

Research article

Assessment of Frequency and Clinical characteristics of Cardiac dysrhythmia-diagnosed patients over a period of six months in St. Paul's Hospital Millennium Medical College Adult Emergency Department, Addis Ababa Ethiopia.

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St. Paul Hospital Millennium Medical College
Post Graduate Study Program

**Assessment of Frequency and Clinical characteristics of Cardiac
dysrhythmia-diagnosed patients over a period of six months in St. Paul's
Hospital Millennium Medical College Adult Emergency Department**

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diagnosed patients over a period of six months in SPHMMC adult ED**

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**A Thesis Submitted to the Department of Emergency Medicine and Critical Care; in Partial
Fulfillment of Specialty Training; Saint Paul's Hospital Millennium Medical College**

ADDIS ABEBA, ETHIOPIA

OCTOBER, 2022

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Full title of the research project	Assessment of Frequency and Clinical characteristics of cardiac dysrhythmia-diagnosed patients over a period of six months in SPHMMC adult ED
Study period	April 01, 2022 to September 30, 2022
Study Area	Hospital Millennium Medical College Adult Emergency Department
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I have declared that, this is my original work and has never been presented in this or any other university and all the source material used for this thesis have been fully acknowledged.

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ACKNOWLEDGEMENTS

I would like to thank St. Paul's Hospital Millennium Medical College for providing me an opportunity for conducting this research.

I also would like to thank my advisors, Dr. Etsegenet Aklog (Assistant professor of Emergency Medicine and Critical Care) and Dr. Yemane Gebremedhin (Assistant professor of Emergency Medicine and Critical Care) for their encouragement, golden comments, suggestions and guidance throughout conducting this research. In addition, I would like to thank my friends for their genuine support, idea sharing and provision of materials to read on during the process of preparing this paper.

Finally, I would like to thank to those authors and researchers whom articles I have read and cited.

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List of acronyms

AF - Atrial Fibrillation
AIVR - Accelerated Idiopathic Ventricular Rhythm
AV - Atrioventricular
AVnRT - Atrioventricular nodal Reentry Tachycardia
AVRT - Atrioventricular Reentry Tachycardia
BPM - Beats Per Minute
CHF - Congestive Heart Failure
DCMP - Dilated Cardiomyopathy
DM - Diabetes Mellitus
ECG – Electrocardiogram
Echo - Echocardiography
ED - Emergency Department
ETB - Ethiopian Birr
HTN - Hypertension
ICU - Intensive Care Unit
IHD – Ischemic Heart Disease
LBBB - Left Bundle Branch Block
LVH - LVH
PR - Pulse Rate
PSVT - Paroxysmal Supraventricular Tachycardia
RBBB - Right Bundle Branch Block
SPHMMC - Saint Paul’s Hospital Millennium Medical College
SPSS - Statistical Package for the Social Sciences
SOB - Shortness of Breath

Abstract

Background: Cardiac dysrhythmias are irregularities in the heartbeat, abnormalities in the rate (too fast or too slow) or abnormalities in conduction. They are commonly encountered medical problem in emergency department and a common cause of morbidity and mortality necessitating a study on their frequency and clinical characteristics. Primary aim of this study was to assess the frequency and clinical characteristics of diagnoses of cardiac dysrhythmias in St. Paul's Hospital Millennium Medical College Adult Emergency Department over 06 months.

Methods and materials: A cross-sectional study was conducted from April 1, 2022 to September 30, 2022 in adult emergency department of SPHMMC, Addis Ababa, by reviewing the charts of 181 patient's Data, data was entered to Epi-info 7 and exported to IBM SPSS Statistics for Windows, Version 25 for analysis.

Result: A total of 181 cases were revised and among those 100 (55.2%) were female and 81(44.8%) were male. The majority of patients were above 50 years old and the mean age of participates was 54.6 ranging from 18 to 95 years. Atrial fibrillation (N=87, 46.7%) is the most common cardiac dysrhythmia followed by brady-dysrhythmia (N=36, 19.3%), conduction system disturbance (N=19, 13.1%) and PSVT (N=16, 8.4%). The commonest symptom at presentation is SOB and palpitation. Majority of patients were cardio-vascular stable. Digoxin, metoprolol and atropine were mostly used to control most of the dysrhythmias.

Conclusion and Recommendation: Cardiac dysrhythmias such as atrial fibrillation, brady-dysrhythmia and PSVTs are frequent in emergency department and hence concerned body should focus on optimizing short term such as on emphasizing antiarrhythmic medication and defibrillator use and on long term strategy such as opening cardiac center.

Keywords: Clinical, Dysrhythmia, Emergency

1. Introduction

1.1 Background

Dysrhythmia is an abnormal rhythm of the heart. The only normal rhythm of the heart is a normal sinus rhythm in which an impulse is generated in the sinoatrial (SA) node, which is conducted through and slowed down while passing through the atrioventricular node (AV). It is then conducted through the bundle of His, to bundle branches, and eventually into the Purkinje fibers. Any deviation from this conduction pathway results in arrhythmia. Arrhythmias can be classified based on different criteria. The most common way to classify them is based on the rate of conduction as bradyarrhythmia with a heart rate less than 60 beats per minute (bpm) and tachyarrhythmia with a heart rate higher than 100 beats per minute. They can also be categorized into four groups: **supraventricular tachycardias** which include atrial fibrillation, atrial flutter, paroxysmal supraventricular tachycardia and wolff-white-parkinson syndrome, **brady-dysrhythmias** (any rhythm that results in heart beat less than 60 BPM including sinus bradycardia, AV blocks or junctional bradycardia etc), **ventricular arrhythmias** and **extra beats** which include premature atrial contractions, premature ventricular contractions and premature junctional contractions. Patients with cardiac arrhythmia present with a broad spectrum of clinical presentation from being entirely asymptomatic to sudden cardiac arrest. Symptoms include palpitations, light headedness, shortness of breath, chest pain, passing out or they may present with complications such as heart failure or stroke. Dysrhythmias occur as a result of problems within the electrical conduction system of the heart. It is diagnosed with tests such as electrocardiogram (ECG) and Holter monitor.(1, 2)

Many arrhythmias can be managed effectively. Treatment may include non-pharmacological such as vagal maneuvers, pharmacological (anti-arrhythmic medications), medical procedures such as inserting a pacemaker, and surgery. Patients with severe symptoms from an arrhythmia or medically unstable may receive urgent treatment with a controlled electric shock in the form of cardioversion or defibrillation. Cardiac rhythm abnormalities are associated with significant morbidity, mortality and economic costs. The prevalence of arrhythmias is expected to be 1.5% to 5% in the general population, with atrial fibrillation being the most common.(1)

1.2 Statement of the Problem

Cardiac arrhythmia is a commonly encountered medical problem in emergency department. They have wide spectrum of clinical manifestations and if left untreated it can lead to serious complications including cardiac arrest. It is also a common cause of morbidity and mortality. Not only is a common cause of morbidity and mortality, it is also a cause of increased hospital admissions and economic burden. Cardiac arrhythmias have been reported as frequent but their incidence is unknown. Although previous studies have characterized the prevalence and incidence of selected rhythm abnormalities, including atrial fibrillation, supraventricular arrhythmias, and ventricular arrhythmias, a robust description of the overall rhythm condition profile encountered among adults is lacking.(3)

Arrhythmias are among the most complex and insufficiently studied diseases of modern cardiology(4) and although there are various types of cardiac arrhythmias, their prevalence has not been well studied in our country, Africa, as well as in other parts of the world.

In the United States, Arrhythmias directly account for more than 36,000 deaths annually and constitute the underlying or contributing cause in almost 460,000 cases.(2) 25% of all emergency department visits for supraventricular tachycardia result in hospitalization.(5)

Africa is experiencing an increasing burden of cardiac arrhythmias. Unfortunately, the expanding need for appropriate care remains largely unmet because of shortage of essential medical expertise, and the high cost of diagnostic equipment and treatment modalities. Thus, patients receive suboptimal care. One-third of the Sub-Saharan African countries do not have a single pacemaker center, and Only South Africa and several North African countries provide complete services for cardiac arrhythmias, leaving more than hundreds of millions of people in Sub-Saharan Africa without access to arrhythmia care considered standard in other parts of the world.(6)

In Ethiopia, there is no study on general cardiac arrhythmias but one community based cross-sectional study in Jimma showed that the prevalence of atrial fibrillation is 4.3%.(7)

1.3 Rationale of the Study

Cardiac dysrhythmias are a common medical problem encountered in emergency departments and their presence in various diseases combined with limited research on the topic necessitated the study of their clinical characteristics and frequency. The data will emphasize on the need for implementation of effective strategies aimed at improving the management of patients with cardiac dysrhythmias, allotment of patient care resources and hence will help in reducing hospital admissions and the economic burden associated with cardiac arrhythmia.

As I found no research on similar topic, this research will also be used as baseline data for future studies.

2 Literature Review

Khurshid, Choi et al. underwent a national prospective cohort study at UK Biobank in which 502,627 adult participants recruited over four years (2006-2010) and found that 2.35% had a baseline rhythm abnormality. The prevalence increased with age. 15,906 new rhythm abnormalities were detected during this follow-up. Among these, atrial fibrillation, brady-arrhythmias, and conduction system diseases were more common than supraventricular arrhythmias. Older age, male, hypertension, chronic kidney disease, and heart failure were associated with new rhythm abnormalities.(3)

David H. Murman et al. analyzed U.S. Emergency Department Visits for Supraventricular Tachycardia from National Hospital Ambulatory Medical Care Survey (NHAMCS) data from 1993–2003 using a four-stage probability sample of visits to different hospitals and of the 1.1 billion ED visits within the period, an estimated 555,000, or approximately 50,000 per year, were related to SVT. Most SVT patients in the ED were younger than 65 years of age, female, and white. The most common reasons for the SVT visit were increased heart rate and chest pain. Overall, 62% presented with abnormal pulsations or palpitations (including increased or irregular heartbeat).(5)

A study done in Marshfield, Wisconsin, USA on prevalence of PSVT where they reviewed 1,763 records from Marshfield Epidemiological Study Area (MESA) identified prevalent and new cases of PSVT diagnosed from July 1, 1991 until June 30, 1993 showed a prevalence of 2.25/1,000 persons and the incidence was 35/100,000 person. Other cardiovascular disease was present in 90% of males and 48% of females. Compared with patients with other cardiovascular disease, those with lone PSVT were younger had a faster PSVT heart rate were more likely to have their condition first documented in the emergency room. The onset of symptoms occurred during the childbearing years in 58% of females with lone PSVT versus 9% of females with other cardiovascular disease.(8)

Another study done from Marshfield Epidemiological Study Area (MESA) showed the prevalence of atrial flutter to be 88/100,000 person-years. Incidence rates ranged from 5/100,000 in those less than 50 years old to 587/100,000 in subjects older than 80. Atrial flutter was 2.5 times more common in men. The risk of developing atrial flutter increased 3.5 times in subjects with heart failure and 1.9 times for subjects with chronic obstructive pulmonary disease. Among those with atrial flutter, 16% were attributable to heart failure and 12% to chronic obstructive lung disease.(9)

Fingrova Z and et al. retrospectively studied the prevalence of SVT and the clinical outcome in 755 patients with pulmonary hypertension of different etiologies. The most prevalent arrhythmias were atrial fibrillation followed by atrial flutter. An excessive prevalence of SVT was found in patients with pulmonary arterial hypertension associated with congenital heart disease. Parameters significantly associated with mortality in a multivariate analysis included age, male gender, functional exercise capacity and right atrial diameter ($p < 0.05$). Neither diagnosis of SVT nor type of arrhythmia predicted mortality.(10)

Domanovits, H.et al. reviewed the medical records of patients who presented with spontaneous sustained VT and were treated in Vienna General Hospital, University of Vienna, Medical School emergency department from December 1993 to August 1998. Within a period of 57 months, 75 patients presented with sustained VT. 77% of these patients were hemodynamically stable and the rest 23% were unstable. Ischemic heart disease accounted for 76% of patients as underlying disorder. Acute myocardial infarction (AMI) was present in 21% of stable patients compared to in 65% of unstable patients. VT was terminated by electrical therapy in 51% of patients (all unstable patients and 22 stable who failed to respond to the intravenous antiarrhythmic therapy). 4% of VT terminated spontaneously, 45% VT was terminated by first-line intravenous drug therapy.(11)

Terese Lindberg et al. underwent longitudinal observational study on 6902 people above 60 years old for 06 years and found that the baseline prevalence of AF was 4.9%, and other arrhythmias including ventricular premature complexes, SVT, and supraventricular extrasystole

were seen in 8.4% of the population. A first- or second-degree AV block was found in 7.1% of the population, and there were no significant differences between men and women in baseline arrhythmia prevalence.(12)

A prospective observational study done in western United States on Cardiac arrhythmias in hospitalized patients with COVID-19 in which they followed 143 patients who were put on telemetry. The incidence and types of cardiac arrhythmias were analyzed and compared between survivors and non-survivors. Among these patients, over all in-hospital mortality was 25.2% (36/143 patients) during the period of observation. Sinus tachycardia, the most common arrhythmia (detected in 39.9% of patients), occurred more frequently in non-survivors. Premature ventricular complexes occurred in 28.7%, and non-sustained ventricular tachycardia in 15.4% of patients, with no difference between survivors and non-survivors. Sustained ventricular tachycardia and ventricular fibrillation were not frequent.(13)

Portuguese Association of Arrhythmology, Pacing and Electrophysiology (APAPE) conducted a survey in Portuguese hospitals to assess the occurrence of arrhythmias in COVID-19 patients, and their clinical characteristics. This research involved twenty hospitals which reported 692 hospitalized patients. An arrhythmic episode occurred in 11.7% of the patients. New onset arrhythmias occurred in 64% of them, 70.3% male, median age 73.5 (61-80.3) years. 79.7% of the arrhythmic episodes were associated with comorbidities, mainly hypertension. Regarding arrhythmias, atrial fibrillation or flutter accounted for 62.5%, PSVT accounted 26.6%, 7.8% sinus brady-cardia and 3.1% for ventricular tachycardia.(14)

A.S. Parwani et al. underwent a prospective observational study in which A total of 113 consecutive patients with positive PCR testing for SARS-CoV2 as well as radiographically confirmed pulmonary involvement admitted to the ICU from March to May 2020 were included and observed for a cumulative time of 2321 days. Fifty episodes of sustained atrial tachycardias, five episodes of sustained ventricular arrhythmias and thirty bradycardic events were documented.

Sustained new onset atrial arrhythmias were associated with hemodynamic deterioration in 13 cases (35.1%). Patients with new onset atrial arrhythmias were older, showed higher levels of cardiac biomarkers, and a more severe course of disease. Relevant arrhythmias are common in severely ill ICU patients with COVID-19 and are associated with worse courses of disease and require specific treatment.(15)

The Reykjavik Study, a prospective cardiovascular population study, followed 9139 men and 9773 women aged 33 to 79 years from 1967 to 1991. The prevalence of third-degree atrioventricular block in this general population was low. Third-degree atrioventricular block was found in 11 persons, seven male and four female, an overall prevalence of 0.04%. All had some underlying heart disease, which may affect the prognosis more than the heart block. Fewer subjects than expected were found to need a pacemaker.(16)

Similar study on prevalence of RBBB in the Reykjavik Study found 126 men (out of 9139) and 67 women (18912). The incidence of RBBB increased with age. RBBB had a significant relationship with hypertension, elevated fasting blood glucose, and underlying cardiovascular disease in men younger than 60 years. RBBB in women younger than 60 years is often associated with hypertension.(17)

Elsah Tegegn et al underwent a community based cross sectional study of prevalence of atrial fibrillation in 634 (>40years old) Jimma population in which they found the overall prevalence to be 4.3% and the prevalence rose steeply with advancing age in the study population.(7)

3. Objectives

3.1 General Objective:

- To assess the frequency and clinical characteristics of cardiac dysrhythmia-diagnosed patients in SPHMMC adult ED from April 01, 2022 to Sep 30, 2022

3.2 Specific objectives:

- To describe the frequency of different types of cardiac dysrhythmias at SPHMMC from April 01, 2022 to Sep 30, 2022.
- To describe the clinical characteristics of cardiac dysrhythmia at SPHMMC ED from April 01, 2022 to Sep 30, 2022.
- To describe the impact of cardiac dysrhythmias on emergency stay and outcome at SPHMMC ED from April 01, 2022 to Sep 30, 2022.

4. Methods

4.1 Study Setting:

This study was conducted in adult emergency department of Saint Paul's Hospital Millennium Medical College (SPHMMC), which is located in Addis Ababa, a capital city of Ethiopia. which is the second largest hospital in the country. The study was conducted by collecting charts of those patients with a diagnosis of any dysrhythmia from April 01, 2022 to September 30, 2022.

4.2 Study Period:

This research was conducted from April 01, 2022 to September 30, 2022.

4.3 Study Design:

An institutional based cross-sectional study over 06 months was conducted.

4.4 Study Population:

4.4.1 Source population

All adult patients visiting SPHMMC adult Emergency department during the data collection period were the source of study population.

4.5 Sampling method

All medical records with an ECG-evidenced diagnosis of dysrhythmia from April 01, 2022 to September 30, 2022 were included.

4.6 Eligibility criteria

4.6.1 Inclusion criteria

- Patients who are 18 years old and above who have ECG based diagnosis of cardiac dysrhythmia.

4.6.2 Exclusion criteria

- Those under the age of 18 years
- Patients with diagnosis of dysrhythmia but with no ECG evidence
- Sinus tachycardia

4.7 Data Collection and Procedures:

Data was collected using a structured questionnaire, in English, which was adopted from different literature developed for similar purposes, it is then reviewed to suit the local condition. All data were collected from patient's charts and SPHMMC emergency department Health Management Information System (HMIS). Necessary data was extracted by reviewing patient's chart. Three data collectors were recruited for data collection and completeness and accuracy was checked by the research conductor.

4.8 Data Quality Control:

Before embarking up on Data collection, tool was pretested on 5% samples of similar study subjects on records of patients for validity of the survey tool and questionnaires were standardized. Based on the finding possible amendments were made on the questionnaires. After wards, data were collected by collectors who received training for three day and supervision were done by the principal investigator on daily basis throughout the data collection period. After completion of the data collection, each questionnaire was checked for completeness.

4.9 Data processing and analysis:

Data entering, coding and clearing was performed using Epi-info version 7 and statistical analysis was done using IBM SPSS Statistics for Windows, Version 25. Frequency and cross tabulation were used to check for missed value and variables. Descriptive statistics such as mean, median, frequencies, and percentage is used for demographic and clinical characteristics of patients. Odds ratio and the corresponding 95% CI is used for estimation of strength of association. Statistical significance will be set at a p-value of <0.01 . Finally, the study findings will be presented using narratives, tables and figures.

4.10 Measurement

4.10.1 Dependent variable

- Type of arrhythmia

4.10.2 Independent variable

- Age
- Sex
- Triage
- Presenting symptoms
- Co-morbidity (HTN, DM, Thyroid disorders, CKD, Asthma, COPD)
- Major presenting illness
- Serum electrolyte disturbances
- Stability
- Echocardiography
- Treatment
- Length of stay at ED
- Outcome

4.11 Operational definition

- **Brady-dysrhythmias:** any rhythm that results in heart beat less than 60 BPM including sinus bradycardia, AV blocks or junctional bradycardia.
- **Ventricular rhythm:** sustained rhythms that originate from below AV node (ventricular tachycardia, Accelerated Idioventricular Rhythm, Idioventricular Rhythm)
- **Extra beats** which include premature atrial contractions, premature ventricular contractions and premature junctional contractions.
- **Conduction system disturbances:** Isolated conduction abnormalities without derangement of rate or rhythm (LBBB, RBBB, Fascicular block, and 1st degree AV block with normal rate)
- **“Other arrhythmias”:** dysrhythmias which does not fall within the four category (SVT, Brady-dysrhythmias, ventricular rhythm, and extrasystole) such as wandering atrial foci, sinus arrhythmia, accelerated junctional rhythm etc
- **Dysrhythmia-lone diagnosis:** A patient presenting with only cardiac dysrhythmia (with no other illness).
- **Stability:** patient’s hemodynamic status as labeled on charts (“stable” and “unstable”)
- **Length of stay:** the duration a patient stays at ED.
- **Outcome:** Admission to ward/ICU, discharge to home, against medical advice or death.
- **Sinus tachycardia:** Any fast sinus rhythm due to fever, hypoxia, dehydration, hypotension, anxiety etc

4.12 Ethical consideration

Ethical clearance and approval to conduct this research was obtained from St. Paul's hospital millennium medical college institutional research review board with reference number PM23/28, Addis Ababa Ethiopia. To ensure confidentiality name and other personal identities was not used during data collection.

4.13 Dissemination of results

The result of the study will be reported to St. Paul's hospital millennium medical college, the result will also be presented to medical/scientific community on different national and international meetings. The paper will be submitted to Emergency and Critical Care Medicine department and finally it will be sent to Pan African journal of emergency medicine and critical care (PAJEC) for possible publishment.

5. RESULT

5.1 Socio-demographic characteristics

A total of 181 cases were revised and among those majority 100(55.2%) were female and 81(44.8) were male. High number of the patients belong to the age group 50-65years. The median age of participates was 58 years ranging from 18 to 95 years.

Table 1: Socio-demographic characteristics of patients with diagnoses of cardiac dysrhythmia at SPHMMC from April 1 to September 30

Variable		Frequency (N=181)	Percentage
Age Category	18-49 year	61	33.7%
	50-65 year	62	34.3%
	>65 year	58	32%
Gender	Male	81	44.8
	Female	100	55.2

5.2 Triage categories of patient

From the total 181 cases review, majority 58 (32.0%) were triaged to Red, 52 (28.7%) to orange, 52(28.7%) to yellow and 19 (10.5%) triaged to green. **See Figure 1**

39% of all atrial fibrillation cases were to triaged to yellow followed by to orange (31%) and red (18%). All PSVT cases except one (to orange) were triaged to red.

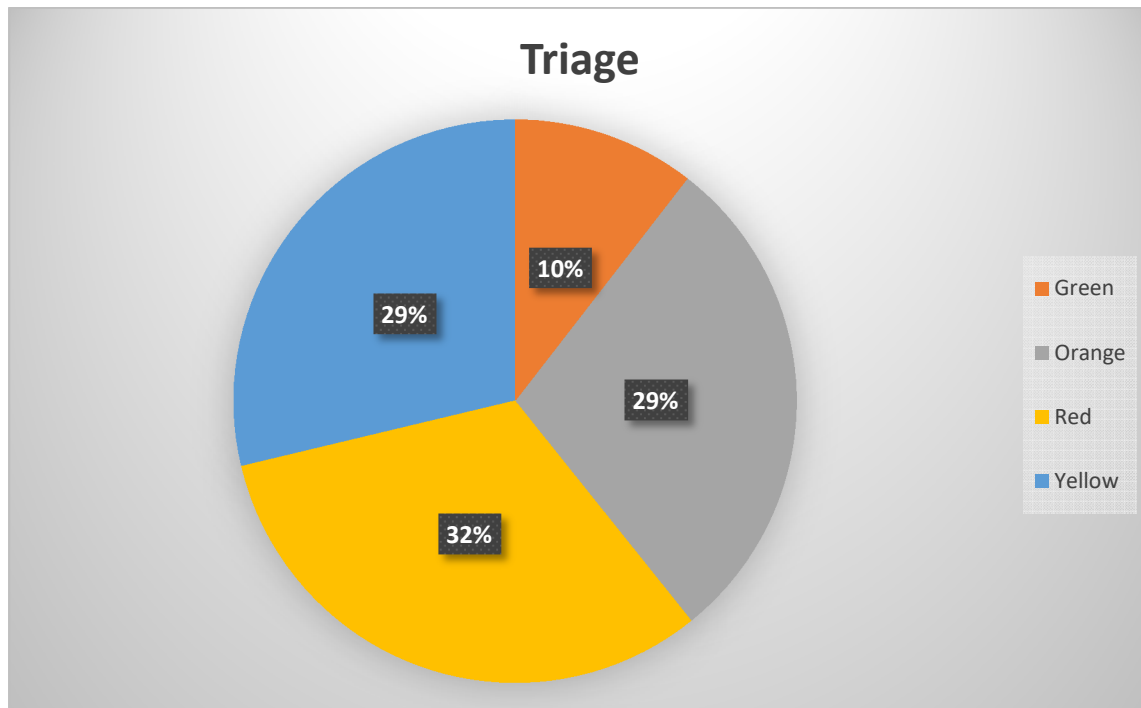


Figure 1: Triage category of patients with diagnoses of cardiac dysrhythmia at SPHMMC from April 1 to September 30

5.3 Dysrhythmia diagnosis Time

Majority of cases(N=105,58%) were new diagnoses and the rest (N=76,42%) were known diagnoses either before the study period or at other health facility.

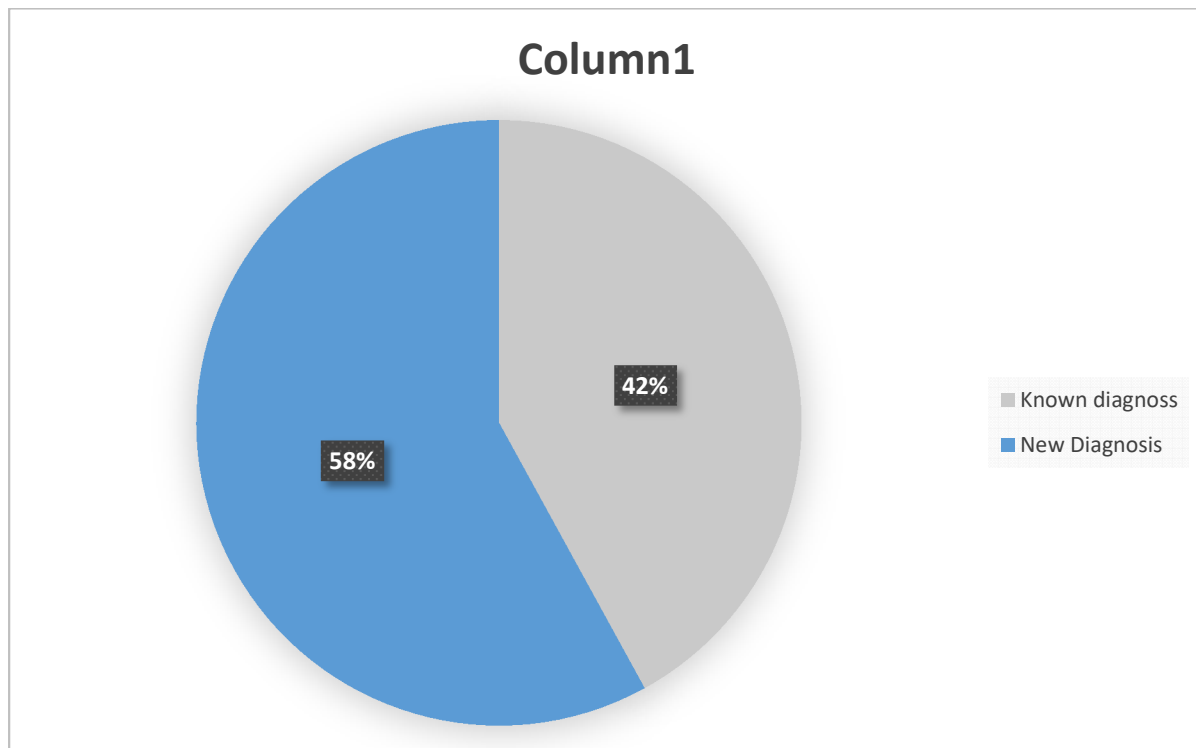


Figure 2:Time of diagnosis of all cardiac dysrhythmia at SPHMMC from April 1 to September 30

5.4 Dysrhythmia Frequency

There was a total of 186 cardiac dysrhythmia-diagnoses. The most frequent dysrhythmia was atrial fibrillation (N=87, 46.7%), brady-dysrhythmias (N=36, 19.3%) were the second most frequent dysrhythmias, 13.6% conduction system disturbances and 8.6% PSVT, see **Table 2**

Table 2: Frequency of cardiac dysrhythmia-diagnoses at adult SPHMMC ED from April 1 to September 30

Variables	Frequency (N=186)			PERCENTAGE
	FEMALE	MALE	TOTAL	
SEX				
AF	57	30	87	46.7%
PSVT	12	4	16	8.6%
MAT	3	3	6	3.2%
Atrial flutter	1	1	2	1.0%
Brady-dysrhythmia	16	20	36	19.3%
1 st degree AV block	0	1	1	2.7%
2 nd degree AV block	3	2	5	13.8%
3 rd degree AV block	8	10	18	50%
Sinus bradycardia	5	6	11	30.5%
Conduction system disturbance	6	20	26	13.9%
LBBB	5	14	19	73%
RBBB	1	4	5	19.2%
Fascicular block	0	1	1	3.8%
1 st degree AV block	0	1	1	3.85
Extrasystole	4	4	8	4.3%
PVC	3	2	5	62.5%
PAC	1	2	3	37.5%
Ventricular rhythms	0	3	3	1.3%
Ventricular tachycardia	0	2	2	66.7%
AIVR	0	1	1	33.2%
Others (Sinus arrhythmia)	1	1	2	1.0%

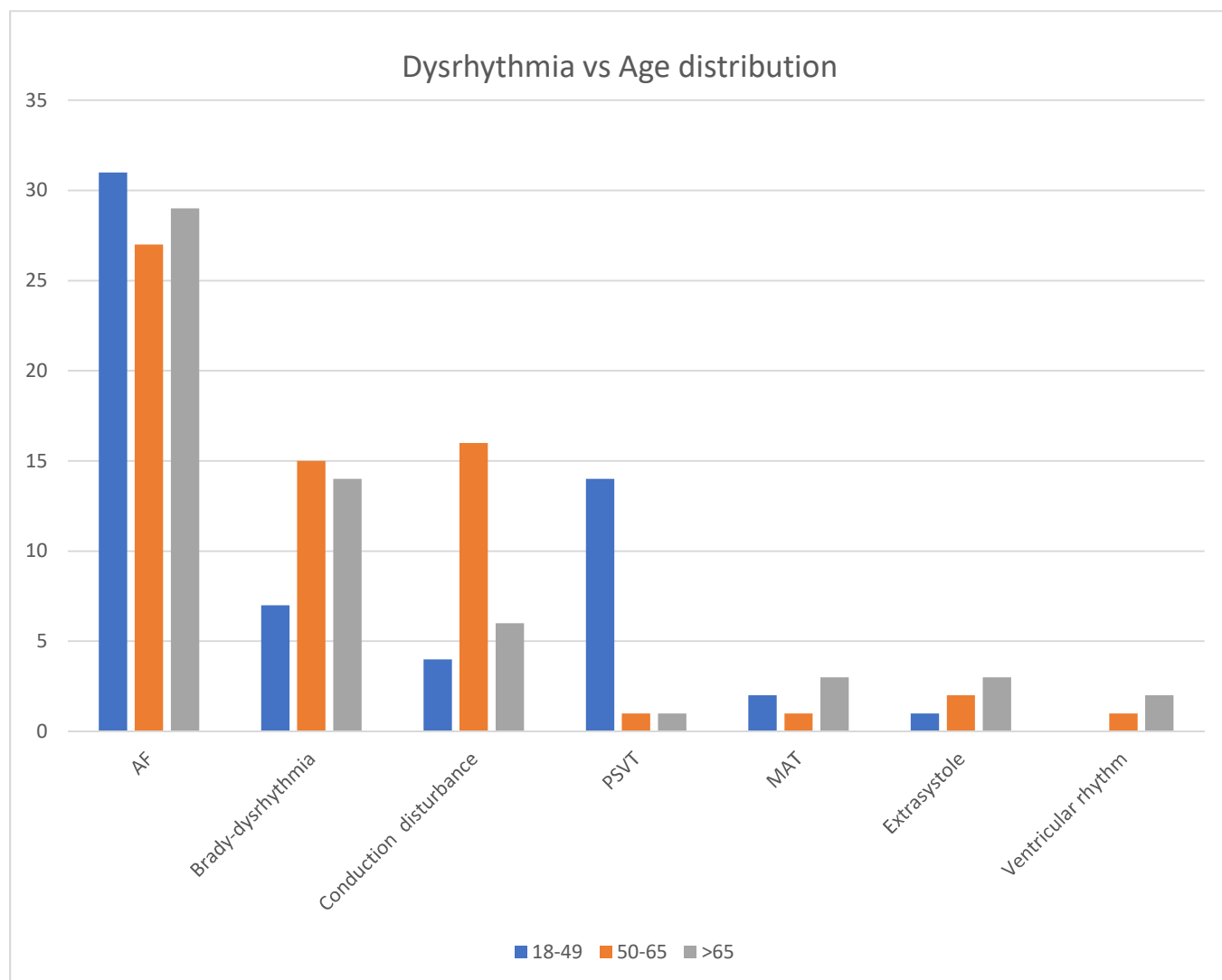


Figure 3: Diagnoses of cardiac dysrhythmias and their age distribution at SPHMMC adult ED from April 1 to September 30

Forty-four patients (24.3%) presented with no major illness rather than the dysrhythmia.

Dysrhythmia-lone diagnosis were more common in female than male. 68% (N=30) of these dysrhythmias were found in female

Table 3: Frequency of dysrhythmia-lone diagnoses among patents with diagnoses of cardiac dysrhythmia at SPHMMC adult ED from April 1 to September 30

VARIABLE	FEMALE (N%)	MALE (N%)	Total (N%)
Dysrhythmia-lone			
diagnoses	30(68%)	14(32%)	44(24.3%)
Bradydysrhythmia	11(25%)	7(15.9%)	18
AF	10(22.7%)	3(6.8%)	13
PSVT	9(20.4%)	3(6.8%)	12
Ventricular tachycardia	0	1(2.2%)	2

From the total study patients, 36 (19.8%) patients have brady-dysrhythmia. Among those who had brady-dysrhythmia, 18 (40%) had third degree AV block and 11 (30.5%) had sinus bradycardia, **See Figure 4**. Among those with sinus bradycardia, 04 were secondary to serum potassium derangement and 02 were due to digoxin toxicity.

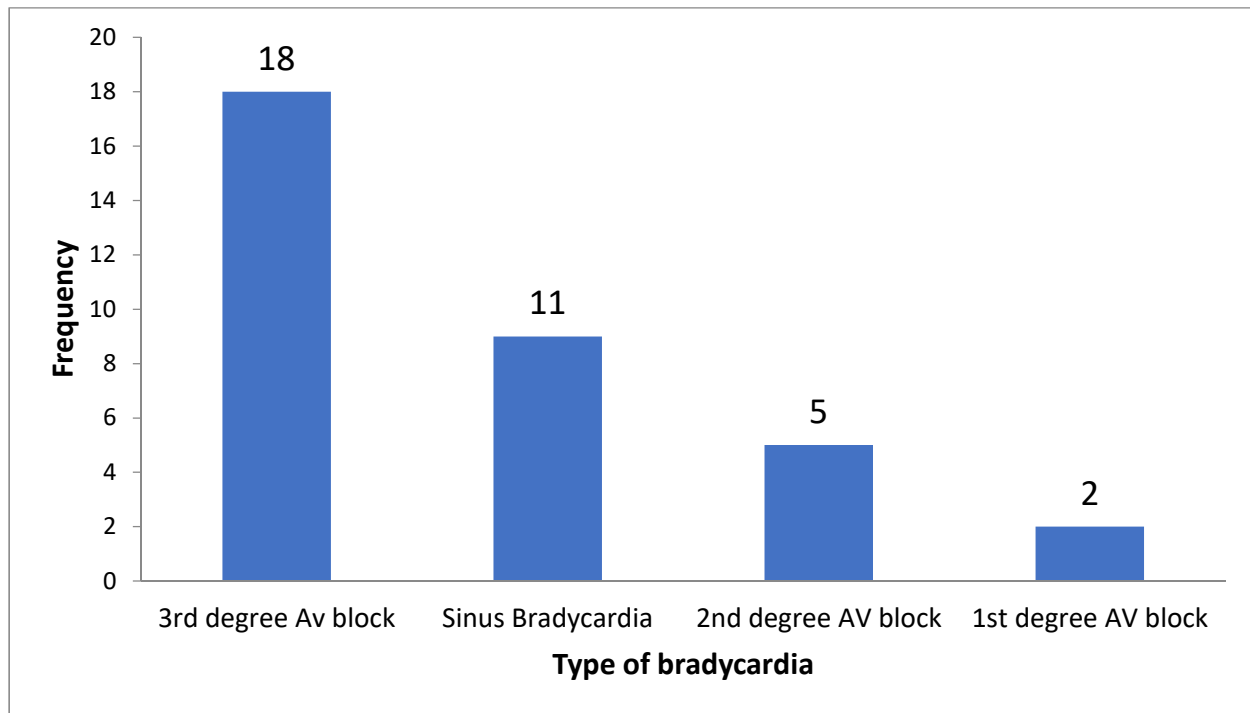


Figure 4: Frequency of diagnoses of brady-dysrhythmias at SPHMMC from April 01 to September 30

5.5 Common symptoms at presentation to ED

On presentation to ED, the most common symptom is SOB (N=67, 37%) followed by palpitation (N=45,24.9%), GBS (N=36,20.4%), chest pain (N=31,17.1%), easy fatigability (N=29, 16%), body weakness (N=13, 7.2%), altered mentation (N=11, 6.1%), cough (N=10, 5.5%), syncope (N=8, 4.4%), and bleeding (N=5, 2.8%) respectively.

From sub analysis of symptoms of presentation among patients diagnosed with dysrhythmia alone (among 44 patients), the commonest symptom is palpitation which was present in 20 patients, and SOB in 13 pts, **See Table 4.**

Table 4: Description of symptoms among those with Dysrhythmia-lone diagnoses and their frequency at SPHMMC adult ED from April 1 to September 30

Symptoms	Frequency	percentage
Palpitation	20	45.4%
SOB	13	29.5%
Easy fatigability	10	22.7%
Chest pain	9	20.5%
Syncope	7	15.9%
Altered mentation	7	15.9%

Most patients with paroxysmal supraventricular tachycardia diagnosis had palpitation and SOB, **See Table 5.**

Table 5: Presenting symptoms among patients with diagnoses of PSVT at SPHMMC adult ED from April 1 to September 30

Symptoms	Frequency	percentage
Palpitation	15	93%
SOB	8	50%
Chest pain	4	25%
Altered mentation	1	6.2%

5.6 Pulse rate at presentation

Table 6: Pulse rate of patients with diagnoses of cardiac dysrhythmia at presentation to SPHMMC adult ED from April 1 to September 30

Pulse rate	Female N(%)	Male N(%)
<60BPM	16(8.8%)	20(11%)
60-100BPM	20(11%)	21(11.6%)
101-140BPM	31(17.1%)	23(12.7%)
>140BPM	33(18.2%)	17(9.4%)

5.7 Patient's condition at presentation

Out of 181 cases reviewed, 34(18.8%) cases were labeled un-stable.

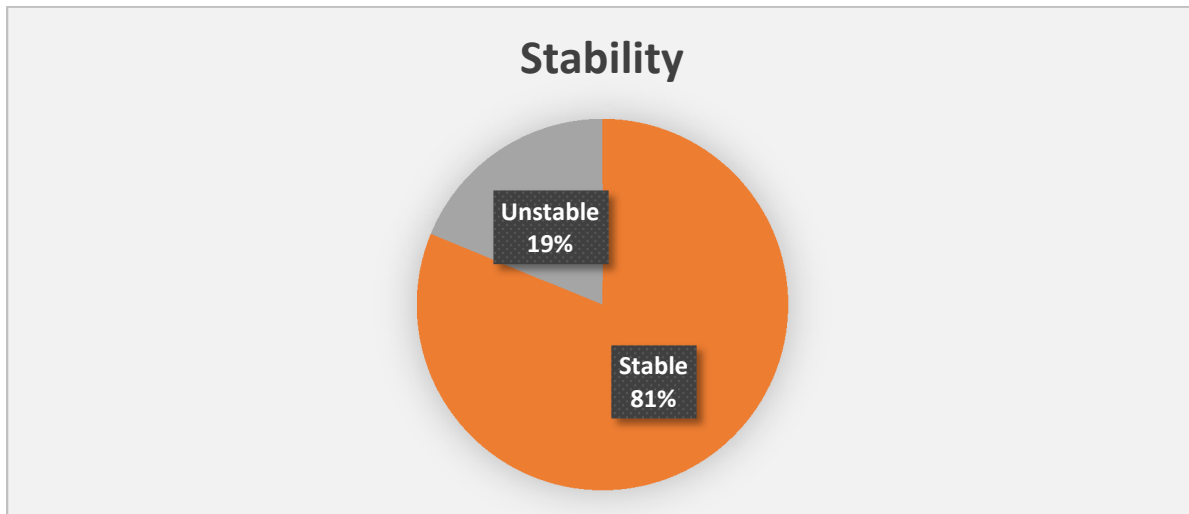


Figure 5: Description of Stability of patients with diagnoses of cardiac dysrhythmia at SPHMMC adult ED from April 1 to September 30

Out of the 34 cases reviewed, brady-dysrhythmias accounted for the majority of unstable dysrhythmias, **See Table 7.**

Table 7: Frequency of diagnoses of unstable cardiac dysrhythmias at SPHMMC adult ED from April 01 to September 30

Unstable dysrhythmia	Frequency	percentage
PSVT	5	14.7%
AF	4	11.7%
V. Tachycardia	2	5.8%
Bradyarrhythmia	23	67.7%
1 st degree AV block	1	4.3%
2 nd degree AV block	4	17.3%
3 rd degree AV block	14	60.8%
Sinus bradycardia	4	17.3%

5.8 Comorbidities of the study patients

37.6% (N=68) of the patients had comorbidity. Among those comorbidities, hypertension was the commonest comorbidity present on 48 (26.5%) of patients followed by diabetes mellitus present in 25 (13.8%) patients, See Figure 8.

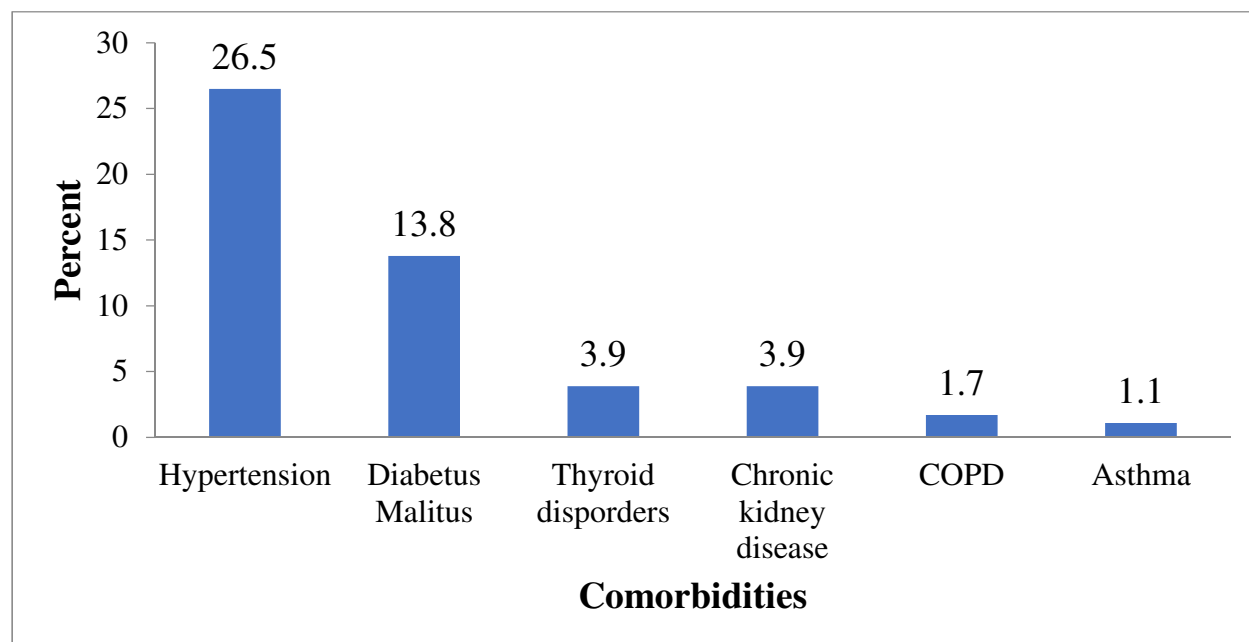


Figure 6: Diagnosed comorbidities among the study patients

Table 8: Diagnoses of cardiac dysrhythmia and their frequency of comorbidities

Comorbidity	Dysrhythmias				
	AF	brady-dysrhythmia	3 rd degree AV block	Conduction disturbance	PSVT
HTN	19	14	10	12	1
DM	3	11	7	9	-
Hyperthyroid	7	-	-	-	-
COPD	3	-	-	-	-
Asthma	1	1	-	-	-
CKD	1	1	-	-	-

5.9 Major Illness (Primary Diagnosis) of study patients

Majority of the patients had major illnesses, CHF (38.7%) being the leading. Infection was present in 31(17.1%) patients, ACS in 20 (11%), AKI in 14 (7.7%), stroke in 12 (6.6%), warfarin toxicity in 11 (6.1%), hypertensive crisis in 9 (5%), PE in 5 (2.8%) and thyroid storm in 3(1.7%).

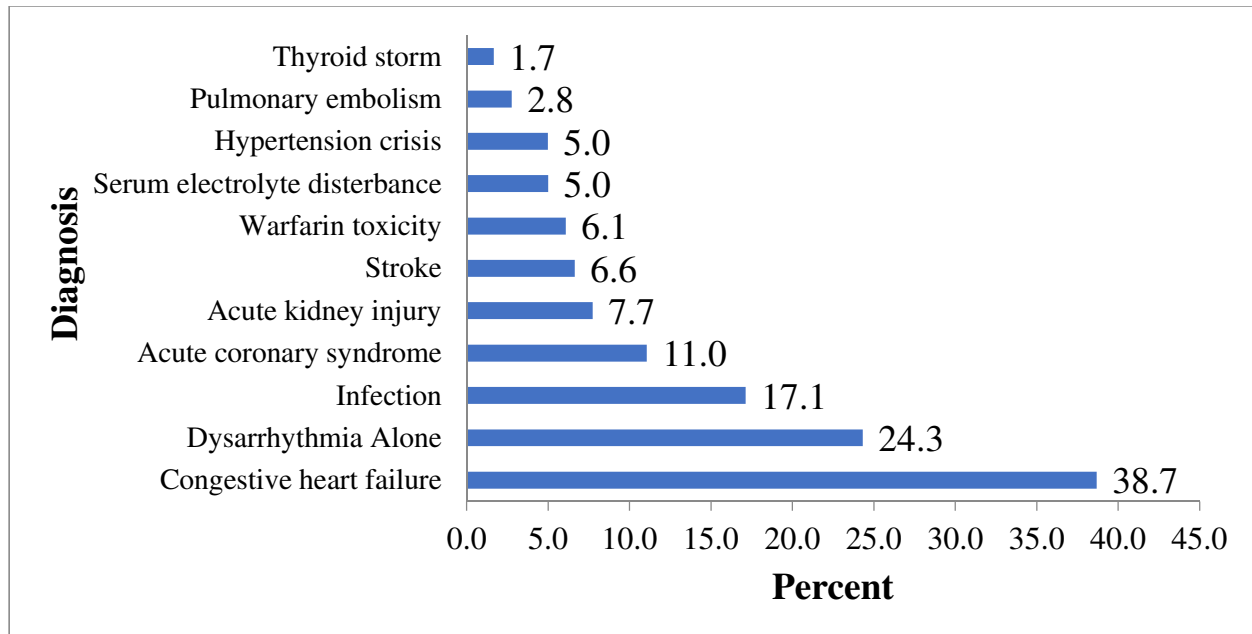


Figure 7: Description of major illness (primary illness) among patients with cardiac dysrhythmia-diagnoses at SPHMMC adult Ed from April 01 to September 30

5.10 Echocardiography Findings

Echocardiography was present in 110(60.8%) patients and valvular lesion is the most frequent finding which was found in 69 (62.7%) patients and pulmonary hypertension was found in 39 (35.4%), **See Table 10**. There were 61 atrial fibrillation diagnoses which had echocardiography, and among these 78.6%(N=48) had valvular lesions and 49%(N=30) had pulmonary hypertension,

Table 9:Echocardiographic findings among those with echocardiography of patients with diagnoses of dysrhythmia at SPHMMC ED from April to September 30

Variable	Frequency	percentage
Valvular lesions	69	38.1%
Pulmonary HTN	39	21.5%
LVH	17	9.4%
IHD	13	7.2%
DCMP	11	6.1%
Atrial Enlargement	5	2.8%
Normal Echo	9	8.1%

5.11 Treatment pattern

Digoxin was the commonest antiarrhythmic drug used in treatment of dysrhythmia in this study. Electrical cardioversion was done in 07 unstable dysrhythmias (06 PSVT and 02 Ventricular Tachycardia) and one stable dysrhythmia. See **Figure 10**

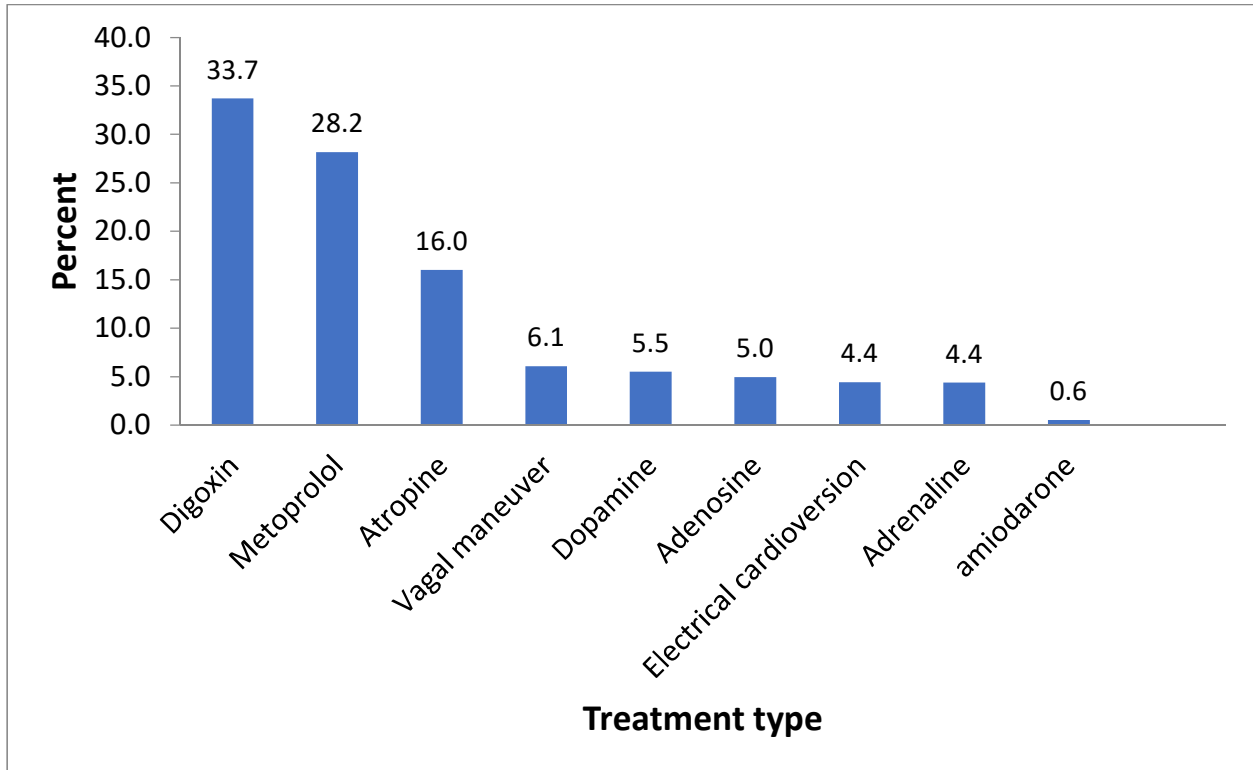


Figure 8:Treatment patterns among patients with diagnoses of cardiac dysrhythmia at SPHMMC adult ED from April 01 to September 30

5.12 Length of Stay at ED

Majority of the study patients stayed at emergency room more than 24 hours, See **Table 11**.

Table 10: Length of stay of patients with cardiac dysrhythmia-diagnoses at SPHMMC adult ED from April 1 to September 30

Time	Frequency	percentage
<24 hour	38	21 %
24-72 hour	81	44.8 %
72-120 hour	41	22.7 %
>120 hour	21	11.6 %

Table 11: Length of stay at ED among those with dysrhythmia-lone diagnoses

Time	Frequency(N)	percentage(%)
<24 hour	18	40.9 %
24-72 hour	21	44.8 %
72-120 hour	4	9 %
>120 hour	1	2.2 %

5.13 Disposition of patients

Among all patients, majority (N=110, 60.7%) of patients were discharged improved, see **Table 13**. Majority of patients who went home against medical advice are those having brad-dysrhythmias.

Table 12: Outcome of patients with diagnoses of cardiac dysrhythmia at SPHMCC ED from April 01 to September 30

Stability	Discharge	Admission to ward	Admission to ICU	Against medical advice	Death	Total
Stable	90	30	15	4	8	147
Unstable	20	0	4	1	9	34
Total	110	30	19	5	17	181

In this study, the most frequent cardiac dysrhythmia was atrial fibrillation (there were 87 AF cases out of 186 diagnoses of cardiac dysrhythmias). Therefore, we tried to analyze if there is crude association between AF and different variables. In binary logistic regression analysis, it shows that atrial fibrillation is significantly associated with pulmonary hypertension. Patients with pulmonary hypertension have 5 (COR: 5, CI: 2.2-11.3) times higher risk of developing atrial fibrillation. Those patients with valvular lesions have significant association with atrial fibrillation (COR: 4.3, CI: 2.2-8.1). In addition, female gender has 2.3 times higher risk of atrial fibrillation as compared with male gender. On those patients diagnosed with atrial fibrillation, there is no association with age category, See **Table 14**.

Table 13: Binary logistic regression analysis result of atrial fibrillation with demographic variables and echocardiographic findings, September 2022

Variables		COR	Confidence interval	P-Value
Pulmonary hypertension	Yes	5.0	2.2-11.3	0.00
	No	Ref		
Age category	18-49 year	Ref		
	50-65 year	0.5	0.3-1.1	0.11
	>65 year	0.8	0.4-1.7	0.56
Valvular lesions	Yes	4.3	2.2-8.1	0.00
	No	Ref		
Sex	Female	2.3	1.2-4.1	0.008
	Male	Ref		

6. Discussion

In this cross-sectional study, we described the frequency and clinical characteristics of dysrhythmia-diagnosed patients who visited SPHMMC ED from April 1, 2022 - September 30, 2022. In this study of patients with diagnoses of dysrhythmias over 6 months, female were more affected genders and the commonest age group in this study patients were above 50 years old and median age was 58(18-95years). Similar findings was reported for age and gender characteristics in other studies.(3, 18) Of all diagnoses of cardiac dysrhythmias, atrial fibrillation dominated adult ED arrhythmias and followed by brady-dysrhythmias and the next most frequent dysrhythmias were conduction system disturbance and PSVT. A study conducted in United Kingdom on prevalence of Frequency of Cardiac Rhythm Abnormalities in a Half Million Adults reported similar findings.(3)

Atrial fibrillation in this study accounted for 46.7% of all the cardiac dysrhythmias. Most of them were above 50 years old (N=56, 64.3%), most were female (N=57, 65.5%), and binary logistic regression analysis shows that AF is associated with pulmonary hypertension and valvular lesions. This is consistent with a study done by Guy Rozen et al on Emergency Department Visits for Atrial Fibrillation in the United States (19) and a study done by Wanamaker B et al on Atrial Arrhythmias in Pulmonary Hypertension: Pathogenesis, Prognosis and Management.(20) A study done by Fingrova et al on prevalence and clinical outcome of SVT in different etiologies of pulmonary hypertension found that AF and atrial flutter were prevalent in pulmonary HTN which is similar with our study that 30 out of 87 (34.5%) had pulmonary HTN and this number could increase if echocardiography could have been done for all patients There were only 02 atrial flutter with no pulmonary HTN but with echocardiographic finding of valvular lesion which doesn't go this with study even though the number of cases in this study is very few.(10)

There were 16 PSVT cases in this study of which 75% of them were female patients, most of them belong to the age group of 18 – 50 years which is similar with a study done by David et al on U.S. emergency department visits for supraventricular tachycardia in which they found that most SVTs were common in younger females.(5) 7 out of 16 PSVT cases (43.7%) had valvular lesion and

those without tend to be younger and females which is consistent with a study done in Marshfield, Wisconsin, USA on prevalence of PSVT.(8)

Brady-dysrhythmias were the 2nd most diagnoses of cardiac dysrhythmias in this study. There were 36 diagnoses from which 3rd degree AV block was a major contributor for most of the brady-dysrhythmias and most of these had an underlying heart disease, 55% of 3rd degree AV block had echocardiographic finding, which is similar with the Reykjavic study on prevalence and prognosis of third-degree atrioventricular conduction block, a prospective cardiovascular population study.(16)

On presentation to ED, the most common symptom was shortness of breath (SOB), followed by palpitation. All patients in this study were not solely with a diagnosis of dysrhythmia alone because most of them presented with major other illness so we did sub analysis of those patients with dysrhythmia-lone diagnosis and palpitation was the most common presenting symptom followed by SOB. We also did another sub-analysis of presenting symptoms in those with paroxysmal supraventricular tachycardia and 15 out of 16 these cases had palpitation followed by SOB in 8 patients and chest pain in 4 patients which is consistent with David H. Murman et al. who analyzed U.S. Emergency Department Visits for Supraventricular Tachycardia.(5)

Even though, most of the dysrhythmias were with major illnesses or primary illness, twenty-four percent of all dysrhythmias presented with no major illness. From this category, brady-dysrhythmias accounted for majority (41%) followed by atrial fibrillation (29.5%) and paroxysmal supraventricular tachycardia (27%).

Most of the patients were cardiovascular stable (81.2%). From the unstable, most of them were brady-dysrhythmias followed by PSVT, AF and ventricular tachycardia. Electrical cardioversion was done in seven unstable dysrhythmias (5 PSVTs and 2 VTs) and on one stable PSVTs. For other unstable arrhythmias, they were treated with pharmacologically. Most unstable brady-dysrhythmias were 3rd degree AV block and were unsuccessful with pharmacological treatment

and among these, 04 died, one admitted to ICU and one left against medical advice and four referred to other facility.

Digoxin, metoprolol and atropine were the most common used anti-arrhythmic drugs. Vagal maneuvers were done on 11 patients. Even though vagal maneuvers were routine practice, they were less effective because most of them lead to adenosine or other antiarrhythmic drugs. While digoxin and metoprolol were used to control most tachyarrhythmias, other antiarrhythmic drugs such as amiodarone or procainamide were rarely used if used. Atropine was used in most of symptomatic brady-dysrhythmias and second line was dopamine and adrenaline. Pacing, irrespective of type, has never been used on any of these unstable brady-dysrhythmias.

Significant number of patients diagnosed with dysrhythmia (79%) and 59% of patients with dysrhythmia-lone diagnosis stayed at emergency room for more than 24 hours contributing for overcrowding of emergency department with additional other factors.

7. Conclusion and Recommendation

7.1. Conclusion

Atrial fibrillation is the most frequent diagnosis of dysrhythmia followed by brady-dysrhythmias and conduction disturbance and PSVT were the next most frequent dysrhythmias. Cardiac dysrhythmia is more common in females than in males. Majority of cardiac dysrhythmia are found in older patients. PSVT is common in young females. 3rd degree AV block contributes for most of the brady-dysrhythmias and comorbidity is common in this group. On presentation to Emergency department, the most common symptom is shortness of breath and palpitation. Majority of adult cardiac dysrhythmias present with concomitant illness (primary illness) and majority are cardiovascular stable.

Even though vagal maneuvers are common practice, they are less effective in terminating supraventricular tachycardias. Electrical cardioversion is not common. Digoxin and metoprolol are used to control most tachyarrhythmias while many other antiarrhythmic drugs are not commonly used. Cardiac pacing has never been used on any of these unstable brady-dysrhythmias.

7.2. Recommendation

Based on the finding the following recommendation will be forwarded to concerned bodies.

For health institutions

As this research indicated, management options are very limited both pharmacological and non-pharmacological and hence the institution should give attention to the short and long terms management options, for instance initiating cardiac pacing in emergency department, launching cardiac center etc.

Cardiac dysrhythmias are commonly encountered medical condition in the emergency department and require rapid interventions by emergency physicians therefore the health institution should provide regular training and Education programs, emphasize antiarrhythmic medication and defibrillator use.

For further researches;

It will be more valuable if studies will be conducted on this subject matter with alternative community-based as well as institutional-based prospective study designs for prolonged period so as to assess the precise picture of cardiac dysrhythmias, their clinical characteristics and factors associated with them.

8. Limitation

This study has a number of limitations. The identification of all types of cardiac dysrhythmia was solely based on physician's diagnosis in emergency department therefore may lead to misdiagnoses of cardiac dysrhythmias and undiagnosed dysrhythmias may be missed and hence their clinical characteristics. In addition, stability of the cases was taken as labeled on the charts. As this data is secondary data, data abstraction depended on the accuracy and completeness of the medical records such as presenting symptoms could be written as such different from the patient's own words and could also be undocumented information. Another limitation of this study is that sample data was not enough to analyze associations and conclude.

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