ORIGINAL ARTICLE

FREQUENCY OF ATRIAL FIBRILLATION IN PATIENTS ADMITTED WITH COVID-19 INFECTION IN A TERTIARY CARE HOSPITAL

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ABSTRACT

OBJECTIVE: To determine the frequency of atrial fibrillation in patients with COVID-19 infection admitted to a tertiary care hospital.

MATERIALS AND METHODS: This cross-sectional study was conducted from September 2021 to March 2022 at the Department of Cardiology, Khyber Teaching Hospital, Peshawar, Pakistan. Using a non-probability consecutive sampling technique, patients of both genders aged 18 to 70 years who tested PCR-positive for COVID-19 infection with atrial fibrillation (AF) were selected. Patients with a previous history of AF, thyroid disorders, or other cardiac diseases (ischemic or congenital heart disease, infective endocarditis, or heart failure) were excluded from the study. A total of 181 patients meeting the inclusion criteria were enrolled. Baseline information, including age, gender, BMI, and disease duration, was recorded. A detailed medical history was obtained, followed by a clinical examination. Special attention was given to the pulse. A heart rate of more than 100 beats per minute and an irregular rhythm were noted. Atrial fibrillation was confirmed using a 12-lead ECG. Data were recorded in a specially designed proforma. All patients were treated according to hospital protocols.

RESULTS: A total of 181 patients were enrolled, including 113 males (62.4%) and 68 females (37.6%). The mean age of the patients was 52.80 ± 5.245 years. The mean weight of the patients was 75.22 ± 7.101 kg, and the mean BMI was 24.822 ± 2.7423 kg/m^2. The mean disease duration was 5.07 ± 1.029 days, with 93 patients (51.4%) having a disease duration of five days or more. Atrial fibrillation was observed in 57 patients (31.5%). Stratification of atrial fibrillation with respect to age, gender, BMI, and disease duration was performed. There was no significant difference among the stratified groups except for the age of the patients.

CONCLUSION: Atrial fibrillation is a frequent arrhythmic complication in patients with COVID-19. Elderly patients are more likely to develop it.

KEYWORDS: COVID-19 infection, Arrhythmias, Atrial fibrillation (AF)

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INTRODUCTION

Coronavirus disease 2019 (COVID-19), caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has rapidly evolved into one of the most devastating pandemics in modern medical history. Since its emergence in Wuhan, China, in late 2019. [1] It has affected virtually every country, resulting in extensive global morbidity and mortality. [2] As of 2025, millions have died, and countless others continue to struggle with its long-term consequences. The exact treatment remains largely unknown, and vaccination is considered the safest option to improve morbidity and prevent worse outcomes. [3]

While COVID-19 is primarily considered a respiratory illness, it has become increasingly clear that it affects multiple organ systems, particularly the cardiovascular system. Cardiovascular complications such as myocarditis, myocardial infarction, thromboembolism, and a variety of arrhythmias have been commonly reported, especially in hospitalized patients. Among these, atrial fibrillation (AF) stands out as the most frequent arrhythmia, raising concern among clinicians due to its association with significant morbidity, including stroke and heart failure. [4]

The mechanisms responsible for AF in the context of COVID-19 are multifactorial. These include direct viral invasion of myocardial cells, systemic inflammation, hypoxia, electrolyte disturbances, endothelial dysfunction, and sympathetic overactivation. [5] Additionally, the use of certain medications such as corticosteroids and antiviral agents may further exacerbate the pro-arrhythmic environ-

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ment. Numerous studies have demonstrated that patients with pre-existing cardiovascular disease are at greater risk of adverse outcomes when infected with SARS-CoV-2. However, even patients without prior cardiac history have shown a tendency to develop de novo cardiac complications, including AF. It is critical to recognize such arrhythmias early, as they often precede or coincide with hemodynamic deterioration.

Furthermore, recent data suggest that the presence of AF in COVID-19 patients is linked to a worse prognosis. [6] Studies have shown that mortality, thromboembolic events, and sepsis rates are higher among patients with cardiac disease than in those without. [7] Another study conducted by Sanz AP et al. demonstrated that the prognosis is poor in COVID-19 patients with atrial fibrillation. [8] AF with COVID-19 has increased incidence of intensive care unit (ICU) admission, thromboembolic events, and mortality. Given this association, it becomes essential to monitor hospitalized patients carefully for signs of arrhythmia, particularly those in high-risk groups.

Despite the global interest, limited research has been carried out in South Asia, and specifically in Pakistan, regarding the prevalence and clinical significance of AF in COVID-19 patients. This study was thus designed to provide local data on the burden of this potentially fatal complication. The findings could help guide early diagnostic strategies, such as routine ECG screening, and influence clinical management protocols for COVID-19 patients

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted from September 17, 2021, to March 17, 2022, at the Department of Cardiology, Khyber Teaching Hospital, Peshawar, Pakistan, a tertiary care referral center catering to a diverse population. Assuming an AF frequency of 36% and taking a margin of error of 7% with a confidence level of 95%, the calculated sample size was 181. [12] Using a non-probability consecutive sampling technique, patients of both genders aged 18 to 70 years, who tested positive for COVID-19 via PCR and presented with atrial fibrillation (AF), were included in the study. Exclusion criteria encompassed a known history of atrial fibrillation, thyroid disorders (hyperthyroidism or hypothyroidism), and pre-existing cardiac conditions, including ischemic heart disease, congenital heart disease, infective endocarditis, and overt heart failure.

A total of 181 patients who met the inclusion criteria were enrolled in the study. After obtaining informed consent, demographic data such as age, gender, weight, height, and BMI were recorded. The duration of COVID-19-related symptoms before hospital admission was noted, and patients were categorized based on symptom duration (less than five days vs. five days or more). A thorough history and clinical examination were performed with a specific focus on cardiovascular status. Pulse assessment included rhythm regularity and heart rate; patients with a pulse rate exceeding 100 beats per minute and irregular rhythm were further investigated. Atrial fibrillation was confirmed using a standard 12-lead electrocardiogram (ECG), interpreted by experienced cardiologists. All patients were managed according to the existing hospital protocols for COVID-19 and cardiovascular complications. The ECG findings and patient information were documented using a structured data collection tool designed specifically for this study.

Data was analyzed using IBM SPSS version 23. Mean and standard deviation were computed for quantitative variables, including age, BMI, and disease duration. Frequency and percentages were calculated for qualitative variables, including gender and the presence of AF. Data were stratified according to the presence or absence of AF based on factors such as age, gender, BMI, and disease duration. A post-stratification chi-square test was applied, and a p-value ≤ 0.05 was considered statistically significant.

RESULTS

Out of the 181 patients enrolled, 113 were male (62.4%) and 68 were female (37.6%). The mean age of the participants was 52.80 ± 5.245 years, indicating a middle-aged population. Stratification by age revealed that 73 patients (40.3%) were 40 years or younger, while 108 patients (59.7%) were older than 40 years.

The average weight recorded was 75.22 ± 7.101 kg, and the mean BMI was calculated to be 24.822 ± 2.7423 kg/m^2. Based on BMI, 95 patients (52.5%) had a BMI ≤23 kg/m^2, while 86 patients (47.5%) had a BMI >23 kg/m^2. Regarding the duration of illness, 93 patients (51.4%) had symptoms lasting five days or longer before presenting to the hospital, while 88 patients (48.6%) presented within the first five days of symptom onset.

Atrial fibrillation was identified in 57 patients, accounting for 31.5% of the total cohort. Among these, a

Table No 1: STRATIFICATION OF ATRIAL FIBRILLATION WITH RESPECT TO AGE, GENDER, BMI, AND DISEASE DURATION

		ATRIAL FIBRILLATION		Total	p-value
		Yes	No		
AGE (years)	<40	16 (21.9%)	57 (78.1%)	73 (100.0%)	0.041
	>40	41 (37.9%)	67 (62.1%)	108 (100.0%)	
GENDER	MALE	39 (34.5%)	74 (65.5%)	113 (100.0%)	0.074
	FEMALE	18 (26.5%)	50(73.5%)	68 (100.0%)	
BMI	≤23	30 (31.6%)	65 (68.4%)	95 (100.0%)	0.912
	>23	27 (31.4%)	59 (68.6%)	86 (100.0%)	
DISEASE DURATION	≥5	60 (64.5%)	93 (100.0%)		0.098
	<5	64 (72.7%)	88 (100.0%)		

higher proportion of AF was observed in patients older than 40 years, with a statistically significant association ($p = 0.041$). No statistically significant associations were found between AF and gender ($p = 0.074$), BMI ($p = 0.912$), or symptom duration ($p = 0.098$), although there was a trend toward increased AF in patients with longer symptom duration. Stratification of AF with respect to age, gender, BMI, and disease duration is shown in Tables 1.

DISCUSSION

This study adds valuable data to the growing body of evidence concerning cardiac complications of COVID-19, especially atrial fibrillation. We found a 31.5% prevalence of AF in hospitalized COVID-19 patients. Another local study reported a 13.6% prevalence. [9]

Our findings are higher than what has been reported in international studies. For instance, a large retrospective study conducted by Daniel R. Musikantow et al. reported an AF incidence of approximately 10% in over 3,900 COVID-19-positive individuals. [10] Similarly, a meta-analysis by Zumel Li et al. found a pooled prevalence of 11% across 19 studies. [11] RM Iciardi et al. reported that among hospitalized COVID-19 patients with cardiovascular diseases and terminal illness, AF prevalence was as high as 36%. [12] G. Onder et al. found a 24.5% prevalence of AF in COVID-19 patients who succumbed to the disease. [13]

The disparity between our findings and international data may be due to several factors. First, our study was conducted in a tertiary cardiology unit, where patients admitted typically have more severe or complicated disease. It is possible that many of the enrolled patients had subtle underlying cardiac abnormalities that had not been previously diagnosed. Furthermore, patients presenting with severe COVID-19 symptoms were more likely to be admitted to the hospital, meaning our sample may have been biased toward a sicker population. It is important to note that many COVID-19 patients were managed as outpatients, and these cases were not included in our study as well as other studies. For this reason, the prevalence of AF in our study, as well as in many international studies, may not represent the true population-level prevalence of AF in COVID-19. [1] Another possible explanation is the timing of hospital presentation. Many patients in our region delayed seeking medical care due to fear of isolation, lack of awareness, or limited access to health facilities during the pandemic. Consequently, by the time of admission, many were already in advanced stages of illness, with widespread systemic inflammation and cardiac stress—both of which are known to predispose to arrhythmia.

Age emerged as the only statistically significant factor associated with the presence of AF in our study. This finding aligns with established knowledge, as aging is a known risk factor for atrial remodeling and increased arrhythmogenic potential. [15, 16] Elderly patients tend to have diminished physiological reserve and are more susceptible to the combined effects of viral infection, inflammation, and hypoxia, leading to arrhythmias. Other variables, including gender, BMI, and disease duration, were not significantly associated with AF. However, it is worth noting that a trend toward higher AF prevalence was seen in males and in those with longer symptom duration. Larger studies may be able to confirm or refute these trends with greater statistical power.

Previous research has indicated that respiratory illnesses such as SARS, viral pneumonia, and sepsis are associated with an increased risk of AF. [17, 18] Given that AF prevalence in COVID-19 is comparable to other viral pneumonias, it is likely that AF in COVID-19 is a general myocardial inflammatory response rather than a spe-

cific complication of a single disease. Several proposed mechanisms support this, including: Cytokine Storm with Elevated levels of pro-inflammatory cytokines, such as IL-6 and TNF-a, may lead to myocardial inflammation and fibrosis. Electrolyte Imbalances, hypoxia, and medication effects (such as azithromycin and some antivirals) may result in disturbances in potassium, magnesium, and calcium levels, often observed in severe COVID-19, may promote arrhythmogenesis.

Although studies have suggested that inflammatory markers such as IL-4, CRP, D-dimers, and troponins, along with steroid therapy, may play a role in atrial fibrillation development. However, our study did not evaluate these factors, as it was beyond our research objectives. [19]

Our findings also highlight a need for increased collaboration between infectious disease specialists and cardiologists during pandemics. Integrating cardiac assessments into routine COVID-19 care protocols may improve early detection of complications and ultimately reduce morbidity and mortality.

The study was conducted at only one tertiary care hospital, which may limit the generalizability of the findings to other settings, especially non-tertiary or rural hospitals. Being a cross-sectional study, it cannot establish a causal relationship between COVID-19 infection and the onset of atrial fibrillation (AF). The use of non-probability consecutive sampling may introduce selection bias, as only those patients who were admitted and met the inclusion criteria during the study period were included. By excluding patients with a known history of AF, thyroid disorders, or other cardiac diseases, the study may have underestimated the total burden of AF in all COVID-19 patients, particularly those with complex medical histories. The study did not assess clinical outcomes associated with AF, such as ICU admission, mortality, stroke, or thromboembolic events, limiting its prognostic relevance.

CONCLUSIONS

The findings of this study indicate that atrial fibrillation is a relatively common cardiovascular complication in hospitalized COVID-19 patients, with a higher prevalence in middle-aged individuals. The high incidence of AF highlights the importance of early cardiovascular monitoring in COVID-19 patients, especially through ECG screening. Identifying AF at an early stage can help optimize treatment strategies, potentially improving patient outcomes and reducing the risk of complications such as thromboembolism and stroke.

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Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Sharif MA	✓	✓	×	×	✓	×
Faheem M	✓	✓	×	✓	✓	×
Ahmad F	✓	✓	×	×	✓	×
Ashraf A	✓	✓	×	✓	✓	×
Shah SS	✓	✓	×	✓	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

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