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Prevalence of Arrhythmias in Indian Elderly Population Aged Above 65 years - A Retrospective Observational Study

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Abstract

Background:

Arrhythmia can affect individuals of any age, though it is more commonly observed in older individuals, with both occurrence and frequency significantly increasing as age advances. The objective of the present study is to assess the prevalence of type of arrhythmias in older patients above 65 years with unexplained symptoms.

Method:

This is a single-center, retrospective observational study that included 1412 patients above 65 years of age. Patients who complained of puzzling symptoms were assessed for risk of arrhythmias using an ambulatory ECG monitoring solution that employs a wearable remote patient monitoring ECG patch.

Results and Discussion

A total of 1412 patients with unexplained symptoms of chest pain, weakness, palpitations etc., were included in the present analysis. Out of the 1412 patients under study, 582 patients were aged between 65-74 years, 470 patients aged between 75-84 years and 360 patients aged 80 and above. The majority of the patients were presented with sweating 64 (11%), 53 (11.27%) and fatigue 42 (11.6%) in age groups of 64-74, 75-84 and ≥ 85 years respectively. Diabetes and hypertension were the major comorbidities among the three patient groups included in the study. Atrial tachycardia was prominently observed in 236 patients, 193 patients and 28 patients in the age group of 65-74 years ,75-84 and ≥ 85 years age groups respectively.

Conclusion

Authors concluded that the prevalence of arrhythmias was appropriately assessed in the geriatric population who presented themselves with puzzling symptoms. The study also ascertained that ambulatory ECG monitoring using a wearable ECG patch can be a promising diagnostic technique in assessing the risk of arrhythmias in vulnerable patients.

Keywords: Arrhythmias, Remote patient monitoring, Unexplained symptoms, Geriatrics

Introduction

The medical term for arrhythmia is abnormal cardiac rhythm disease. Each year, millions of individuals are impacted by this condition, which is one of the main causes of sickness and mortality globally. According to the WHO, cardiovascular illnesses, including arrhythmia, cause 17.9 million deaths annually. Arrhythmia can strike anybody at any age, although older persons are more likely to experience it than younger ones, with both incidence and frequency rising sharply with advancing years. In actuality, it is predicted that up to 60% of seniors have some sort of arrhythmia. [1]

The greatest burden on healthcare systems worldwide is caused by cardiovascular disease (CVD); not only do CVDs cost more and more to cure, but their incidence is also rising as a result of our sedentary lifestyle in the modern world [2]. Nearly nine million fatalities worldwide each year are attributable to ischemic heart disorders (IHDs), including myocardial infarction (MI) [3]. IHDs are also the major cause of CVD-related mortality in the United States. Smoking and other tobacco use, diabetes, cerebrovascular disorders, hypertension (HTN), conduction abnormalities, and other comorbidities are frequently made worse by IHDs, which increases morbidity and mortality. [4]

The most serious side effect of IHD is acute myocardial infarction (AMI). Whether pharmacological or radiological, immediate intervention is necessary for almost all AMIs. Survival rates for AMI have significantly increased because to early identification and intervention using developing technology such temporary pacemakers or percutaneous coronary intervention (PCI) [5].

The death rates for AMI have remained constant over the past ten years, despite the best management practices and the introduction of ground-breaking therapies [6]. Although death rates may have peaked, some AMI-related factors or consequences can still cause considerable morbidity and mortality, which may have contributed to the plateau in recent data [7].

One such factor resulting in worse outcomes is AMI associated with arrhythmia(s); previously published data have conclusively proven that AMI associated or complicated with any arrhythmia leads to increased mortality even with early detection and intervention when compared to AMI without arrhythmia [8]. Furthermore, the type of arrhythmia and the level at which dissociation occurs between atrial and ventricular rhythm can significantly determine eventual outcomes [9].

Arrhythmias are linked to severe morbidity and mortality in older individuals, as well as a higher risk of heart failure, stroke, and sudden cardiac death [10]. Additionally, this population's ongoing medication use, surgical issues, polypharmacy, cognitive impairment, frailty, and weakened immune system can all complicate the diagnosis and management of arrhythmias.

Arrhythmias in older adults are associated with significant morbidity and mortality, including an increased risk of stroke, heart failure, and sudden cardiac death [11]. Furthermore, the management of arrhythmias in this population is often complicated by factors such as continuous usage of drugs, surgical complications, polypharmacy, cognitive impairment, and frailty, week immune system which can make treatment challenging [12].

The diagnosis of arrhythmia in older adults can be challenging, as these individuals often have multiple comorbidities that can complicate the clinical picture. The use of electrocardiography (ECG) is the primary diagnostic tool for arrhythmia, but it’s difficult to monitor older patients with bulky conventional Holter for ECG with multiple wires which can offer discomfort to the patient. The conventional holters may provide more noise due to wires, cumbersome design, and ultimately results in less analysable data and diagnostic yield. diagnostic modalities, such as ambulatory ECG monitoring and event monitoring, may

be necessary to diagnose arrhythmias that occur infrequently. How ever, loop recorders require invasive procedures.

The wearable wireless biosensors integrated with digital technologies able communicate with Bluetooth might offer ambulatory monitoring for extended period with real time data acquisition. The use of IoT based AI engines for data capturing and analysis would be helpful for the fast delivery of error free reports. The use patient monitoring solutions with wearable biosensors with at most patient comfort and clinical actionable reports might be helpful to monitor older aged population for arrhythmia detection and treatment planning. [13].

Materials & Methods

Study design and Participants: This single-Centre, retrospective study involving 1412 geriatric patients with complaints of palpitations, profuse sweating, unexplained chest pain, syncope, dizziness and weakness in the cardiology department of Jayadeva Institute of Cardiovascular Science and Research between January 2023 to June 2023 were considered for remote patient monitoring for the assessment of risk of arrhythmia using VigoHeart Ambulatory ECG monitoring solution. .

Participants: The eligibility of patients participating in the study was based on age of patients more than 65 years who presented with puzzling symptoms into the cardiology wing of the hospital. Patients with a history of surgery or concomitant illness and a habit of cigarette smoking and alcoholism were also included in the study.

Ethics: The study was approved by the Institutional Ethics Committee (IEC) of Jayadeva Institute of Cardiovascular Science and Research and was conducted in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Statistical Analysis: Statistical analyses were made using the statistical software SPSS (version 2.0, IBM, Chicago). Results were summarized as mean and standard deviation (SD) for quantitative data and as numbers (%) for categorical findings.

Results

A total of 1412 patients with unexplained symptoms of chest pain, weakness, palpitations etc., were included in the present analysis. Out of the 1412 studies patients, 582 patients were aged between 65-74 years, 470 patients aged between 75-84 years and 360 patients aged 80 and above. The demographic details are presented in Table 1 below. Patients presented with unexplained symptoms are tabulated in Table 2. The majority of the patients were presented with sweating 64 (11%), 53 (11.27%) and fatigue 42 (11.6%) in age groups of 64-74, 75-84 and ≥ 85 years respectively. As expected, there were several comorbidities in the selected patient population group. Diabetes and hypertension were the major comorbidity among the three patient groups included in the study. The comorbidities in individual age groups are detailed in Table 3.

Table 1: Demographic data of the subjects by age groups

Variable	65-74 years	75-84 years	≥ 85 years
N (%) 1412	582 (41.2%)	470 (33.3%)	360 (25.5%)
Mean Age (years)	70 ± 4	80 ± 3	87 ± 2
Male	205 (35%)	175 (37%)	203 (56%)
Females	377 (65%)	295 (63%)	157 (44%)
Mean weight (kgs)	67.6 ± 13.2	62.1 ± 10.4	63.8 ± 9.2

Mean Body Mass Index (kg/m^2)	28.5 ± 3.9	24.9 ± 4.2	23.8 ± 3.2

Table 2: Distribution of Symptoms of Patients included in the study

Symptoms	65-74 years	75-84 years	≥ 85 years
Chest pain	36 (6.18%)	26 (5.53%)	18 (5%)
Palpitations	42 (7.21%)	37 (7.87%)	26 (7.22%)
Syncope	26 (4.47%)	16 (3.40%)	14 (3.89%)
Anxiety	54 (9.27%)	49 (10.42%)	33 (9.17%)
Fatigue	48 (8.24%)	42 (8.94%)	42 (11.67%)
Dyspnea	36 (6.18%)	32 (6.80%)	29 (8.05%)
Light-headedness	33 (5.68%)	24 (5.10%)	19 (5.28%)
Sweating	64 (11%)	53 (11.27%)	36 (10%)

Table 3 Comorbidities in the Patient Population

Comorbidities	65-74 years	75-84 years	≥ 85 years
Hypertension	349 (60%)	320 (68%)	259 (72%)
Diabetes	361 (62%)	329 (70%)	245 (68%)
Chronic kidney disease	151 (26%)	150 (32%)	158 (44%)
Chronic obstructive pulmonary disease	140 (24%)	132 (28%)	122 (34%)
Alcohol intake	112 (19.24%)	78 (16.60%)	64 (17.78%)
Thyroid disorders	144 (24.74%)	95 (20.21%)	68 (18.89%)
Obesity	163 (28%)	116 (24.68%)	59 (16.39%)
Congenital heart defects	23 (3.95%)	14 (2.98%)	8 (2.23%)
Smoking	189 (32.47%)	126 (26.80%)	89 (24.72%)

All the included patients were analyzed for risk of arrhythmias using a VigoHeart ambulatory ECG monitoring solution and the prevalence of type of arrhythmias in different age groups is presented in Table 4. The study showed that a significant number of patients were reported with Atrial tachycardia in 236 patients, 193 patients and 28 patients in the age group of 65-74 years ,75-84 and ≥ 85 years age groups respectively.

Table 4: Prevalence of type of arrhythmias in the elderly population

Type of Arrhythmias	65-74 years	75-84 years	≥ 85 years
1st Degree Atrioventricular Block	35 (6.01%)	38 (8.08%)	4 (1.12%)
2nd Degree Atrioventricular Block - Type 1	13 (2.23%)	15 (3.19%)	6 (1.67%)
2nd Degree Atrioventricular Block - Type 2	23 (3.96%)	12 (2.56%)	4 (1.12%)
Accelerated Idio Ventricular Rhythm	38 (6.52%)	26 (5.53%)	6 (1.67%)
Advanced High Degree Atrioventricular Block	4 (0.68%)	2 (0.42%)	1 (0.28%)
Atrial Fibrillation	55 (9.45%)	35 (7.45%)	10 (2.78%)
Atrial Flutter	5 (0.86%)	1 (0.21%)	0 (0%)
Atrial Pacing Rhythm	2 (0.35%)	1 (0.21%)	0 (0%)
Atrial Tachycardia	236 (40.5%)	193 (41.06%)	28 (7.78%)
Complete Heart Block	13 (2.24%)	5 (1.06%)	2 (0.56%)

Intraventricular Conduction Delay	75 (12.89%)	60 (12.76%)	9 (2.5%)
Junctional Bradycardia	3 (0.51%)	0 (0%)	0 (0%)
Junctional Rhythm	10 (1.71%)	6 (1.27%)	0 (0%)
Long QT	77 (13.23%)	58 (12.34%)	13 (3.62%)
Non-Sustained Ventricular Tachycardia	86 (14.78%)	67 (14.25%)	10 (2.78%)
Pauses	71 (12.19%)	52 (11.06%)	7 (1.95%)
Paroxysmal Supraventricular Tachycardia more than 10%	5 (0.86%)	4 (0.85%)	3 (0.83%)
Paroxysmal Supraventricular Tachycardia Run	26 (4.47%)	21 (4.46%)	3 (0.83%)
Paroxysmal Supraventricular Tachycardia	17 (2.92%)	11 (2.34%)	2 (0.56%)
Premature Ventricular Contractions more than 10%	23 (3.95%)	5 (1.06%)	0 (0%)
Second-Degree Atrioventricular Block Type II (2:1)	4 (0.69%)	5 (1.06%)	0 (0%)
Short runs of Atrial Fibrillation	6 (1.03%)	5 (1.06%)	1 (0.28%)
Sick Sinus Syndrome	3 (0.51%)	1 (0.21%)	0 (0%)
Sino Atrial Exit Block	4 (0.68%)	4 (0.85%)	0 (0%)
Sinus Bradycardia	3 (0.51%)	4 (0.85%)	0 (0%)
Supraventricular Tachycardia	5 (0.86%)	13 (2.76%)	3 (0.83%)
Tachy-Brady Syndrome	2 (0.34%)	0 (0%)	0 (0%)
Ventricular Fibrillation	2 (0.34%)	0 (0%)	0 (0%)
Ventricular Pacing Rhythm	2 (0.34%)	2 (0.42%)	1 (0.28%)
Ventricular Tachycardia	1 (0.17%)	1 (0.21%)	0 (0%)
Wolf-Parkinson-White Syndrome	1 (0.17%)	0 (0%)	0 (0%)

Discussion

Cardiovascular diseases, in particular arrhythmias, is quite prevalent in the elderly population. The average life expectancy in INDIA is 8.28 years for males and 9.73 years for women after the age of 80 [13]. As a result, it is anticipated that the prevalence of arrhythmias in adults under the age of 80 would rise, offering significant therapeutic challenges to doctors and adding financial stress to society. Sadly, studies on clinical populations under-represent adults in their eighties and even beyond. This innovative review examines the research.

An extracellular matrix volume increase in aged ventricles that is associated with left ventricular hypertrophy and fibrosis might be caused by changes in the matrix metalloproteinase/tissue inhibitor ratio. In older hearts, fibrotic alterations limit the safety margin for conduction by encouraging conduction block and re-entry when premature electrical stimulation decreases the rapid sodium current's availability. In order to promote the generation of early after depolarizations, oxidative stress, which is thought to be a separate mediator of age-related arrhythmias, decreases the repolarization reserve by raising late sodium current (INa-L), late calcium current (ICa-L), and the Na-Ca exchanger. In structurally altered hearts, the latter can cause ventricular tachycardia (VT) or ventricular fibrillation [14].

In the elderly, arrhythmias significantly reduce quality of life and increase death. Age-related increases in the occurrence of cardiac arrhythmias and abnormalities of impulse production and conduction are seen [15,16]. The frequency and impact of electrophysiological abnormalities will increase along with the aging of the US population and advancements in cardiovascular therapy for heart failure and coronary disease.

In fact, hospitalization rates among Medicare seniors for a number of common arrhythmias, such as ventricular fibrillation (VF), atrial fibrillation (AF), sinoatrial node (SAN) dysfunction, and atrial flutter, continue to rise faster than the rate of aging of the population [17,18]. The diagnosis of arrhythmia in older adults can be challenging, as these individuals often have multiple comorbidities that can complicate the clinical picture. The use of electrocardiography (ECG) is the primary diagnostic tool for arrhythmia, but it's difficult to monitor older patients with bulky conventional Holters for ECG with multiple wires which can offer discomfort to the patient. Wireless devices offer the advantages of usability, comfort, safety and increased patient compliance. The present study assessed the risk of arrhythmias in geriatric population with such an ambulatory ECG monitoring solution using a wireless ECG patch.

Limitations of the study

The current investigation, adopting a non-randomized retrospective design, possesses inherent biases and limitations. These limitations stem from the study's reliance on a retrospective analysis of data gathered from a collective pool within the cardiology department. Retrospective studies inherently entail a heightened risk of measurement bias, a risk that could be significantly mitigated through the adoption of a prospective study design. Our future strategy involves conducting a prospective randomized multicentric study to more effectively evaluate the promising outcomes of the ECG patch.

Conclusion

Single lead ECG monitoring with VigoHeart, ambulatory ECG monitoring solution using a wearable wireless patch is more convenient to use by both patients and clinicians. The present study appropriately assessed the risk of arrhythmias in geriatric population who presented themselves with puzzling symptoms. The remote patient monitoring of ECG using wearable ECG patch can be a promising technique in assessing the risk of arrhythmias vulnerable patients and can be extrapolated to other population groups.

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Data Availability: The patient data associated with this study is readily available and can be obtained from the author on written demand and justification.

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Conflict Of Interests: The authors declare no conflict of interest.

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