	2.31
30-40	10	7.69
41-50	22	16.92
51-60	23	17.69
61-70	41	31.54
71-80	25	19.23
>80	6	4.62
Gender		
Female	56	43.08
Male	74	56.92

Table 5: Risk Factors in Patients with Acute Ischemic Stroke

Risk factors For Stroke	**Number**	**Percent**
Previous H/o stroke	5	3.85
Diabetes Mellitus	71	54.62
Hypertension	93	71.54
Alcoholic	38	29.23
Smoker	46	35.38
CAD	10	7.69
Total Cholesterol ≥240 mg/dL	11	8.46
Triglycerides ≥200 mg/dL	3	2.31
High-Density Lipoprotein <40 mg/dL	84	64.62
Low-Density Lipoprotein ≥160 mg/dL	19	14.62
Very Low-Density Lipoprotein <34mg/dL	100	76.92

The most frequent elements of the metabolic syndrome were hypertension (71.54%) and low HDL cholesterol levels (64.62%), while diabetes mellitus incidence (54.62%) was not far behind. These data suggest the dominant relationship between dyslipidemia, hypertension, and diabetes on one side and ischemic stroke on the other. Interestingly, smoking (35.38%) and alcohol intake (29.23%) as parts of the lifestyle were quite prevalent, which is indicative of the multifactorial essence of stroke risk.

Table 6: ECG Findings in Patients with Acute Ischemic Stroke

ECG	Number	Percent
Normal ECG	40	30.77
Left Bundle Branch Block	18	13.85
Right Bundle Branch Block	8	6.15
Left Anterior Fascicular Block	8	6.15
Left Posterior Fascicular Block	12	9.23
Left Ventricular Hypertrophy	41	31.54
T Wave Inversion	17	13.08
Total	130	100.00

Among the patients studied, the most frequent ECG abnormality was left ventricular hypertrophy (31.54%), followed by normal ecg (30.77%). Conduction abnormalities such as left bundle branch block (13.85%), right bundle branch block (6.15%), left anterior fascicular block (6.15%), and left posterior fascicular block (9.23%) were also noted. T-wave inversion, an indicator of possible ischemia or cardiac strain, was observed in 13.08% of cases.

Table 7: Types of Significant Cardiac Arrhythmias Detected on 24-Hour Holter Monitoring

Significant Cardiac Arrhythmias (24 Hour Holter)	Number	Percent
Supraventricular Ectopic(SVE)	25	34.25
Supraventricular Tacchycardia(SVT)	14	19.18
Ventricular Ectopic(VE)	8	10.96
Paroxysmal Atrial Fibrillation(PAF)	10	13.70
Supraventricular runs(SV RUN)	3	4.11
Bigeminy	3	4.11
Bradyarythmia(BA)	10	13.70
Total	73	100.00

Out of 73 patients with serious cardiac arrhythmias, the predominant finding was supraventricular ectopic beats (34.25%), followed by supraventricular tachycardia (19.18%) and paroxysmal atrial fibrillation (13.70%). Bradyarrhythmias (13.70%) and ventricular ectopics (10.96%) were also present to a significant extent. The occurrence of supraventricular runs and bigeminy was quite rare, with only 4.11% of patients exhibiting them.

Table 8: Association Between TOAST Classification and Stroke Severity

Toast Clasification	Minor	Moderate	Moderate to Severe	Severe	Total
	No. (%)	No. (%)	No. (%)	No. (%)	
CLASS 1	17(70.83)	50(69.44)	17(85)	11(78.57)	95
CLASS 2	0	7(9.72)	0	0	7
CLASS 3	2(8.33)	8(11.11)	2(10)	3(21.43)	15
CLASS 4	5(20.83)	4(5.56)	1(5)	0	10
CLASS 5	0	3(4.17)	0	0	3
P value	0.138				

The majority of patients across all stroke severity groups were classified under TOAST Class 1 (large artery atherosclerosis), making up 73.1% of the overall cohort. This group was particularly dominant in the moderate (69.44%), moderate-to-severe (85%), and severe (78.57%) categories, suggesting a consistent trend of severity among large artery strokes. Class 2 (cardioembolic strokes) accounted for 9.72% of moderate cases but was not represented in any other severity group. Small vessel disease (Class 3) showed a broader distribution, appearing across all severity levels but most notably in severe strokes (21.43%). Although a trend was observed in the distribution of stroke severity among different TOAST classes, the association did not reach statistical significance (p = 0.138).

Table 9: Association Between Stroke Artery Involvement and Types of Cardiac Arrhythmias

ARTERY OF STROKE	Normal	Bigeminy	BA	PAF	SV RUN	SVE	SVT	VE
	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)
ACA(n=2)	1(50)	0	0	0	0	0	1(50)	0
MCA(n=71)	30(42.25)	2(2.82)	5(7.04)	6(8.45)	2(2.82)	13(18.31)	8(11.27)	5(7.04)
PCA(n=11)	10(90.91)	0	0	0	0	1(9.09)	0	0
PICA(n=11)	4(36.36)	0	1(9.09)	0	0	5(45.45)	1(9.09)	0
ACA+MCA(n=2)	0	0	0	2(100)	0	0	0	0
MCA+PCA(n=17)	6(35.29)	0	3(17.65)	0	1(5.88)	2(11.76)	3(17.65)	2(11.76)
Basilar Artery(n=11)	4(36.36)	1(9.09)	1(9.09)	1(9.09)	0	2(18.18)	1(9.09)	1(9.09)
Vertebral Artery(n=5)	2(40)	0	0	1(20)	0	2(40)	0	0
p value	0.254							

The analysis across different arterial territories shows that middle cerebral artery (MCA) strokes (n = 71) were associated with the highest variety and frequency of arrhythmias, including supraventricular ectopics (18.31%), supraventricular tachycardia (11.27%), paroxysmal atrial fibrillation (8.45%), and ventricular ectopics (7.04%), no statistically significant association was found between the artery of stroke and arrhythmia type (p = 0.254).

Table 10: Association Between Circulation Territory of Stroke and Types of Cardiac Arrhythmias

Circulation Of Stroke	Normal	Bigeminy	BA	PAF	SV RUN	SVE	SVT	VE
	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)
Anterior	30(41.67)	3(4.17)	5(6.94)	6(8.33)	2(2.78)	13(18.06)	8(11.11)	5(6.94)
Posterior	21(53.85)	0	2(5.13)	2(5.13)	0	10(25.64)	3(7.69)	1(2.56)
Anterior + Posterior	6(31.58)	0	3(15.79)	2(10.53)	1(5.26)	2(10.53)	3(15.79)	2(10.53)
p value	0.590							

Across different stroke circulation territories, the most frequent arrhythmia overall was supraventricular ectopics (SVE, 19.23%), followed by supraventricular tachycardia (10.77%) and paroxysmal atrial fibrillation (7.69%). Patients with anterior circulation strokes (n = 72) exhibited a broader range of arrhythmias, with SVE (18.06%) and SVT (11.11%) being relatively more common. Posterior circulation strokes (n = 39) were associated with a higher proportion of normal rhythm (53.85%), though SVE was also notable (25.64%). In combined anterior and posterior circulation strokes (n = 19), there was a greater presence of bradyarrhythmia (15.79%), SVT (15.79%), and VE (10.53%). Despite differences in distribution, the association between stroke circulation and cardiac arrhythmia type was not statistically significant (p = 0.590).

Table 11: Association Between Brain Area Involvement and Cardiac Arrhythmias Detected on 24-Hour Holter Monitoring

Area of Brain involvement	Normal	Bigeminy	BA	PAF	SV RUN	SVE	SVT	VE	p value
Cortical Infarct	25	0	3	1	0	11	4	3	0.254
Subcortical Infarct	8	1	1	0	0	1	3	0	0.331
Cortical & Subcortical Infarct	14	0	4	7	2	4	4	4	0.021
Brainstem	7	2	1	2	0	4	2	1	0.341
Cerebellum	3	0	1	0	1	5	1	0	0.192

Among all brain regions, infarcts involving both cortical and subcortical areas demonstrated a statistically significant association with arrhythmia occurrence ($p = 0.021$). This group showed a higher frequency of paroxysmal atrial fibrillation (PAF), bradyarrhythmias (BA), and ventricular ectopics (VE), indicating that broader anatomical involvement may amplify autonomic disruption and arrhythmic risk. In contrast, isolated cortical and subcortical infarcts were primarily associated with supraventricular ectopics (SVE) and normal rhythm findings, with fewer significant arrhythmias overall. Brainstem infarcts, known for their proximity to autonomic regulatory centers, also presented with diverse arrhythmias, including PAF and SVT, but these findings did not reach statistical significance. Cerebellar infarcts, typically less involved in autonomic control, had the lowest arrhythmic burden.

Table 12: Association Between TOAST Classification and Presence of Paroxysmal Atrial Fibrillation (PAF)

	PAF Present	PAF Absent	Total	P value
	No. (%)	No. (%)		
CLASS 1	5(5.26)	90(94.74)	95	0.001
CLASS 2	4(57.14)	3(42.86)	7	
CLASS 3	1(6.67)	14(93.33)	15	
CLASS 4	0(0)	10(100)	10	
CLASS 5	0(0)	3(100)	3	

There was a statistically significant association between TOAST classification and the presence of PAF ($p = 0.001$). Class 2 (cardioembolic strokes) had the highest proportion of PAF (57.14%), strongly linking atrial fibrillation with cardioembolic etiology. In contrast, PAF was rarely observed in other classes, and completely absent in Class 4 and Class 5 strokes.

DISCUSSION

The current study aimed to evaluate the prevalence and spectrum of cardiac rhythm disturbances in patients with acute ischemic stroke using 24-hour Holter monitoring and to explore their association with stroke severity. Our findings reaffirm that cardiac arrhythmias are frequently detected in this patient group and may influence short- and long-term outcomes. Notably, a significant association was observed between the presence of arrhythmias, particularly AF, and higher stroke severity scores, suggesting a potential prognostic role.[4]

Among 73 significant arrhythmias detected, supraventricular tachyarrhythmias were the most common (71.23%), followed by ventricular arrhythmias (15.07%) and bradyarrhythmias (13.70). Among the brain areas evaluated, combined cortical and subcortical infarcts showed a statistically significant association with moderate to severe and severe stroke presentations ($p < 0.001$), suggesting a broader extent of functional impairment when both gray and white matter regions are involved. These findings are consistent with the work of Pierik et al. (5 who observed that larger or multi-territorial infarcts, especially those with both cortical and subcortical involvement, are more likely to result in cardioembolic or severe stroke presentations.

In this study, large artery atherosclerosis (TOAST Class 1) was the most common subtype and was more frequently associated with moderate-to-severe and severe strokes. The most recent trend also aligns with the results of Adams et al,[3] and Pierik et al,[5] who found that large artery stroke causes significantly greater disability than small artery stroke because it mainly affects brain areas supplied by large vessels and often involves cortical infarctions. Though small vessel disease (Class 3) is mainly associated with mild strokes, it was found in the severe group of our study. This finding is not isolated, as in the case of Maaijwee et al,[6] who emphasized the burden of lacunes as a progressive worsening factor in the clinical presentation. Cardioembolic (Class 2) strokes were only seen in the moderate subcategory, which is probably a consequence of their earlier diagnosis and treatment. Atrial fibrillation turned out to be the most clinically significant arrhythmia in our study. The detection of AF paroxysmal has become more frequent with increasing stroke severity in the study, corroborating the findings of Yahya et al,[7] and Gündüz et al,[8] who reported the highest rate of AF diagnosis in severe embolic stroke patterns.[9,10] This is very important when dealing with embolic stroke of undetermined source. In this case, accurate and timely detection of AF leads to rapid initiation of anticoagulation and thus reduces the risk of recurrence.[11-13] The results of our study provide further evidence of the association between cardioembolic strokes (TOAST Class 2) and paroxysmal atrial fibrillation, and that AF plays a major role among the causative factors in this category.[4,6,14] Small percentages of PAF detection in Class 1 and Class 3 cases might be due to the coexistence of risk factors or to mere incidental findings.

The absence of PAF in strokes due to other or undetermined causes (Class 4 and 5) supports the specificity of AF as a hallmark of cardioembolism. These results align with studies by Sanna et al,[15,16] and Gladstone et al,[17,18] which advocate for extended cardiac monitoring in patients with cryptogenic or suspected embolic strokes to detect early AF. This further highlights the clinical importance of TOAST classification in guiding post-stroke rhythm surveillance and anticoagulation strategies. While not statistically significant, the findings suggest that strokes involving the MCA, basilar artery, and combined vascular territories may predispose patients to a wider range of arrhythmias, including supraventricular, ventricular, and bradyarrhythmias. These territories often supply regions such as the insula and brainstem, which are closely tied to cardiac autonomic regulation.[1,6,19] Among the regions analyzed, infarctions involving both cortical and subcortical areas showed a statistically significant association with arrhythmia burden ($p = 0.021$), particularly with PAF, BA, and VE. This finding suggests that strokes affecting multiple neuroanatomical substrates may cause more profound autonomic dysregulation, predisposing patients to arrhythmogenic events.

Our results align with the findings of Kallmünzer et al,[19] who reported a higher incidence of serious cardiac arrhythmias in patients with larger infarcts and those involving multiple vascular territories. In particular, PAF, an arrhythmia of significant embolic potential, was most frequently seen in patients with combined cortical-subcortical involvement in our study. Although the association between stroke artery involvement and cardiac arrhythmias was not statistically significant ($p = 0.254$), the distribution patterns offer clinical insights. MCA infarcts, being the most common, were associated with the highest absolute number of arrhythmias, including PAF, bradyarrhythmias, SVT, and SVE, consistent with the MCA territory's frequent involvement of the cortex, an area known to influence autonomic regulation.[1,5] PCA infarcts, on the other hand, showed predominantly normal Holter findings, suggesting a lower arrhythmic burden. Interestingly, the ACA+MCA group showed a 100% incidence of PAF, though the sample size was small. MCA+PCA and basilar artery strokes showed diverse arrhythmias, particularly bradyarrhythmias, SVT, and VE, pointing to more extensive or posterior circulation involvement. While not statistically conclusive, these findings are in line with prior studies emphasizing the role of vascular territory, especially MCA involvement, in influencing post-stroke arrhythmic risk.[14,19,20]

CONCLUSION

This study highlights that acute ischemic stroke predominantly affects older adults, especially males, with hypertension, diabetes, and dyslipidemia being the most common risk factors. The MCA was the most frequently involved vessel and showed a significant association with higher stroke severity. Cardiac arrhythmias, especially supraventricular tachyarrhythmias and bradyarrhythmias, were frequently observed and showed a statistically significant correlation with stroke severity. Combined cortical-subcortical and brainstem strokes were associated with a higher arrhythmic burden. The TOAST classification identified large artery atherosclerosis as the most prevalent subtype, while PAF was significantly associated with cardioembolic strokes (Class 2). These findings underscore the value of 24-hour Holter ECG in stroke patients for the timely detection of arrhythmias and guiding preventive strategies.

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