



A COMPREHENSIVE ANALYSIS OF CARDIAC ARRHYTHMIAS (ATRIAL FIBRILLATION AND TACHYCARDIA): A MEDICAL CAMP SURVEY IN INDIA

Cardiology

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ABSTRACT

Background: Cardiovascular diseases (CVD) account for the majority of non-communicable diseases among the Indian population. Improved detection methods and early diagnosis are crucial in cardiac arrhythmias including tachycardia and atrial fibrillation. This study examined individuals at a medical camp to determine the heart rate and the occurrence of cardiac arrhythmias. **Methods:** This population-based, cross-sectional, multidisciplinary study was conducted in 80 centers across India. Data regarding heart rate was collected from individuals attending medical camp using the Omron Complete Blood Pressure Monitor + EKG Model BP7900. The collected data was analyzed using the reports generated by the device and categorized into normal heart rate, tachycardia, and possible atrial fibrillation (AF). **Results:** A total of 1500 individuals were analyzed, of which 77.5% individuals presented with normal heart rate, followed by 15.3% individuals with tachycardia, and 2.3% with possible atrial fibrillation. The mean (SD) normal heart rate, tachycardia and AF were 85.3 (11.7) bpm, 101.1 (13.6) bpm, and 85.9 (14.3) bpm respectively. Among analyzed individuals, (men; n=603 and women; n=264) majority of men and women presented with normal heart rate (77.9% and 79.2%), followed by tachycardia (13.8% and 16.3%), and atrial fibrillation (3.5% and 1.1%) respectively. **Conclusion:** Most of the analyzed population had a normal heart rate, followed by tachycardia. Men had a higher prevalence of cardiac arrhythmias (tachycardia and AF) than women. Individuals were advised to seek an early diagnosis to avoid future cardiovascular complications.

KEYWORDS

Cardiac arrhythmias, tachycardia, atrial fibrillation, early diagnosis

INTRODUCTION

Cardiovascular diseases (CVD) are the major cause of mortality in India (282 deaths per 1,00,000) as compared to the global level (233 deaths per 1,00,000) [1]. Early screening and diagnosis of CVD are crucial in identifying high-risk cases and developing preventive strategies for reducing mortality rates worldwide [2].

Tachycardia (atrial or ventricular rate of >100 beats per minute [bpm]) being one of the risk factors for CVD, is classified as supraventricular tachycardia; sinus tachycardia; atrial flutter; atrial fibrillation; and junctional tachycardia [3]. Any form of persistent tachycardia, especially, ventricular, and/or supraventricular, leads to tachycardia-mediated cardiomyopathy (TMC) resulting in heart failure and death [3,4]. Although the etiology, clinical characteristics, and pathophysiology of TMC are less understood, more research is needed to assess the importance of early diagnosis, prevention, and long-term management of TMC to reduce the risk of heart failure and sudden death [3].

The most common tachycardias are ventricular tachyarrhythmias and atrial fibrillation (AF), which are also the most important cardiac arrhythmias [5]. Among these, AF is one of the most prevalent cardiac arrhythmias with stroke as a major risk factor (~fivefold risk) contributing to increased cardiovascular and all-cause mortality [6-9]. The real-life global survey evaluating patients with atrial fibrillation (REALISE-AF) registry, India revealed that most common comorbidities associated with AF were hypertension (50.8%), history of valvular heart disease (40.7%), and diabetes (20.4%) [10]. The clinical manifestation of AF varies with type and severity of symptoms, which are associated with tachycardia and other complications viz. arterial embolism and heart failure [11]. Since the signs of atrial fibrillation are non-specific or missing, the diagnosis is often delayed until the advanced phase [12]. The AF related morbidity can be effectively prevented and controlled by early diagnosis and an adequate treatment option [11]. Currently, the management of AF comprises evaluation of thromboembolic risk and stroke prevention, management of symptoms through suitable rate-control or rhythm-control methods, and treating concurrent diseases [7].

This study aims to evaluate the variations in heart rate of individuals attending medical camp with focus on both normal sinus rhythm and cardiac arrhythmias such as tachycardia and atrial fibrillation.

METHODS

Study Design And Outcomes

This population-based, cross-sectional, multidisciplinary study was conducted in 80 centers across India. Data was collected from the individuals of either sex, visiting the medical camp. Heart rate was captured using the Omron Complete Blood Pressure Monitor + EKG Model BP7900. Data related to heart rate was recorded, analyzed based on the reports generated by the device, and categorized into normal heart rate, tachycardia, and possible atrial fibrillation.

Statistical Methodology

Data analysis was performed using the statistical package of social sciences (SPSS, version 23.0). Qualitative variables were represented as numbers and percentage while quantitative data was presented as mean and standard deviation (SD). Categorical variables were compared between men and women using the chi-square test. The p-value <0.05 was considered as statistically significant.

RESULTS

A total of 1500 individuals were analyzed, of which, 77.5% (n=1162) individuals showed normal heart rate between 60 to 100 bpm; 15.3% (n=229) individuals showed tachycardia (>100 bpm), and 2.3% (n=35) individuals showed possible atrial fibrillation. Around 5% (n=74) individuals showed unclassified readings. The mean (SD) heart rate was 85.3 (11.7) beats per minute (bpm) in individuals with normal heart rate, 101.1 (13.6) bpm in individuals with tachycardia, and 85.9 (14.3) bpm in individuals with possible atrial fibrillation (Table 1).

Total 603 men and 264 women were analyzed. Among 603 men, the majority (77.9%; n=470) of men showed normal heart rate, followed by 13.8% (n=83) and 3.5% (n=21) with tachycardia and possible atrial fibrillation, respectively. However, among 264 analyzed women, the majority (79.2%; n=209) showed normal heart rate, followed by tachycardia (16.3%; n=43) and atrial fibrillation (1.1%; n=3), respectively. The heart rates between men and women were comparable (Table 2).

Table 1: Analysis Of Heart Rate

Parameter	Normal	Tachycardia	Possible atrial fibrillation	Unclassified
Individuals	1162 (77.5)	229 (15.3)	35 (2.3)	74 (4.9)
Heart rate (bpm), mean (SD)	85.3 (11.7)	101.1 (13.6)	85.9 (14.3)	90.7 (20.6)

Data presented as n (%) unless otherwise specified.

Table 2: Comparison Of Heart Rate

Parameters	Men (N=603)	Women (N=264)	p-value
Normal	470 (77.9)	209 (79.2)	0.150
Possible atrial fibrillation	21 (3.5)	3 (1.1)	
Tachycardia	83 (13.8)	43 (16.3)	
Unclassified	29 (4.8)	9 (3.4)	

Data presented as n (%)

DISCUSSION

A systematic analysis of heart rate trends in a heterogeneous population attending medical camp was performed to understand normal sinus rhythms along with cardiac arrhythmias such as tachycardia and atrial fibrillation. The key finding revealed that the majority of individuals exhibited a normal heart rate (77.5%), followed by tachycardia (15.3%). Moreover, gender-based analyses revealed, both men and women exhibit normal heart rate (77.9% and 79.2%), followed by tachycardia (13.8% and 16.3%) and atrial fibrillation (3.5% and 1.1%). Men showed higher prevalence of atrial fibrillation as compared to women.

Heart rate analysis of 1500 individuals revealed that 77.5% exhibit normal heart rate, followed by 15.3% individuals with tachycardia and 2.3% individuals with possible atrial fibrillation. Agarwal S. et al. reported 13.5% of individuals develop AF with an average follow-up of 19 years and heart rate of <60 bpm was associated with an increased risk of AF [13]. The mean (SD) heart rate in our study was 85.3 (11.7) bpm in individuals with normal heart rate. The result was consistent with the BEAT study survey from India in which 3743 young hypertensives had an average resting HR of 82.8 (10.4) bpm [14]. The mean (SD) heart rate in healthy individuals was recorded as 81.6 (14.0) bpm (18-20 years), which was significantly decreased to 74.2 (12.7) bpm in aged individuals (71-80 years) [15]. This study also reported that individuals with medical conditions showed higher mean heart rate as compared to those without any medical condition after adjusting age; where the maximum difference was observed in individuals with diabetes (82.6[14.1] bpm vs. 78.3[14.5] bpm) and chronic obstructive pulmonary disease (82.5[13.9] bpm vs. 78.3[14.5]).

The mean (SD) heart rate in individuals with tachycardia was found to be 101.1 (13.6) bpm in present study. The result was consistent with previous results where the mean (SD) heart rate was reported as 105 (2.0) bpm in supine and 125 (11.0) bpm in the up-right position in individuals with inappropriate sinus tachycardia (IST) [16]. Dalal et al., proposed that heart rate (HR) can be considered as a prognostic marker as each 10 bpm increase in resting HR can substantially increase the risk of adverse CV and mortality outcomes. He further reported that with increasing age, the frequency of first transient tachycardia increased linearly, from 3.7% in patients between 25 and 29 years to 6.6% in patients between 50 and 54 years [17]. The presentation of AF can range from asymptomatic to serious complications such as cardiogenic shock and ischemic stroke. On examination, these individuals can be tachycardic along with irregularly irregular pulse with heart rate in between 110 bpm to 140 bpm [18]. The present study reported mean (SD) heart rate of 85.9 (14.3) bpm in individuals with possible atrial fibrillation.

Gender-based analysis revealed that out of 603 men and 264 women, the majority of individuals had a normal heart rate (77.9% for men and 79.2% for women). However, 13.8% of men and 16.3% of women presented with tachycardia, while 3.5% of men and 1.1% of women had possible atrial fibrillation. The prevalence of atrial fibrillation was found to be comparably higher in men than in women. Similar results were reported by Khachab et al., where prevalence of AF was higher in men as compared to women (59% vs. 37%) [19]. Contradictory results were shown by Singh et al., where atrial fibrillation was reported in 65.4% of females (n=72) and 34.5% of males (n=38) [20].

Although the study elucidated subtle variations in the heart rate dynamics across genders, it is also necessary to use state-of-the-art monitoring technologies and advanced analytical techniques to measure heart rates. Currently, in the case of AF, the gold standard for the diagnosis is the examination of ECG since irregular pulses generate erroneous findings [8]. Early detection and treatment of irregular heart rates are critical to avoid serious cardiovascular events.

The study had several limitations. First, the data was acquired from a

medical camp where heart rate was monitored by measuring pulse rate, therefore deviation is conceivable. Data on age, comorbidities, and other risk factors would have significantly improved the existing results. The study solely evaluates outcomes from a particular medical camp, therefore the association with the overall population is limited.]

CONCLUSION

Most of the individuals in the analyzed population had a normal heart rate followed by tachycardia. Men had a higher prevalence of cardiac arrhythmias (AF) than women. State-of-the-art monitoring technologies must be used in conjunction with accurate and timely diagnosis of cardiac arrhythmias to reduce the risk of future consequences.

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Conflict Of Interest: Dr. Amit Gupta and Dr. Shweta Ghatge are employees of USV Pvt. Ltd. All other authors have nothing to disclose.

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