

# Prevalence of Arrhythmias and Risk Factors of Arrhythmias in Patients experiencing them in Azad Jammu Kashmir

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## Abstract

**Objective:** Determine the prevalence of arrhythmias in patients presenting to cardiology unit with cardiac complaints at AIMS and assess the risk factors of arrhythmias in those patients.

**Materials and Methods:** The study was conducted at Cardiology department Abbas Institute of Medical Sciences Muzaffarabad on 100 consecutive patients of both genders presented with various heart diseases. All patients presenting to cardiology unit of AIMS after confirmation of functional impairment of heart in the duration of Feb-April, 2015 were included in the study. The age of the patients ranged (Mean±SD); 18-100 (56.68±14.08) years. 43% of the subjects were male. A questionnaire was designed regarding Arrhythmias (ventricular or atrial and their further types), blood pressure, diabetes, physical activities, smoking exposure, Rheumatic heart disease, thyroid disease, Coronary artery disease (< or equal to 50% stenosis), Myocardial infarction. Body mass index, Xray findings and ECG changes were noted. Duration of study was 2 months (1 February to 3 April 2015). The data were analyzed using SPSS 16.

**Results:** Out of 100 enrolled subjects, 30% had arrhythmias, 10% of which had ventricular arrhythmias (7% ventricular tachycardia and 1% with ventricular fibrillation, and 2% with premature ventricular contraction) and 19% with atrial arrhythmias (15% with atrial fibrillation, 3% with supraventricular tachycardia, 1% with long QT interval), and 1% with complete heart block. Among the patients with arrhythmias 81% had hypertension, 32% had diabetes, 24% had high BMI, 34% had family history of coronary artery disease, 46% had MI, about 9% had Rheumatic heart disease, about 11% had smoking exposure, about 3% had thyroid disease, about 40% experienced syncope and 35% had high cholesterol.

**Conclusion:** The prevalence of arrhythmias was 30%. Hypertension and MI were among the most prevalent risk factors in the arrhythmic patients.

**Keywords:** Arrhythmias, Prevalence, risk factors

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**Contribution of Authors:** Haya Saleem planner, research conductor and writer of this research paper, Saleem Abbasi Clinically evaluated the patients, made the diagnosis and helped in writing manuscript

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## Introduction

Arrhythmia is a malfunction of heart's electrical system that causes heart to pump less effectively. All those diseases causing structural damage or functional impairment of the heart can develop arrhythmias. It is caused by abnormal automaticity, triggered activity and reentry of impulse.

Arrhythmias are classified as tachyarrhythmias and bradyarrhythmias. Tachyarrhythmias are sinus tachycardia, atrial fibrillation, atrial flutter, supraventricular tachycardia, ventricular tachycardia, ventricular fibrillation. Bradyarrhythmias are sinus bradycardia, first degree heart block, Mobitz type 1, Mobitz type 2 and complete heart block.

Atrial Fibrillation is the commonest arrhythmia that enhances the risk for heart disease and stroke. About 3 million adults in the United States have been diagnosed with atrial fibrillation.<sup>1</sup>

Sinus tachycardia is a rapid contraction of the heart in response to various factors such as drugs, or conditions, like pain, fever, hyperthyroidism, excitement, hypoxia, and the use of amphetamines. In some cases sinus tachycardia can be due to heart failure, valvular heart disease, etc

Atrial flutter is a cardiac arrhythmia characterized by atrial rates of 240-400 beats/min and some degree of atrioventricular (AV) node conduction block. For the most part, morbidity and mortality are due to complications of rate (eg, syncope and congestive heart failure [CHF]).<sup>2</sup> According to a study, it is estimated that about 200,000 new cases of atrial flutter are presented in U.S. annually. At highest risk of developing atrial flutter are men, the elderly and individuals with preexisting heart failure or chronic obstructive lung disease.<sup>3</sup>

Supraventricular tachycardia (SVT) is tachycardia in which electropathologic substrate arises above the bundle of His and causes heart rates to exceed 100 beats per minute. Persistent or recurrent accelerated rhythms can cause significant morbidity

Ventricular tachycardia refers to the heart rate greater than 100 (or 120) beats/min, with 3 or more

consecutive irregular beats, arising distal to the bundle of His. It may arise from working ventricular myocardium, the distal conduction system, or both. Ventricular tachycardia (VT) or ventricular fibrillation (VF) are most leading cause of the sudden cardiac deaths in the United States, at an estimated rate of approximately 300,000 deaths per year.<sup>2</sup>

Ventricular fibrillation is a condition in which there is uncoordinated contraction of the cardiac muscle of the ventricles in the heart reducing the efficiency of heart as a contractile pump. Ventricular fibrillation is the most fatal cardiac rhythm disturbance.

Long QT interval occurs as the result of a defect in the ion channels, causing a delay in the time it takes for the electrical system to recharge after each heartbeat. When the Q-T interval is longer than normal, it increases the risk for torsade de pointes, a life-threatening form of ventricular tachycardia

Heart block causes bradyarrhythmias. It might be congenital or acquired. It is of three types. In first-degree heart block, the heart's electrical signals are slowed as they move from the atria to the ventricles (the heart's upper and lower chambers, respectively). This results in a longer, flatter line between the P and the R waves on the EKG.

In second degree heart block, electrical signals between the atria and ventricles are slowed to a large degree. Some signals don't reach the ventricles. On an EKG, the pattern of QRS waves doesn't follow each P wave as it normally would. Second-degree heart block is divided into two types: Mobitz type I and Mobitz type II.

In Mobitz type 1 (also known as Wenckebach's block), there is a progressive delay of electrical signals, followed by a skipped beat. On the EKG, the delay is shown as a line (called the PR interval) between the P and QRS waves. The PR interval progressively increases until the QRS waves don't follow the next P wave.

In second-degree Mobitz type II heart block, there is an interruption in the transmission of some of the electrical signals to the ventricles. On an EKG, the PR interval is prolonged but constant. Sometimes, though, the QRS wave is missing when signal from atria to ventricle is blocked.

In complete heart block, none of the electrical signals reach the ventricles.. When complete heart block occurs, cardiac tissues other than the components of the conduction system begin to transmit electrical signals to cause ventricular contraction. This natural backup system is slower than the normal heart rate and atria and ventricles contract independently. On an EKG, the normal pattern is disrupted. The P waves occur at a faster rate, and it isn't coordinated with the QRS waves.

Premature ventricular contraction (PVC) is caused by an ectopic cardiac pacemaker located in the ventricle. In PVCs, QRS complexes are premature and broad i.e greater or equal to 120ms. QRS complexes are not preceded by a P wave, and the T wave is usually large, and its direction is opposite to the major QRS deflection.

There are various risk factors for arrhythmias. These are age, myocardial infarction, tobacco smoke, high blood cholesterol, high blood pressure, physical inactivity, obesity and overweight, diabetes mellitus, rheumatic heart disease, congenital diseases incompletely developed conduction system, thyroid disease, family history of coronary artery disease and alcohol consumption.<sup>4</sup> Epidemiologic data indicate that structural coronary arterial abnormalities and their consequences are the cause of 80 percent of fatal arrhythmias.<sup>5-8</sup>

This study was performed to analyze the prevalence of arrhythmias and assessment of risk factors in those patients experiencing arrhythmias in Muzaffarabad city.

## Methodology

The study was conducted at Cardiology department Abbas Institute of Medical Sciences Muzaffarabad on 100 consecutive patients of both genders presented with various heart diseases. All patients presenting to cardiology unit of AIMS after confirmation of functional impairment of heart in the duration of Feb-April, 2015 were included in the study. The age of the patients ranged (Mean±SD); 18-100 (56.68±14.08) years. 43% of the subjects were male.

A questionnaire was designed comprising of questions regarding, Ischemic heart disease, Hypertension, Diabetes, Physical activities, smoking

exposure, Body mass index, family history of coronary artery disease, rheumatic heart disease, thyroid disease, syncope, ECG changes and Xray findings. Physical examination including height in meters and weight in kilograms were recorded. Body mass index was calculated as weight in kilograms divided by height in meter squares. Body mass index of >25 was considered as abnormal.

A 12 lead ECG was done in all those patients coming to A&E of AIMS Muzaffarabad presenting with palpitations, dyspnea, chest pain and syncope. ECG was analyzed by qualified cardiologist and diagnosis was made. Majority of these patients were admitted in CCU AIMS and serial ECGs were done before and after treatment.

Blood pressure was measured in sitting position in right arm after five minutes of rest. Patient was declared hypertensive when systolic blood pressure of more than 140 mmHg or diastolic pressure of more than 90 mmHg was recorded. Fasting blood sugar of 126mg/dl and above regarded as diabetes mellitus.

Fasting cholesterol of less than 180mg/dl was considered normal, between 180-220 mg/dl as border line normal and greater than 220mg/dl as definitely abnormal. Physical activity was assessed according to the daily activities and the profession of the subjects. Duration of study was two months. (1 February to 3 April 2015) Data were analyzed using SPSS 14.

## Results

Out of 100 enrolled subjects, 30% had arrhythmias, 10% of which had ventricular arrhythmias (7% ventricular tachycardia and 1% with ventricular fibrillation, and 2% with premature ventricular contraction) and 19% with atrial arrhythmias (15% with atrial fibrillation, 3% with supraventricular tachycardia, 1% with long QT interval), and 1% with complete heart block. (Figure 1) Among the patients with arrhythmias (Figure 2) 81% had hypertension, 32% had diabetes, 24% had high BMI, 34% had family history of coronary artery disease, 46% had MI, about 9% had Rheumatic heart disease, about 11% had smoking exposure, about 3% had thyroid disease, about 40% experienced syncope and 35% had high cholesterol.

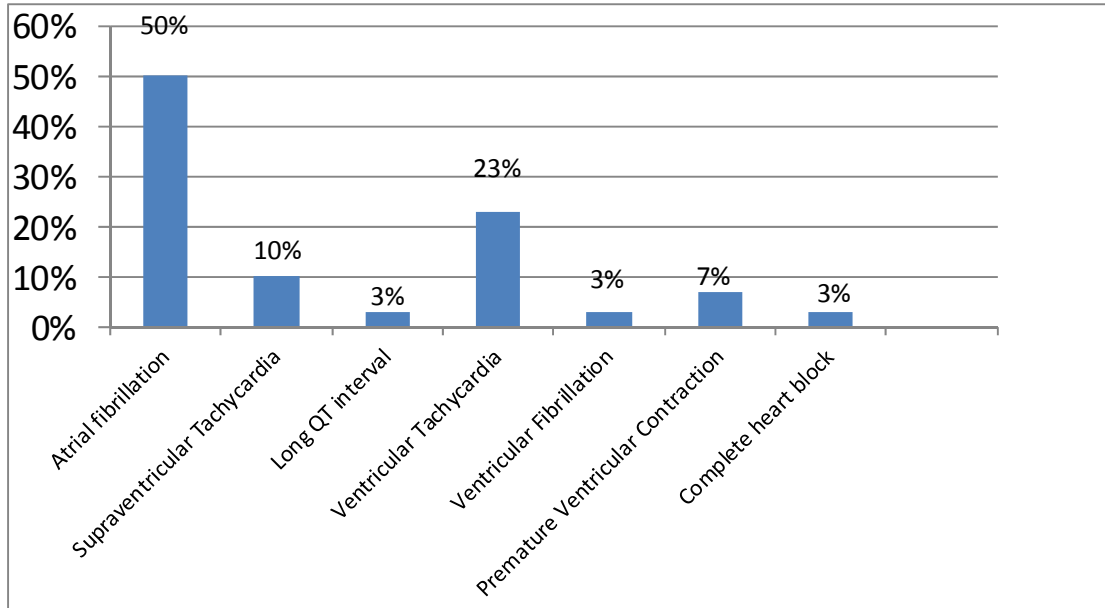


Figure 1: ????

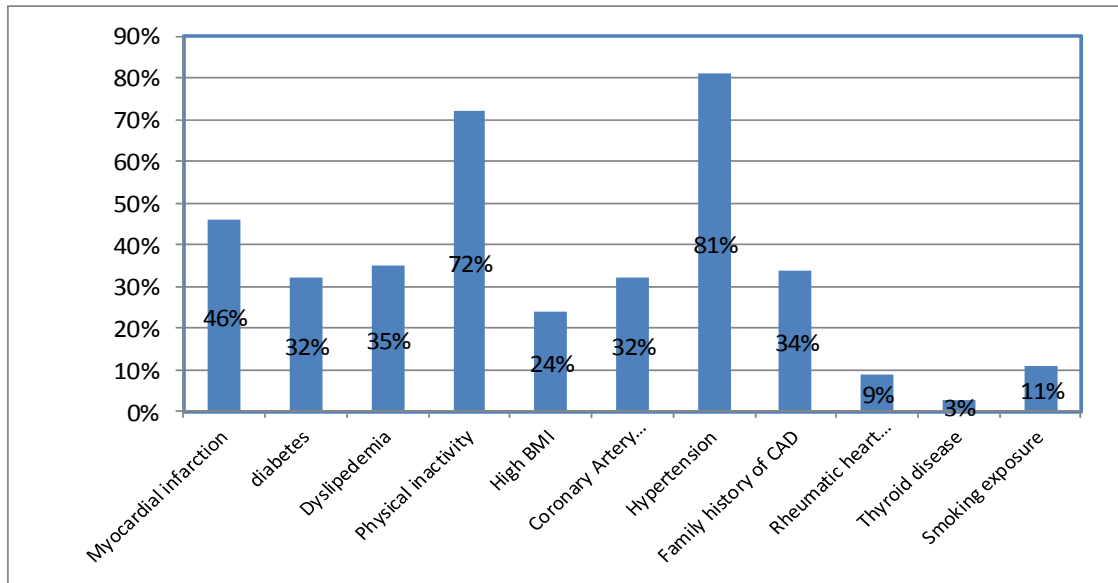


Figure 2. Risk factors in Patients with Arrhythmia

### Discussion

Arrhythmia is one of the leading cause of sudden cardiac deaths. The current annual incidence of sudden cardiac death in the US is likely to be in the range of 180,000-250,000 /year.<sup>9</sup> In the overwhelming majority of cases sudden cardiac death results from a fatal cardiac arrhythmia, either VT/VF or severe bradycardia/pulseless electrical activity.<sup>10</sup>

Atrial Fibrillation is the most common sustained heart rhythm disorder. The likelihood of developing these arrhythmias increases with age. It is the most common heart rhythm abnormality in people over the age of 65, with a median age of 75 years. Approximately 70% of Atrial Fibrillation patients are between 65 and 85 years old.<sup>11</sup> A Fib may increase the risk of blood clots and stroke, and causes 15 to 20 percent of ischemic strokes, where blood flow to the brain is blocked by clots or plaque in a blood vessel.<sup>12</sup> According to this study

atrial fibrillation came out to be the most prevalent i.e. about 50%.

The second most common risk factor came out to be ventricular tachycardia i.e. 23%. The incidence of VT in the United States is not well quantified, because of the clinical overlap of VT with VF, but examination of sudden death data provides a rough estimate of VT incidence. Most sudden cardiac deaths are caused by VT or VF, at an estimated rate of approximately 300,000 deaths per year in the United States, or about half of the estimated cardiac mortality.<sup>13</sup>

Supraventricular tachycardia came out to be in 10% of patients. According to a population-based study, the incidence of paroxysmal SVT was 35 cases per 100,000 person-years and peak incidence was in the middle age people.<sup>14</sup>

Patients with PVC were 7%. Premature ventricular contractions (PVCs) are one of the most common arrhythmias and they can occur with or without heart disease. The prevalence of PVCs varies greatly, with approximately less than 3% to more than 60% in asymptomatic individuals. Data from a population study indicates that the prevalence ranges from less than 3% for young white women without heart disease to almost 20% for older African American individuals with hypertension.<sup>2</sup>

Ventricular fibrillation in arrhythmic patients was 3%, according to this research. It is the most commonly identified arrhythmia in cardiac arrest patients.<sup>15</sup>

Long QT interval was present in 3% of patients with arrhythmia. Inherited Long QT syndrome is estimated to affect between one in 2,500 and 7,000 people.<sup>16</sup>

About 3% of patients had complete heart block. In a survey in the Exeter 282 family doctors notified 139 patients with some degrees of abnormal atrioventricular conduction. The prevalence of second-degree and third-degree heart block was estimated to be 17.3 per 100,000, of complete block past or present 15.6, and of complete block at the time of survey 13.1. Heart block was more common in men than women, the gender ratio being 1.4 to 1; its prevalence increased with age, and the morbidity rate was less than that reported by others.<sup>17-19</sup>

The most common risk factor in patients with arrhythmias came out to be hypertension i.e. 81%.

Arterial hypertension is one of the predominant causes of atrial and ventricular arrhythmias. In hypertension hypertrophy of cardiac muscle is characterized not only by increased myocardial mass, but also by proliferation of fibrous tissue and decreased intercellular coupling, that causes irregular electrical properties and increases the tendency to various arrhythmias.<sup>20</sup>

The second most common risk factor came out to be physical inactivity. Patients with ventricular tachycardia are often restricted from participating in exercise of moderate to high intensity; however, controlled levels of exercise can be maintained following medical consultation.<sup>21</sup> Although there are evidences that prove that arrhythmias can be induced by intense exercise<sup>22</sup>, still physical inactivity can cause coronary artery disease which may cause arrhythmias.

Another important risk factor for Coronary artery disease is myocardial infarction. Ventricular arrhythmias are common after MI especially in people with severe MI and with no previous history of coronary artery disease. Ventricular arrhythmia after MI was found to be associated with a 6-fold increase in mortality rate. Thus, identification of high-risk MI survivors and prevention of ventricular arrhythmias could markedly improve the outcomes<sup>(23)</sup>. About 46% patients experiencing arrhythmias had myocardial infarction.

Other factors like Dyslipidemia, smoking, diabetes, high BMI, and smoking exposure, which can increase the risk of coronary artery disease can also cause arrhythmias and they were present in significant no of patients (32% had diabetes, 24% had high BMI, 34% had family history of coronary artery disease, 35% had high cholesterol, about 11% had smoking exposure).

Other diseases like thyroid disease and rheumatic heart disease can also cause arrhythmias. Hyperthyroidism as well as hypothyroidism can cause changes in cardiac output, cardiac contractility, myocardial oxygen consumption, blood pressure, and systemic vascular resistance.<sup>24, 25</sup> Although it is well known that hyperthyroidism can predispose to atrial fibrillation, it is not well recognized that whether hypothyroidism can predispose to ventricular dysrhythmias or not.<sup>26</sup> The early recognition and

effective treatment of thyroid dysfunction in patients with arrhythmia is mandatory because the long-term prognosis of arrhythmia may be improved with the appropriate treatment of thyroid dysfunction.<sup>27</sup> In patients with rheumatoid arthritis (RA), a major cause of sudden cardiac death is atherosclerotic coronary artery disease, leading to acute coronary syndrome and ventricular arrhythmias.<sup>28</sup> About 3% of patients had thyroid disease and 9% had rheumatic heart disease.

## Conclusion

The prevalence of arrhythmias was 30%. Hypertension and physical inactivity and MI were among the most prevalent risk factors in the arrhythmic patients.

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(We belong to Allah & we shall return to Him)

**Professor Khalida Adeeb Khanam Akhtar**

People come in this world & leave. Many make no impact, some make bad impact and there are a few who make good impact. They try to uplift the humanity. These are the people who value their precious time and life as time is unit of life. They live their life to the fullest without indulging in useless activities. They are not slave to the greed and materialism. They have sensitive heart. They care and share! Professor Khalida Adeeb Khanam Akhtar was such a precious person who tried all her life to ignite the flame of handwork, honesty and research among young doctors. She used to get disappointed when she would see doctors becoming slave of greed and money. As Iqbal said:



نقش ہیں سب ناتمام خون جگر کے بغیر  
نغمہ ہے سودائے خام خون جگر کے بغیر

Professor Khalida Adeeb Khanam Akhtar had that "khoon e Jigar"; a "madness" or Janoon to achieve the best and perfect. She had that maddening love for education and research. Masjid e Qurtabah in Spain is a lasting impression made by this madness and so are zillions of great inventions by Muslim Scientists in the golden era 700-1400 that laid the very foundations of modern Sciences and medicine. When we lost that spirit we became barren; no more Ibn-e Sina, no more ar-Razi, no more Ibn-e Haytham, no more Az-Zharawi, no more al-Bairooni, al-Batni and greatest among men patrons of sciences such as Ma'moon Rashid, Mehmood Ghaznawi and Salahuddin Ayyubi!

Professor Khalida Adeeb Khanam Akhtar left us all on 16 Oct 2015. She was a person of highest caliber with extremely high moral and ethical values. Her capabilities had no match. She was a legend and shall remain so. She will always live in our souls and hearts. NEVER TO BE FORGOTTEN.

The entire profession pays highest tribute to the one and only Professor Khalida Adeeb Khanam Akhtar for the services she rendered to the profession in general and Obs/Gynae in particular. Till her death she was Editor in chief of the Journal of Society of Obstetricians and Gynaecologists and in a short span of four years had made an impact in medical journals due to her untiring efforts.

We pray that her candle may ignite many others in future. Man does not take with him worldly belongings but only deeds. Her contributions will prove for her to be Sadqah Jariah (Lasting good deeds benefitting the humanity)

**May ALLAH rest her soul in peace and give her the highest place in Paradise. Ameen**