

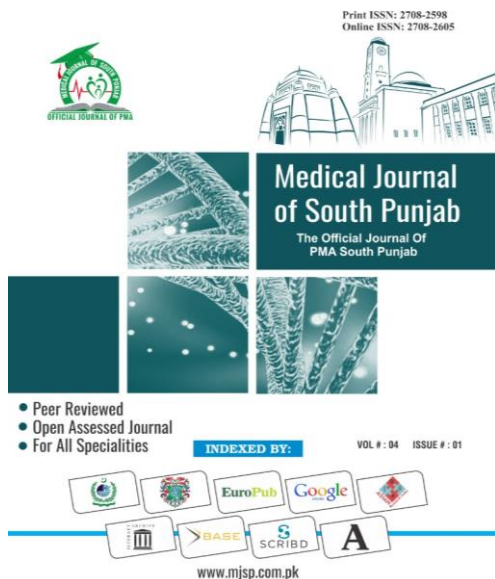
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48 hours holter monitoring in detecting occult atrial fibrillation in Adults

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ABSTRACT

Objective: to evaluate the effectiveness of 48 hours Holter monitoring in detecting clinically asymptomatic atrial fibrillation (AF) in young patients who have experienced an ischemic stroke.

Methods: A cross-sectional study was conducted at Neurology department of National Institute of Cardiovascular Diseases (NICVD) Karachi, Pakistan from August 2022 to July 2023, focusing on patients admitted with ischemic stroke. Study comprised medical data from 48 patients who were admitted for 48-hour Holter monitoring. During the monitoring period, patients were identified as positive if atrial fibrillation lasting 6 minutes or longer was detected.

Results: Overall, 48 patients were included in this study with mean age 46.38 ± 6.13 years. There were 72.9% males and 27.1% females. Hypertension was the most common family history of the study patients. The mean national institute of health stroke scale and Glasgow coma scale of the patients was 10.29 ± 3.31 and 12.14 ± 1.28 , respectively.

Conclusion: The 24-hour Holter monitoring method exhibits a low detection rate for atrial fibrillation/flutter (AF/AFL), but it is more likely to detect AF in individuals of advanced age, as well as those with hypertension, stroke symptoms, or diabetes.

Keywords: Holter monitoring, 48 hours, Occult atrial fibrillation, Stroke, hypertension

1. INTRODUCTION

Atrial fibrillation (AF) is characterized by irregular heartbeats evidenced by the absence of P waves on an ECG, lasting at least 30 seconds¹, and while more commonly seen in older individuals or those with cardiovascular risk factors², it still affects 3% of adults, making it prevalent across age groups. Symptoms associated with AF can manifest in all three subtypes—permanent, persistent, or paroxysmal AF³.

Research has demonstrated that asymptomatic atrial fibrillation (AF), whether occurring during or after a stroke⁴, significantly increases the risk of ischemic stroke by four to five times, highlighting the importance of investigating stroke etiology and providing appropriate treatment options to reduce the likelihood of stroke recurrence⁵, despite approximately one-fourth of ischemic strokes having unidentified primary causes⁶.

Stroke imposes a significant economic burden on society, with European Union countries collectively spending an average of €27 billion annually on associated expenses⁷. This amounts to approximately 3% to 4% of the health budget allocated towards addressing the immediate and long-term costs incurred from stroke incidents, including therapy and care⁸.

Holter's 1961⁹ report marked the pioneering introduction of a compact and portable magnetic tape "electro-cardio-recorder," weighing less than 2 kg, capable of continuous recording for up to 10 hours. Since then, ECG monitoring has become widely utilized across various medical contexts¹⁰, encompassing the evaluation of arrhythmia symptoms, prognosis assessment, anti-arrhythmic treatment management, and the identification and treatment of myocardial ischemia¹¹.

The findings of this study can serve as a foundation for further research aimed at refining diagnostic algorithms and treatment guidelines for young patients with possible cardioembolic stroke.

2. METHODOLOGY

A cross-sectional study was conducted at Neurology department of National Institute of Cardiovascular Diseases (NICVD) Karachi, Pakistan from August 2022 to July 2023, focusing on patients admitted with ischemic stroke. The study was ethically approved by the Ethics Review Committee of the hospital. Study comprised medical data from 48 patients who were admitted for 48-hour Holter monitoring. During the monitoring period, patients were identified as positive if atrial fibrillation lasting 6 minutes or longer was detected. The study involved a comprehensive examination of patients' medical records, encompassing factors such as age, gender, clinical diagnosis, stroke characteristics, demographics, electrocardiography, echocardiography results, and the duration and findings of Holter monitoring. Data analysis was conducted utilizing SPSS version 27.0, enabling detailed exploration and interpretation of the collected information to draw conclusions and insights regarding the relationship between ischemic stroke and atrial fibrillation within the study cohort.

3. RESULTS

Overall, 48 patients were included in this study with mean age 46.38 ± 6.13 years. There were 35 (72.9%) males and 13 (27.1%) females. Hypertension 23 (47.9%) was the most common family history of the study patients. (Table. I).

The mean national institute of health stroke scale and Glasgow coma scale of the

patients was 10.29 ± 3.31 and 12.14 ± 1.28 , respectively. (Table. II). According to location of infarction, 35 (72.9%) patients were anterior circulation infarct, 8 (16.7%) were posterior circulation infarct and 5 (10.4%) patients were brainstem infarct. (Figure. I). Whereas, 9 (18.8%) patients were atrial fibrillation and 39 (81.3%) patients were normal holter monitoring outcome. (Figure. II).

Table. I: Demographic characteristics and family history of the study patients

Characteristic	Presence
Age (years)	46.38±6.13
Gender	
Male	35 (72.9)
Female	13 (27.1)
Family history	
Diabetes	5 (10.4)
Hypertension	23 (47.9)
Ischemic heart disease	5 (10.4)
Stroke	8 (16.7)
No	7 (14.6)
Mean±S.D, N (%)	

Table. II: National institute of health stroke scale and Glasgow coma scale of the study patients

Scale	Mean±S.D
National Institute of Health Stroke Scale	10.29±3.31
Glasgow Coma Scale	12.14±1.28

Figure. I

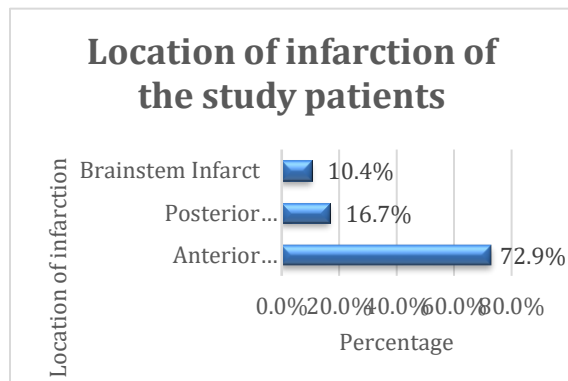
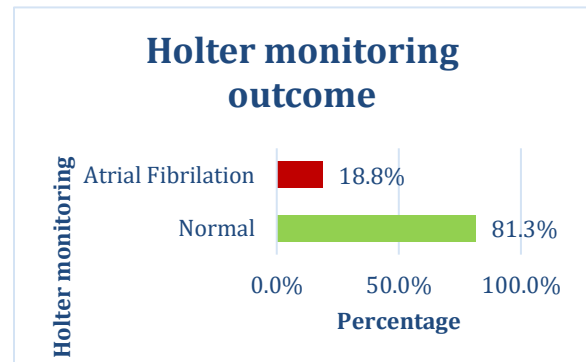


Figure. II



4. DISCUSSION

Detecting persistent atrial fibrillation (AF) is typically straightforward during stroke evaluation through routine ECG assessment, facilitating the demonstration of a clear relationship between the two¹². However, the detection of paroxysmal AF, characterized by short-term spontaneous episodes within a seven-day period, is challenging via routine ECG evaluation. In instances where patients are not thoroughly examined, paroxysmal AF may be mistakenly identified as cryptogenic stroke¹³.

In the present study, 72.9% of cases were reported in males, indicating a higher prevalence among this gender. Additionally, cases were found to be more prevalent in the advanced age group compared to younger age groups, with the mean age of patients recorded as 46.38 ± 6.13 years.

In another study conducted by Khalid et al¹⁴, it was found that 60% of cases were reported in males, with a higher prevalence observed in the advanced age group compared to younger age groups.

Hypertension was the most common family history of the study patients observed in 47.9% of participants, followed by stroke

16.7%, diabetes 10.4% and ischemic heart disease 10.4%. Mutual risk factors for paroxysmal AF and stroke, including hypertension, age, diabetes mellitus, tobacco use, valvular heart disease, male gender, coronary heart disease, sleep apnea, inflammatory disorders, heart failure, and chronic kidney disease, have been identified by Kamel et al¹⁵. These factors play a significant role in the association between stroke and paroxysmal AF.

Stegmann et al¹⁶ concluded that constant monitoring, facilitated by implanted loop recording devices, could identify paroxysmal atrial fibrillation in approximately one quarter of cases, emphasizing the necessity for developing an algorithm to select appropriate cases and detect progressive cardiac rhythm due to limitations in providing intensive monitoring to all stroke cases.

In their respective studies, Shibazaki et al¹⁷ and Schuchert et al¹⁸ reported detection rates of 2.2% and 1.2% for the condition under investigation. Shibazaki et al.'s study provided important information into the prevalence of the condition within a specific cohort, while Schuchert et al.'s study focused on an outpatient setting, yielding a slightly lower detection rate. However, the current large-scale population-based research aligns with these previous findings, corroborating the prevalence rates reported by both studies.

Results from Alhadramy et al¹⁹ stroke unit-based study, encompassing 426 patients, revealed a detection rate of 9.2%, contrasting with the primary care-based population in this study. Additionally, Manina et al²⁰ research utilizing a 24-hour Holter upon admission for CVA or TIA cases reported a notably higher detection rate, indicating the potential applicability of this method in immediate stroke care settings.

Afzal et al²¹ conducted a meta-analysis focused on the detection of atrial fibrillation (AF) following cryptogenic stroke, revealing a detection rate of 13.3% through the utilization of wearable devices. These devices were employed for a median duration of 21 days, allowing for a comprehensive assessment of AF occurrence post-stroke within the studied population.

5. CONCLUSION

The 24-hour Holter monitoring method exhibits a low detection rate for atrial fibrillation/flutter (AF/AFL), but it is more likely to detect AF in individuals of advanced age, as well as those with hypertension, stroke symptoms, or diabetes.

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