PATTERN OF CARDIAC DISEASE AMONG PATIENTS ADMITTED TO JIMMA UNIVERSITY MEDICAL CENTER MEDICAL WARDS, JIMMA TOWN.

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PATTERN OF CARDIAC DISEASE AMONG PATIENTS ADMITTED TO JIMMA UNIVERSITY MEDICAL CENTRE'S MEDICAL WARDS

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ABSTRACT

Back ground:

There is a substantial regional variation and evolvements on the type of underlying causes of heart disease across different part of the world. Cardiac disease is the single most common reason of admission at Jimma University Centre throughout the year. It is thus important to know the underlying patterns of cardiac disease as it is an essential in tackling the problem both as primary prevention as well help the institution get ready for early treatment of common underlying cardiac diseases.

Objectives: To discern patterns of cardiac disease among patients admitted to Jimma University medical center, medical wards from November 2016 to July, 2017.

Methodology:

A hospital based cross-sectional study was employed. Ethical clearance was obtained. A pretested questionnaire was used to collect a data on socio-demographic data, clinical history and physical examination. A type of underlying heart disease was made based on the standard definition but tailored to our setup. The collected data was entered in to SPSS version 20 and was analyzed to valuable information based on the set of variables.

Results:

A total of 278 cardiac patients were studied. The mean age was 49.6 (SD±16.8). Males constitute 141 (50.7%) of the population. Ischemic heart disease accounted for 100 (36.8%) of the total cardiac cases followed by Rheumatic heart disease 48 (16.3%); dilated cardiomyopathy 43 (16%) and hypertensive heart disease 40 (15%). Corpulmonale, Pericardial disease, high output failure, and congenital heart diseases were responsible for 27 (10%), 6 (2%), 3 (1.1%) and 2(.7%) of the total cases, respectively. A total of 246 (88.5%) had a clinical heart failure diagnosis at admission. Atrial fibrillation was present in 18.7% of study participants.

Conclusions:

Ischemic heart disease is on the rise as a major leading underlying type of heart disease in south west of Ethiopia. Further study is needed to determine the burden this diseases at community setting.

Keywords: cardiovascular disease, Ethiopia, hospitalized patients, pattern of cardiac diseases

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ACRONYM

ACS	Acute coronary syndrome
AF	Atrial fibrillation
AFL	Atrial flutter
AIDS	Acquired immunodeficiency syndrome
AR	Aortic regurgitation
AS	Aortic stenosis
ASD	Atrial septal defect
AV	Aortic valve
CAD	Coronary artery disease
CHD	Coronary heart disease
CHF	Congestive heart failure
CKD	Chronic kidney disease
CK-MB	Creatinine kinase mb isoform
COPD	Chronic obstructive pulmonary disease
CVD	Cardio vascular disease
CXR	Chest x-ray
DCM	Dialated cardiomyopathy
EF	Ejection fraction
ECG	Electrocardiography
HHD	Hypertensive heart disease
HIV	Human immunodeficiency virus
ICD	International classification of disease
JUMC	Jimma University medical center
LMICS	Low and middle income countries
LBBB	Left bundle branch block
MI	Myocardial infarction
MS	Mitral stenosis
MR	Mitral regurgitation
NYHA	New york heart association
MVP	Mitral valve prolapsed
PDA	Persistent ductus arteriosus
RBBB	Right bundle branch block
RF	Rheumatic fever
RHD	Rheumatic heart disease
VT	Ventricular tachycardia
WHO	World health organization

CHAPTER ONE

INTRODUCTION

1.1. BACK GROUND INFORMATION

Over the past decade cardiovascular disease (CVD) has emerged a single most important cause of death worldwide. In 2010, the sum of ischemic heart disease (IHD) and stroke represented as a cause of one in every four death worldwide (1). Low income and middle income countries are seeing an alarming rise of CVD as well (2). This dynamic shift resulting in rise of global CVD burden is related partly to the epidemiologic transition as described well by Omran AR. He underlined that the progression through pestilence and famine to the current times of delayed degenerative disease resulted in shift of the leading cause of death from infectious and malnutrition to CVD and cancer. By the same token, a congruent acceleration of CVD rate among low and middle income regions partly parallel this global epidemiologic transition (3).

Regional variations in leading causes of death were substantial however. This is particularly impressing in sub-Saharan African countries where Communicable, neonatal, and maternal disorders still dominate causes of death in the sub-Saharan region. Malaria and HIV/AIDS are the leading causes of death, accounting for nearly half of all deaths in the region in 2010. CVD is the leading cause of death among persons older than 45 years of age (1, 2).

Cardiac disease, particularly ischemic heart disease constitute larger fair share out of CVD in the world. When it comes to a particular etiology of cardiac disease however, it varies considerably among different regions of the world. Also, the difference in patterns of heart failure- the subset of cardiac disease- is well appreciated by different researchers around the globe (4,5). Region(s) of the study, study design, study participants and cardiac conditions of interest during pattern study are some among reasons of this difference. All these researchers underscored that the underlying cause of heart disease is no more static. This is particularly impressive in developing countries thus it is imperative to have a regular surveillance. This study

is aimed at identifying a pattern of cardiac disease whether the typical cardiac disease cause of developing countries like rheumatic valvular heart disease (RHD) remained the leading burden or pattern change has established. Identifying such patterns mean a lot for preventive and management strategy by responsible body.

1.2. STATIMENT OF THE PROBLEM

CVD nowadays is the most important cause of death worldwide. Out of nearly projected 58 million all deaths worldwide that happened in 2005 CVD (mainly heart disease and stroke) were the leading cause of death, being responsible for 30% of all this deaths among all age groups (6). With Global Burden of Diseases, Injuries, and Risk Factors Study 2010 (GBD 2010) report, out of 52.8 million all deaths that took place in 2010, one in every four death was attributed to CVD. Sub-Saharan Africa was one of the exceptions where the communicable, maternal, neonatal, and nutritional causes still accounted for 76% of premature mortality in this region (1). There is scarcity of data over burden of non-communicable diseases particularly CVD in Ethiopia. But, as part of sub-Saharan Africa, the studies done so far indicate communicable diseases are still the major burdens, thus putting non-communicable diseases along the second tier (2).

Looking in to the admission officer's patients data over past two years at Jimma University medical center (JUMC) and inpatient ward logbook, CVD is the single most responsible disease for medical inpatient admission – majority being heart disease (7). It is also noticeable that CVD is the leading cause of inpatient deaths. This implies the burden of the disease in institution and understandably the community served by this institution.

Chronic complications related to any cardiac disease emanate from the fact that substantial number of patients with this disease will eventually have a mechanical insufficiency of heart resulting in heart failure. As such it results in patient mortality and morbidity. Although none of the study done in sub-Saharan African region so far was done on

general population, it is estimated that the economic impact of heart failure in this region is comparable to the developed (high income) countries. This will be translated as that 1% of total budget allocated for health service will be spent for heart failure management (8). Unfortunately what makes the issue worse is that different studies (9, 10, 11, 12) pointed that rheumatic heart disease ((RHD), cardiomyopathies and the like as a leading cause of heart failure in sub-Saharan Africa. These etiologies affect predominantly the younger, rather productive age group disproportionately contributing additional negative economic impact in this region (8).

With the recent studies also, hypertensive heart disease (HHD) is being identified as the leading cause of heart disease in other (other than Ethiopia) African countries (13, 14). This has a huge implication. Dealing with hypertension from prevention to early management by different strategies will significantly reduce (if not eliminate of course) HHD burden. Ischemic heart disease (IHD) - as emerging cause of heart disease in this region - does have similar implication as well.

Knowledge of the patterns of cardiac disease is thus an essential in tackling the problem both as primary prevention and/ or as early treatment with expectant dramatic reduction of further disability and premature death. Such a plan also holds true against both traditional cause of heart disease like RHD and those emerging ones including but not limited to HHD and IHD (8, 15).

CHAPTER TWO

LITRATURE REVIEW

CVD used to represent less than 10% of global mortality before 1990 (16). This state represent a time of pestilence and famine in epidemiologic transition. The current burden of CVD is in sharp contrast where it is responsible for more than 30% globally and 40% in high income countries (HICs). Despite this increase in global burden, the age adjusted mortality related to CVD is decreasing in high income countries. This is because of preventive strategies including but not limited to stopping smoking, effective blood pressure control, awareness over healthy life styles. Advance in the treatment of CVD both acutely and on long term bases do have similar entailment for the result (16).

Coming to low and middle income countries (LMIC) the burden of CVD is on rise rather, so does mortality related to this disease. In fact 85% of overall global burden of the disease reside in these countries. There are a number of factors that has been agreed up on as responsible factors for such a rise. Rapid urbanization decreased physical activity, increasing obesity are some to mention (16). The global variation in CVD rates is related to temporal and regional variations in known risk behaviors and factors. According to ecological analyses of major CVD risk factors and mortality, it is demonstrated that the regional variations are based on differences in conventional risk factors for CVD (2, 17, 18).

It is important to note that, most of the published data on pattern of cardiac disease was done in the developed countries, on Caucasian population leaving data on this subject scarce in developing country in general including in Africa. Furthermore, echocardiography was either not present at time of studies or never used as part of patient evaluation by investigators during many of the studies done in sub-Saharan Africa (8).

Beside such a scarcity, however, Damasceno et al (8) summarized the clinical study done on this continent on heart failure. The vast majority of heart failure in sub-Saharan Africa is due to non-ischemic causes: rheumatic heart disease (RHD), hypertensive heart disease, and cardiomyopathy representing over 75% of the cases. Secondly, ischemic heart disease is

uncommon causes. Finally, cor-pulmunale and pericarditis contributes up to 20% cases of heart failure, underscoring the role of tuberculosis in this region.

Diametrical to the previous thoughts, IHD is no more a rare disease currently in sub-Saharan Africa. In fact, Mensah GA (19) ranked it as the 8th leading cause of death both in males and females in this region. The alarming increase in CVD with trend shift towards atherosclerotic causes – shifting from traditional 'disease of poor' like RHD – has been replicated by different investigators (19, 20, 21, 22, and 23). Furthermore, the incidence of rheumatic fever has been declining for at least 150 years even preceding several years before use of effective antibiotic for its prevention (22). Consequently, RHD - the major attendant following this disease has dropped significantly across the world.

In Ethiopia there are a number of tertiary hospital based studies done so far (24, 9,10,11,12, 25). It these studies can be classified in to two groups. Firstly, those studies that were done on identifying the patterns of cardiac disease among patients having cardiac follow up on retrospective bases (9, 10, 11, 12, 25). These studies had more or less similar finding; rheumatic heart disease was uniformly the major cause of cardiac disease followed by hypertensive heart disease and on the third row by cardiomyopathies and ischemic heart disease.

Secondly, a study (24) which is different in its kind: The Sub-Saharan Africa Survey of Heart Failure (THESUS–HF) was a prospective, multicenter, observational survey of patients with acute heart failure admitted to 12 university hospitals in 9 countries which included Ethiopia. It was done among patients presenting with acute heart failure, for which the causes, treatment, and outcomes during 6 months of follow-up were determined. Strikingly, this study demonstrated dissimilar result with the former mentioned study results. The cause of heart failure in the entire cohort revealed: HHD, idiopathic DCM, RHD and IHD in decreasing frequency. In Ethiopia, as a cause by specific countries in this cohort, idiopathic DCM, IHD and RHD were the top three causes in decreasing order.

Recent studies (13, 14) done in sub-Saharan African countries underscored some pattern change to this 'traditional' cause of cardiac disease in Africa. Owsu et al. (13) for example identified hypertension (45%) as a leading cause of heart failure in one of the teaching hospital in Ghana. RHD and cardiomyopathies were represented as 23 and 15% respectively. Arthur and his colleague conducted nearly similar investigation in University of Port Harcourt Teaching

Hospital of Nigeria (14). They also identified hypertension as a measure cause of congestive cardiac failure representing more than half of the cases. The rest causes in this study were: chronic renal failure (7.8%), RHD (4.3%) and IHD (0.2%) in respective decreasing order.

From the above aforementioned studies, it is conceivable idea to think that there are clear cardiac disease pattern changes among many African countries and sub-Saharan Africa in general. On the contrary however, answering the discrepancy of data between Ethiopia and other African; and within Ethiopian investigators is not a simple. In other word, the simple heterogeneity of cardiac pattern is unlikely to explain this theme alone.

2.1. RISK FACTORS FOR CVD

Worldwide CVD is motored by a number of risk factors, largely by modifiable risk factors. The INTERHEART (17) study identified nine modifiable risk factors that are significantly associated with acute myocardial infarction (MI). It is noteworthy highlighting some of these individual risk factors.Tobacco smoking remained the single most preventable CVD risk factor across the globe. It is estimated that over one billion smokers individual are in the world (26). Tobacco smoking habit varies over different countries. The recent data shows tobacco smoking habit is increasing among LMICs. Fortunately the prevalence of smoking in Ethiopia is less than 1% which is consistent with other sub-Saharan African countries (2).

Elevated blood pressure correlates with the epidemiologic transition to its best. As high as 14% of the deaths worldwide are estimated to be caused by suboptimal blood pressure control; as described by recent work of Lawes et.al. (27). Worldwide, high cholesterol causes some 56% of ischemic heart disease and 18% of strokes amounting to 4.4 million deaths annually (2). As the epidemiologic transition continue the mean plasma level of total cholesterol rise. Dietary fats, particularly which of animal products and processed vegetable oils with increasing sedentary life style are the principal reasons. Although data are scarce, the plasma level of total cholesterol among individual in sub-Saharan Africa is found to be the lowest comparing it with individuals living over the other part of the world (28).

As other many modifiable CVD risk factors, the incidence hyperglycemia and diabetes is on rise across the world. Goodarz Danaei et.al underscored such rise over the past 30 years in the

published systematic analysis of health examination surveys and epidemiological studies (29). It is estimated that more than half of the individual with this disease may remain undetected. As such CVD complications (which are actually by far the major cause of morbidity and mortality in this sect of individuals) will ensue before its management commences. Nearly 85% of diabetics live in LMICs (30). Obesity (which share similar epidemiologic transition related to behavioral and lifestyle changes) is also heightening in LMICs (31). Unhealthy diet and physical inactivity are following similar trend acting in synergistic way with other CVD risk factors. Worldwide increasing aged population because of increase longevity of the populations - although non-modifiable – are among the risk factors for CVD (16).

2.2. SIGNIFICANCE OF THE STUDY

The economic burden related to cardiac disease is huge. It can be viewed in three different levels: first, the expenditure of the health institution delivering care to patients with cardiac disease. This can be in terms of hospitalization, nursing care, medications and the like. Secondly, the impact at micro level, the economic burden at an individual family level whose member is affected by cardiac problem. Thirdly, the impact at macro-level that look at lost worker productivity, or economic growth lost by adults with heart disease or their caregivers being partially or completely out of the work force because of illness (2).

The results after this particular study will have an impact by identifying the underlying pattern of type of cardiac disease in such a way that it can be used by the local hospital to make itself ready to deliver adequate service with each particular heart disease. Furthermore, the results of the study can be used by the national policy maker at large to give due attention to the prevailing type of cardiac disease and its associated factors, and targeting them early so that cardiac problem will be lessened thus decreasing the burden of the disease mentioned thereof. This can be achieved through community awareness and early management of the risks to be identified with this study.

CHAPTER THREE

OBJECTIVE OF THE STUDY

3.1. GENERAL OBEJCTIVE

To assess the magnitudes and patterns of cardiac disease among patients admitted to JUMC medical wards from November 2016 through April 2017.

3.2. SPECIFIC OBJECTIVE

- To specify the type of underlying of cardiac disease among patients admitted with heart problem.
- To assess the magnitude of cardiac disease among patients admitted to medical wards over the study period.
- To determine the associated factors with each specific underlying heart disease identified.
- To determine the ECG findings and association with cardiac abnormalities.

CHAPTER FOUR

METHODOLOGY

4.1. STUDY AREA AND PERIOD

The study was carried out in Jimma University medical center (JUMC) which is geographically located at 352 km from the capital city, Addis Ababa. Currently it is the only teaching and referral hospital providing a service for thousands of clients each year from catchment population of about 15 million people (32). It has specialty clinics, different departments with their respective wards, and staffed with a clinicians of different levels. The internal medicine wards (medical wards) have 04 general wards with 01 stroke unit. It is staffed with subspecialists, internists, residents, intern-doctors, nurses, clinical pharmacists and other supporting staffs.

The study was conducted during period of November, 2016 to July, 2017. The study period was based on the current trends of cardiac case admission from the JUMC admission officer's patient data and the calculated sample size. Thus after reviewing these trends over the past two years, an average of monthly cardiac case of fifty each month was taken (7).

After calculating the sample size, the sample cases were distributed over the specified period.

4.2. STUDY DESIGN

A hospital based cross-sectional study was employed.

4.3. STUDY POPULATION

4.3.1. SOURCE POPULATION

All patients who were admitted to medical wards were the source population.

4.3.2. STUDY POPULATION

Selected individuals admitted with cardiac diseases that fulfilled the inclusion criteria

4.4. ELIGIBILITY CRITERIA

4.4.1. INCLUSION CRITERIA

All adult patients, whose reason of admission to JUMC medical wards are cardiac problem during specified study period.

4.4.2. EXCLUSION CRITERIA

- Patients with hemo-dynamic instability
- Uncommunicative patient.

4.5. SAMPLING

4.5.1. SAMPLE SIZE

The sample size (n) was determined using the single population proportion formula based on the previous known prevalence of cardiac disease, 25.5%, p=0.255 (33). Expected margin of error to be 5% (d= 0.05) and with 95 % confidence level. Based on this, the actual sample size is computed as follow (34)

$$n = \frac{Z^2 p(1-p)}{d^2}$$

n = desired sample size

Z = scale at 95% confidence interval i.e. assumed to be 1.96

P = prevalence 25.5% is used from the previous study.

d = degree of confidence (margin of error), 0.05

$$n = \frac{1.96^2 0.255(1-0.255)}{0.05^2} = 290$$

4.5.2 SAMPLING TECHNIQUE

Consecutive sampling method was used until the target sample size is attained

4.6. STUDY VARIABLE

4.6.1. DEPENDENT VARIABLE

- Type of cardiac disease (RHD, HHD, IHD, Cardiomyopathies, Congenital heart disease, Arrhythmias, and others)

4.6.2 INDEPENDENT VARIABLE

- Socio-demographic variables (Age, Sex, Residence, Occupation, Marital status)
- Behavioral factors (Smoking, Alcohol use, lack of physical exercise),
- Body composition (BMI, abdominal circumference, lipid profile),
- Co-morbidities (DM, hypertension, renal disease, dylipidemia, aneima, HIV infection)

4.7. DATA COLLECTION INSTRUMENT

A structured questionnaire that was prepared after reviewing similar literatures and modified to local context will be used to collect data. The charts of all patients admitted for cardiac disease was viewed and all the required data documented by the primary treating residents was used to fill the questionnaire. The questionnaire contained; socio-demographic data, clinical history and physical examination, patient investigations and diagnosis of the disease. In case additional data which is not documented by treating physician and/ or there was a need for further clarification, the patients were interviewed and /or examined to fill the missing data by data collector as per required.

The X-ray comment of radiologist or ward consultant was accepted as appropriate. The currently working LOGIQ P6 and Samsung ACCUVIX echocardiography machine was used by Echo trained Internal medicine consultants and a cardiologist. Electrocardiography (ECG) interpretation was done by ward consultant physician.

4.8. DATA COLLECTORS

Data collectors were medical residents. They were trained well before data collection started by principal investigator for 1 day on: How to fill the questionnaire, the objective of the study and How to solve or handle a problem when they face regarding the study.

Close supervision was made by principal investigator.

4.9. MEASUREMENT

Waist circumference: the cut-off value for waist circumference was based on sex-specific cut-off values under category of 'substantially increased risk' from WHO guideline (58) as follow.

- Men $\geq$ 102 cm
- Female $\geq$ 88 cm

Body mass index (BMI): the following cut-off values for both men and female was taken (58).

- < 18.5 Kg/M^2 under weight
- 18.5 – 24.9 Kg/M^2 normal weight
- > 25 Kg/M^2 over weight

Hypertension: defined as at least one of the following met (35)

- SBP $\geq$140 mmHg
- DBP $\geq$ 90 mmHg
- Patient on anti hypertensive medication

CHF: was diagnosed based on Framingham's criteria for heart failure (36) **a**

Class of CHF: was based on New York Heart Associations (NYHA) (37) **b**

- **HFpEF**: HF with ejection fraction(EF) > 50% (38).
- **HFrEF**: HF with EF<50% (38).

Rheumatic heart disease: considered to be definitive if there is echocardiographic proven valve lesion(s) which is further specified by the valve(s) affected (39).

Hypertensive heart disease (HHD): was considered if hypertensive patient has at least one of the following (40).

- Left ventricular hypertrophy (LVH) by ECG or echocardiography

- History of congestive heart failure in the absence of documented evidence for other underlying cardiac disease

Chronic stable angina: Sub-sternal discomfort precipitated by exertion, with a typical radiation to the shoulder, jaw or inner aspect of the arm relieved by rest or nitroglycerin in less than 10 minutes (41).

Ischemic cardiomyopathy: ischemic heart disease resulting in left ventricular dysfunction and heart failure symptom (42)

Unstable angina (UA): angina pectoris with at least one of the following**,**

- Rest angina, which is usually more than 20 minutes in duration; or
- New onset angina that markedly limits physical activity; or
- Increasing angina that is more frequent, longer in duration, or occurs with less exertion than previous angina,
- And no elevation in troponins, with or without ECG changes indicative of ischemia (43)

Acute myocardial infarction: Detection of a rise and/or fall in cardiac biomarker values (preferably cTn), with at least one value above the 99th percentile of the URL and with at least one of the following:

- Symptoms of ischemia
- New or presumed new significant ST-segment T wave (ST-T) changes or new LBBB
- Development of pathologic Q waves on the ECG
- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality (44)

Criteria for Previous Myocardial Infarction: Any one of the following criteria meets the diagnosis for prior MI

- Pathologic Q waves with or without symptoms in the absence of nonischemic causes
- Imaging evidence of a region of loss of viable myocardium that is thinned and fails to contract in the absence of a nonischemic cause
- Pathologic findings of previous MI (44).

ST-segment elevation myocardial infarction (STEMI): acute myocardial infarction with characteristic ECG changes (45) **c**

Non–ST-segment elevation myocardial infarction NSTEMI: clinical feature of unstable angina with evidence cardiac necrosis as evidenced by rise of cardiac biomarkers, troponin and/ or CK-MB (43)

Acute coronary syndrome (ASC): covers the spectrum of clinical conditions: UA, NSTEMI to STEMI (46).

Elevated cardiac markers: if there is a rise and/or fall in troponin and/ or CK-MB values with at least one value above the 99th percentile of the upper reference limit for normal individuals (47)

Dilated cardiomyopathy (DCM): presence of left ventricular dilatation and left ventricular systolic dysfunction in the absence of abnormal loading conditions (hypertension, valve disease) or coronary artery disease sufficient to cause global systolic impairment (48)

Peripartum cardiomyopathy: condition meeting the following four criteria (49)

- Development of HF in the last trimester or within 6 months of delivery
- Absence of another identifiable cause of HF
- Absence of recognizable cause of HF prior to last trimester of pregnancy
- LV dysfunction on echocardiography

Cor-pulmonale: Dilatation, hypertrophy of right ventricle and/ or impaired right ventricle function because chest conditions in the absence of congenital heart disease, dysfunction of the left side of heart and structure (50)

Congenital heart disease: a structural or functional abnormality of the heart that predate from birth evidenced by characteristic clinical feature, laboratory and imaging studies echocardiographic findings of specific heart disease

Infective endocarditis: diagnosed as per Duke's criteria (51) [d]

Rheumatic fever: based on the revised Jones criteria (52) [e]

4.10. DATA PROCESSING AND ANALYSIS

After data collection, each questionnaire was checked for completeness and code was given during data collection. Data was entered in to data base, cleaned, and was explored for outliers, missed values and any inconsistencies was standardized and analyzed using SPSS version 20. If outliers and missed values are found during exploration, causes of outliers and missing values was determined and corrected. Descriptive statistics like frequency, tables, graphs and descriptive summaries was used to describe the study variables. Bivariate analysis, binary logistic regression and chi-square test were performed to see the existence of association between independent and dependent variables.

The Independent variables that showed significant association with dependent variables was reported using p-values and odd ratios. The independent variables that have p-value less

than 0.25 on bivariate analysis was used during multivariate analysis to test for associations. Ninety five percent Confidence of interval and p-values less than 0.05 were used as a cutoff point to see the presence of statistical significance during multivariate analysis.

4.11. PRE TEST

The questionnaire was tested using 5% of the sample on randomly selected cardiac patient admitted to JUMC. By doing this pretest, it helped to check identify potential problems of the questionnaire, examining the practicability, reliability and suitability of the method. Thus it helped us modify the questionnaire accordingly. Also the pretest allowed the data collector to familiarize with the instrument.

4.12. QUALITY CONTROL MEASURES

Data collectors was trained for a day long well before data collection started by principal investigator and then after as per required on how to fill the questionnaire.

The structured questionnaire was translated to Afaan Oromo and Amharic language during interview (if needed). Close supervision was made by principal investigator. Data was checked for completeness and consistency every day.

4.13. ETHICAL CONSIDERATIONS

Ethical clearance was taken from the Jimma University, internal medicine department, and institutional review board (IRB) before planning and starting data collection. Official letter was then given to Jimma University medical center administration. After due explanations of the purpose and benefits of the study in detail to the study participants and informing them that they had a full right not to cooperate and participate, the consent form was signed in written form or by a thumb print.

The privacy and confidentiality of the participants was maintained during data collection and analysis period. Confidentiality of the information will be assured from all the data collectors and principal investigators side. Any patient data that have treatment implication

(history, physical examination or investigation results) identified during this study - to which the primary treating physician is not aware of – was communicated to the treating physician for the good of the client.

4.14. DISSEMINATION PLAN

The results of this study will be submitted to the college of health sciences and public health of Jimma University. It will also be made to be known to the hospital administrator. At large the study results will be known to public and scientific society by requesting for publication by appropriate journal organizations.

4.15. OPERATIONAL DEFINITION

Significant history of alcohol use for cardiovascular disease: an average current daily use of alcohol with 3 units (30 gm) or more alcohol containing drinks. This can be interpreted as either use of two or more bottles of 300ml beer with 5% alcohol concentration daily; three or more melekiya of 'areke' daily(30-40% alcohol content); one or more use of 'single Tassa' of 'Tej" or 'Tella'

Significant history of cigarette smoking: this group of people can be

- **Currently non-smokers but, who smoked daily in their life time or smoked 100 pieces of cigarette or its equivalent.**
- **Individuals who are currently smoking cigarette.**

Physically active individual: Individuals doing at least 30 minutes of moderate physical activity suchlike brisk walking a day. This can be through Leisure time OR daily tasks OR work-related physical activity.

Sedentary life style: Individuals who are not otherwise active.

CHAPTER FIVE:

RESULTS

5.1. SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

A total of 1545 patients were admitted to Internal medicine wards over the 09 months from month of November, 2016 through month of July, 2017. A total of 365adults patients with heart disease were admitted to JUMC over this time frame. From these a total of 278 patients who fulfilled the inclusion criteria were participated in this study with 95.9% response rate.

One hundred forty one of the respondents (50.7%) were male whereas 137 (49.3%) were female. The overall mean age of adult patients admitted with cardiac disease who participated in this study over the study period was 49.6 ($\pm$16.8). The mean age of male cardiac patients were 51.5 ($\pm$17.5) and 47.5 ($\pm$15.9) in female counterparts. The overall minimum and maximum age of the patients was 16 and 85 respectively with age range of 69 years. The age group of 45 – 54 was the single largest group, 71 (25.5%) followed by age groups 35 – 44 years, 47 (16.9%). In this study, the number of cases found in the last age groups, i.e. 85 or above was only single individual (0.4%). Majority, 145 (52.2%) of the participants reported being a farmer as their primary livelihood income source. One hundred fifty two (54.7%) participants were illiterate; only 21(7.6%) of the total study participant could attain college level education. Most of the patients in this study, 225 (80.9%) are married. One hundred ninety four (70%) patients are from rural area. The general socio-economic characteristic of the study participants were summarized on Table 1 below.

Table 1: Socio-demographic characteristics of the admitted cardiac patients, JUMC, Southwest Ethiopia, July 2017.

Variables	Frequency	Percent
Age category		
15 - 24 years	17	6.1
25- 34 years	46	16.5
35 - 44 years	39	14.0
45 - 54 years	47	16.9
55 - 64 years	71	25.5
65 - 74 years	38	13.7
75 - 84 years	19	6.8
85+ years	1	.4
Sex		
Male	141	50.7
Female	137	49.3
Occupation		
Farmer	145	52.2
Employed for wedge	18	6.5
Self employed	16	5.8
Home maker	67	24.1
Merchant	13	4.7
Student	17	6.1
other	2	.7
Educational level		
Illiterate	151	54.3
Read and write only	29	10.4
1 – 8th grade	57	20.5
9 - 12th grade	20	7.2
College and above	21	7.6
Marital status		
Single	32	11.5
Married	225	80.9
Divorced	9	3.2
Widowed	12	4.3
Residence		
Urban	84	30.2
Rural	194	69.8

5.2. DISTRIBUTION OF TYPE OF THE UNDERLYING CARDIAC DISEASE

The diagnosis of underlying type of heart disease was based on thorough evaluation of patient's clinical presentation, cardiac biomarkers (based on the indication of course) and other ancillary tests; chest X-ray (CXR), electro-cardiographs (ECG) and trans-thoracic echocardiography (TTE). CXR, ECG and TTE was done for 275 (98.9%), 268 (96.4%) and 256 (92.1%) of patients respectively.

The commonest underlying type of cardiac disease among patients admitted to adult medical wards during study period was ischemic heart disease (IHD) accounting for 100 (36.8%) of the total cardiac cases. Rheumatic heart disease (RHD) was the second most common accounting for 48 participants (16.3%) of the cases followed by nearly similar frequency of dilated cardiomyopathy (DCM) 43 (16%) and hypertensive heart disease (HHD) which represent 40 (15%) of the total cases on the third tier. (Figure.1)

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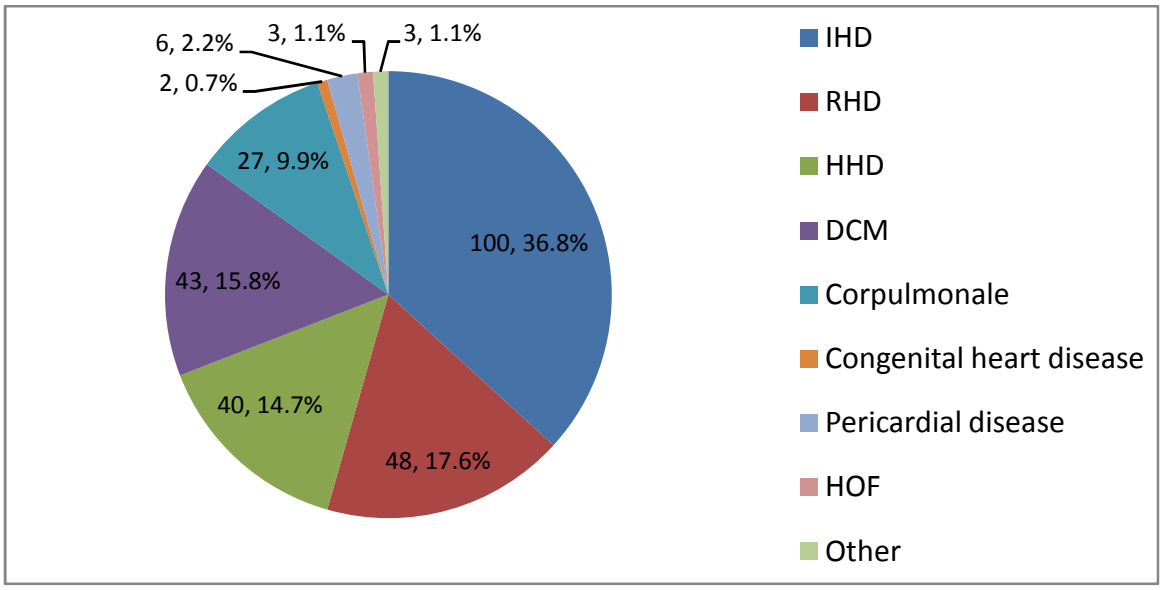

Figure 1: Type of the underlying cardiac disease type from month of November 2016 to July, 2017, JUMC adult medical wards, south west Ethiopia, August 2017

Ischemic cardiomyopathy was the most frequent causes of IHD and it accounts for 68, 68% of total IHD. (Figure 2).

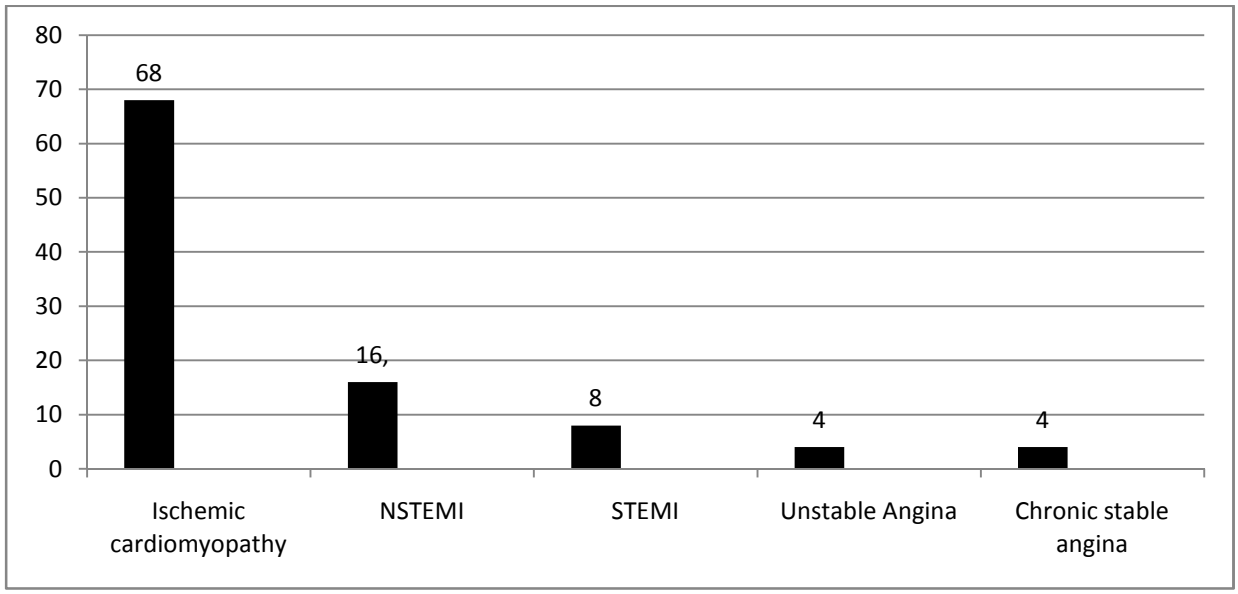

Figure 2: Sub-types of IHD among cardiac patients admitted to JUMC adult medical wards, south west Ethiopia, August 2017

Multi-valvular type of rheumatic heart disease (RHD) involving mitral and aortic valves virtually in all cases represents 42 (87.5%) of all RHD (Figure 3).

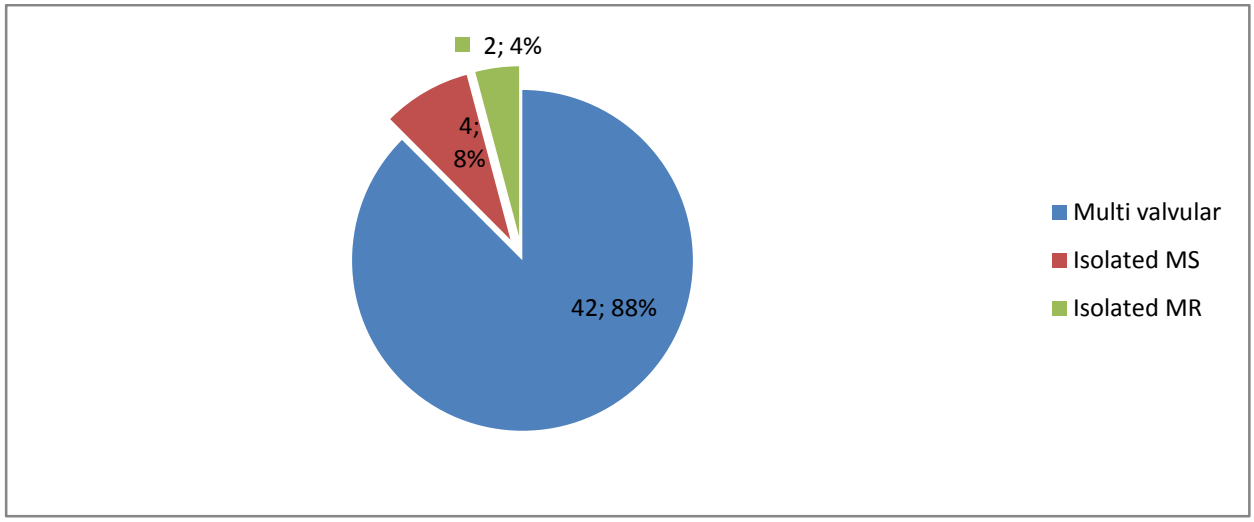

Figure 3: Sub-types of RHD among patients admitted to JUMC adult medical wards, south west Ethiopia, August 2017

Idiopathic DCM, represents 38 (81.4%) of all DCM (Table 2). Chronic obstructive pulmonary disease (COPD) and Post-tuberculosis fibrosis constitute 70% of all causes of corpulmonale (Table 2). All of the six pericardial diseases were due to tuberculosis (TB).

Table 2: The underlying causes DCM and corpulmonale, among patients admitted to JUMC adult medical wards, Southwest Ethiopia, August 2017.

	Causes	Frequency	%
Dilated cardiomyopathy			
	Idiopathic	35	81.4
	Thyrocardiac	6	14.0
	Peripartal	2	4.7
Corpulmonale			
	COPD	14	51.9
	Post TB fibrosis	5	18.5
	ILD	5	18.5
	Idiopathic Pulmunary Hypertension	3	11.1

5.3. DISTRIBUTION OF SPECIFIC TYPE OF UNDERLYING CARDIAC DISEASE BY SOCIO-ECONOMIC CHARACTERISTICS.

We carried out independent t-Test to examine whether there is mean age difference among deferent type of cardiac disease at admission. The mean age (SD) of IHD is the highest 61.0 (10.72) years ($p < 0.001$) while the mean age of RHD is 30.3 (8.8) years ($p < 0.001$) is the lowest mean age. Male proportion was found to be higher in IHD, DCM, HHD and pericardial diseases which accounts for 57, (57.0%); 23, (53.5%); 22, (55.0%) and 5, (83.3%) of the total percent of respective cardiac disease but, none of them is statistically significant. On the other hand, the proportion of female patients was found to be higher in RHD, corpulmonale, congenital heart disease, HOF and cardiac diseases under 'other' category which accounts for 27, (56.2%); 18, (66.7%); 2, (100%); 2, (66.7%) and 9, (66.7%) respectively. However, again this is not statistically significant. Virtually in all type of cardiac disease, rural area as a place of residence was a dominant proportion with exception in patients with congenital heart disease and patients with pericardial disease but, this is not statistically significant (Table 3.)

Table 3: The specific type of underlying cardiac disease by mean age, gender and place of residence from November 2016 to July, 2017, JUMC adult medical wards, south west Ethiopia, August 2017

Type of cardiac disease	Mean age (SD) in years	P-value	Gender		p-value	Place of residence		p-value
			Male, Y (%)	Female, Y (%)		Urban, Y (%)	Rural, Y (%)	
IHD	61.1 (10.7)	<0.001	57, (57.0)	43, (43.0)	0.116	32, (32.0)	68, (68.0)	0.627
RHD	30.3 (8.8)	<0.001	21, (43.8)	27, (56.2)	0.288	12, (25.0)	36, (75.0)	0.387
DCM	42.4 (14)	0.084	23, (53.5)	20, (46.5)	0.693	11, (25.6)	32, (74.4)	0.472
HHD	52.1 (15)	0.263	22, (55.0)	18, (45.0)	0.558	12, (30.0)	28, (70.0)	0.974
Corpulmonale	54.4 (12.6)	0.02	9, (33.3)	18, (66.7)	0.057	10, (37.0)	17, (63.0)	0.417
Congenital heart disease	55(00)	0.647	0, (00)	2, (100)	0.150	1, (50)	1, (50)	0.541
Pericardial disease	27.3 (13.9)	0.001	5, (83.3)	1, (16.7)	0.106	3, (50)	3, (50)	0.286
HOF	47 (28.9)	0.792	1, (33.3)	2, (66.7)	0.545	1, (33.3)	2, (66.7	0.906
Other	46.7 (17.2)	0.602	3, (33.3)	9, (66.7)	0.289	2, (22.2)	7, (77.8)	0.595

5.4. DISTRIBUTION OF TYPE OF THE UNDERLYING CARDIAC DISEASE BY ADMISSION CLINICAL FEATURES.

From all study participant, most of the patients admitted with cardiac disease 246 (88.5%) had a clinical diagnosis of either class III or IV heart failure using Framingham's heart failure criteria score, while, 32 (11.5%) of patients had not by using similar criteria. This finding is more or less in similar fashion across specific types of underlying type of heart disease which is summarized on (Table 4) below with exception of IHD where patients with class III or IV heart failure are relatively less, 79.0% ($p<0.001$).

Table 4: Frequency of heart failure among specific types of underlying cardiac disease among patients admitted cardiac patients, JUMC, South-west Ethiopia August, 2017

	Heart failure at admission		p-value
Type of underlying heart disease	**Y, (%)**	**N, (%)**	
IHD	79, (79.0%)	21, (21.0%)	<.001
RHD	46, (95.8%)	2, (4.2%)	0.08
DCM	41, (95.3%)	2, (4.7%)	0.125
HHD	37, (92.5%)	3, (7.5%)	0.390
Corpulmonale	26, (96.3%)	1, (3.7%)	0.181
Congenital heart disease	2, (100.0%)	0, (0.0%)	0.609
Pericardial disease	5, (83.3%)	1, (16.7%)	0.896
HOF	3, (100.0%)	0, (0.0%)	0.53
Other	7, (77.8%)	2, (22.2%)	0.307

Among 278 total patients participated in this study: 256 (92.1%) of patients had echocardiography done during their inpatient admission stay. Based on ejection fraction reports from echocardiography, 128 (55.7%) of patients had depressed left ventricular systolic function as compared to 102 (44.3%) patients with heart failure has preserved left ventricular systolic function. The status of left ventricular systolic function as based on echocardiography ejection fraction report vary markedly across specific underlying type of heart disease. This ranges for instance from all patients with pericardial disease having preserved left ventricular systolic function (***p***=0.009) to all patient of DCM having depressed left ventricular systolic function (***p***<.001) as summarized in the Table 5 below.

Table 5: Frequency left ventricular systolic function among specific types of underlying cardiac disease among admitted cardiac patients, JUMC South-west Ethiopia, August 2017

	Left ventricular systolic function		p-value
	Maintained	**Depressed**	
IHD	27, (30.7%)	61, (69.3%)	<.001
RHD	29, (61.7%)	18, (38.3%)	0.033
HHD	30, (81.1%)	7, (18.9%)	<.001
DCM	0, (0.0%)	42, (100.0%)	<.001
Corpulmonale	23, (85.2%)	4, (14.8%)	<.001
Congenital heart disease	2, (100.0%)	0, (0.0%)	0.137
Pericardial disease	6, (100.0%)	0, (0.0%)	0.009
Other	5, (71.4%)	2, (28.6%)	0.202

Out of identified or suspected cause of heart failure precipitation, Pneumonia, arrhythmia, drug discontinuation, urinary tract infection (UTI), uncontrolled hypertension and anemia account for 86% of the cases (Figure 4).

Atrial fibrillation was found in 52 (18.7%) of patients as a single or 'add on' cause of heart failure precipitant.

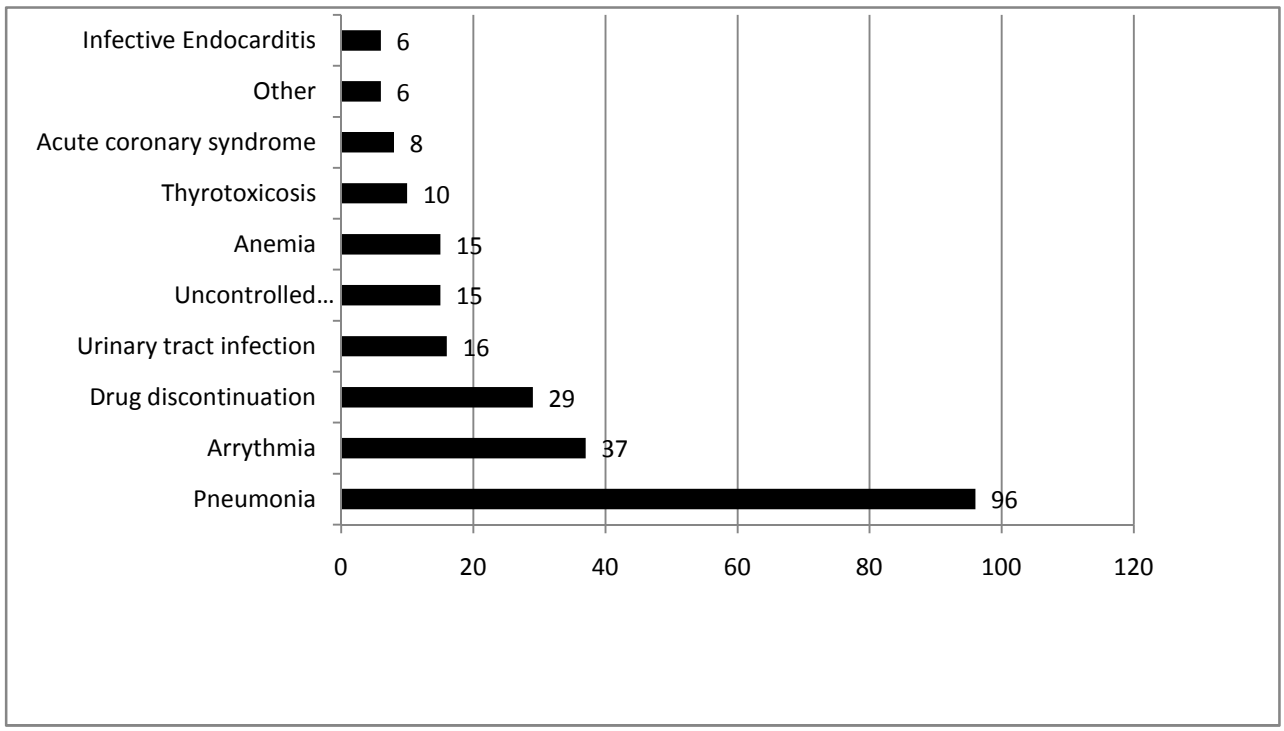

Figure 4: Distribution of f the precipitant causes of heart failure, JUMC adult medical wards, south west Ethiopia, August 2017

5.5. FACTORS AFFECTING THE DISTRIBUTIONS OF SELECTED CARDIAC DISEASES.

Out of the total 278 participants who are screened for traditional cardio-vascular risk factors, 89 (32.0%) patients were hypertensive based on the history [whether the patient is on antihypertensive medication for blood pressure (BP) control or not] and mean BP measures during inpatient hospital stay. Thirty nine (14.0%) of patients had a high (abnormal) waist circumference and also 36 (12.9%) patients had 'over-weight' value based on body mass index (BMI) value. Here, it is worth noting 87 (31.3%) of the study participant are under-weight. Smoking, sedentary life style, Diabetes mellitus (DM), and significant alcohol uses rather account for the smaller fraction of the participant that accounts; 27 (9.7%); 22 (7.9%); 17 (6.1%) and 6 (2.2%) respectively (Table 6). Serum lipid profile was done for only 81 (29.1) of the patients from which 40 (49.4%) of them had dyslipidemia.

Table 6: Frequency of traditional cardio-vascular risk factors among admitted cardiac patients, JUMC South-west Ethiopia, August 2017

Cardio-vascular risk factor	Y	(%)	N	(%)
Hypertensive	89	32.0	189	68.0
High waist circumference	39	14.0	239	86.0
Over weight (BMI)	36	12.9	242	87.1
Smoking history	27	9.7	251	90.3
Sedentary life style	22	7.9	256	92.1
Diabetes mellitus	17	6.1	261	93.9
Significant alcohol use	6	2.2	272	97.8

5.5.1. FACTORS AFFECTING THE DISTRIBUTIONS OF IHD

Univariate analysis

Table 7 shows the association between the predictor variables and the occurrence of IHD after chi-square test for independence was done. There was a significant association between age of the patients ($p < 0.001$); occupation (p = 0.001); level education (p= 0.008); marital status (p <0.001); having diabetes (p= 0.002); high waist circumference (p= 0.01) and over-weight status with BMI (p=0.001) with occurrence of IHD. On the other hand there is no statistically significant association between sex, residence, Hypertension, smoking physical activity and alcohol use

Table 7: Factors associated with IHD -chi-square test-among admitted cardiac patients, JUMC South-west Ethiopia, August 2017

Variable		Ischemic heart disease		P-Value	Crude OR (95% CI)
		No, N (%)	Yes, N (%)		
Age	<45	97 (95.1%)	5, (4.9%)	< .001	1.00
	≥45	81, (46.0%)	95, (54.0%)		22.6 (8.8 - 58.6)
Sex	Male	84, (59.6%)	57, (40.4%)	.116	1.00
	Female	94, (68.6%)	43, (31.4%)		.67 (.41 - 1.10)
Occupation	Farmer	83, (57.2%)	62, (42.8%)	.001	
	Employed for wages	11, (61.1%)	7, (38.9%)		
	Self employed	15, (93.8%)	1, (6.2%)		
	Home maker	43, (64.2%)	24, (35.8%)		
	Merchant	7, (53.8%)	6, (46.2%)		
	Student	19, (100.0%)	0, (0.0%)		
Level of education	Illiterate	85, (56.3%)	66, (43.7%)	.008	
	Read and write	17, (58.6%)	12, (41.4%)		
	Primary school	43, (75.4%)	14, (24.6%)		
	Secondary school	18, (90.0%)	2, (10.0%)		
	College level	15, (71.4%)	6, (28.6%)		
Marital status	Single	32, (100.0%)	0, (0.0%)	<. 001	
	Married	136, (60.4%)	89, (39.6%)		

	others	10, (47.6%)	11, (52.4%)		
Residence	Urban	52, (61.9%)	32, (38.1%)	.627	1.00
	Rural	126, (64.9%)	68, (35.1%)		.88 (.52- 1.49)
Hypertension	No	127, (67.2%)	62, (32.8%)	.109	1.00
	Yes	51, (57.3%)	38, (42.7%)		1.53 (.91 - 2.56)
Smoking	Yes	19, (70.4%)	8, (29.6%)	.470	1.00
	No	159, (63.3%)	92, (36.7%)		1.37 (.58- 3.26)
Diabetes	Yes	5, (29.4%)	12, (70.6%)	.002	1.00
	No	173, (66.3%)	88, (33.7%)		.21 (.07 -.62)
Alcohol use	Yes	3, (50.0%)	3, (50.0%)	.469	1.00
	No	175, (64.3%)	97, (35.7%)		.55 (.11 - 2.8)
Physically active	Yes	166, (64.8%)	90, (35.2%)	.334	1.00
	No	12, (54.5%)	10, (45.5%)		1.54 (.64 - 3.7)
Waist circumference	Normal	160, (66.9%)	79, (33.1%)	.012	1.00
	High	18, (46.2%)	21, (53.8%)		2.36 (1.19- 4.68)
BMI	Under-weight	62, (71.3%)	25, (28.7%)	.001	
	Normal	103, (66.5%)	52, (33.5%)		
	Over-weight	13, (36.1%)	23, (63.9%)		

Multivariate analysis

we performed binary logistic regression on predictor variables that were significant on univariate analysis (those variables with p< 0.2) to determine whether these variables were independently associated with the increased of occurrence of IHD. The results showed that the age 45 or more ($p < 0.01$) and over-weight BMI ($p = 0.002$) were independently associated with an increase in IHD frequency (Table 8).

Table 8: Factors associated with IHD –binary logistic regression- among admitted cardiac patients, JUMC South-west Ethiopia, August 2017

Variable		P-value	AOR (95% CI)
Age	>45	< .001	17.626 (5.883 - 52.806)
BMI	Normal-weight	.009	1.00
	Over-weight	.002	7.536 (2.083 - 27.261)

CHAPTER SIX:

DISCUSSION

The vast majority of cardiac disease in sub-Saharan Africa is due to non-ischemic causes, mainly RHD, HHD, and DCM (8). In this study we tried to assess the socio-economic characteristics, pattern of cardiac disease and association of selected predictor variable with selected underlying type of cardiac disease, particularly ischemic heart disease among admitted cardiac patients over the study period. Our study revealed that the overall mean age of the participants was 49.6 years. It also showed a nearly equal number of men to female proportion where male populations represents, 50.7%.This is in congruent with the Sub-Saharan Africa Survey of Heart Failure (THESUS–HF) where the mean age and male population was 52.3 years and 49.2% respectively (24). Our finding is slightly higher value when compared with the mean age of the participants in a study done at JUMC cardiac clinic follow up which were 43.5 years (11). This may be partly because of the higher number of the type of cardiac disease which affects the older groups (like IHD) in our study, as discussed below, compared to this study.

Nearly 70% (194) patients in this study are from rural area as reported by individuals when asked while the others are from the urban area which is much higher from the study above (11). This difference can be partly explained by the fact that urban populations are more likely to have a regular follow up every 01 to 03 months than the rural populations who came for tertiary hospital like JUMC for treatment and to have a follow up at nearby health centre or hospital then after.

In our study, IHD is strikingly found to be the leading cause of cardiac admission which accounts for 100 (36.8%) of the total cases. So far none of the published articles has similar finding. However the alarming increase of 'emerging' causes of heart disease causes has been noted and have been echoed by several investigators both at (11, 25, 53) home country and (24) at African continent. The increment in the proportion of IHD might be viewed in two ways: first, there may be absolute decrease in the number of RHD (the previously leading cardiac disease) giving way to the emergence of cardiac diseases like IHD (22). Secondly, there may be an increase in the number of cardiac diseases like IHD while there is little or no change at all or even increasing prevalence of RHD (10). On the support of the second idea, the recent work of

Taddese *et. al* (55) which was released this year, 2017 has showed there is still a high prevalence of RHD in the communities of rural areas of Ethiopia with prevalence of 37.5 per 1000 population.

The mean age RHD patients in this study: 30.1 years is similar to the study of JUMC cardiac clinic follow up which were 31.1 years (11). However, this is slightly higher to other's study result (9, 25) where majority rheumatic patients presented symptomatic during their 3rd decade of life (in their twenties). Female predominance (not statistically significant, though) in this study 56.2% were in similar fashion with the finding obtained from the study done in Gondar and Tikur Anbessa Hospital (9, 10).

The proportion of HHD and DCM in our study is much lower when compared to the other study results done in Ethiopia, Nigeria and Ghana (9, 10, 11, 13, 14, 24, and 56). However HHD and DCM are still constitutes a larger percent of the type of cardiac disease 15% and 16% respectively. Along with IHD and RHD these diseases represent 83.1% of the total underlying type of heart disease.

The fact that 18.5% all corpulmonale causes and all pericardial disease were caused by tuberculosis underscore that the significant role of infectious etiology in cardiac diseases in this study.

Our study revealed that most of the patients admitted with cardiac disease 246 (88.5%) had a clinical diagnosis of heart failure. Out of total patients with heart failure, nearly 45% of them had preserved left ventricular ejection fraction from echocardiography report. This finding is in congruent with the epidemiological data which shows nearly half of patients presenting with heart failure have heart failure with preserved ejection fraction (57).

Another impressing finding to note is that atrial fibrillation was found in 52 (18.7%) of patients as a single or 'add on' cause of heart failure precipitant complicating the management of heart failure in this individual and also with its accompanying risk of thrombo-embolic events in this individual. Regarding this finding, THESUS–HF study reported nearly similar impressing finding of 18.3% (24).

Out of the total 278 participants who are screened for traditional cardio-vascular risk factors, 89 (32.0%) patients had hypertension, 39 (14.0%) of patients had a high (abnormal) waist circumference and 36 (12.9%) patients had BMI $\geq$ 25 kg/M^2. Eighty seven (31.3%) of the study participant are under-weight. Smoking, sedentary life style, DM (as reported by patient),

and significant alcohol uses (more than moderate) accounts for; 27 (9.7%); 22 (7.9%); 17 (6.1%) and 6 (2.2%) respectively. Only 21% of the all participants in this study (half of whom are dyslipidemic) were screened for lipid profile. The same is true for diabetes as well, only a self report of diabetes were taken to categorize the patient whether they have diabetes or not. This is because the diabetes screening were not done appropriately or not done at all in the majority of patients. This implicates how these definitively proven risk factors for athero-sclerotic diseases are seen lightly in this particular set up.

So far none of the published open sources (after thoroughly searched) have exhausted the traditional risk factors with respect to cardiovascular disease (specifically atherosclerotic) to compare our study with. However, Mamo Y. and his colleagues (53) who looked in to trends of acute myocardial infarction admissions over a decade among Tikur Anbessa Hospital admitted to medical intensive care unit, found raised total cholesterol and hypertension were commonest risk factors being reported in 69% and 47% of AMI patients respectively. Again, THESUS-HF (mentioned above) found dyslipidemia, smoking, hypertension, diabetes mellitus and abnormal BMI (>30kg/M^2) in 17.3%, 9.8%, 55.4%, 11.4, and 16.3%

It is un-hoped finding however, that the effects of most of the above traditional risk factors like hypertension, smoking, diabetes mellitus and physical inactivity, above are not observed as an independent associated factor with IHD in this study. It is noteworthy looking some probable reasons here. Significant numbers of the study participants are not encountered during their first clinical presentation with initial (new) diagnosis during the study period. Rather a number of patients were diagnosed before current admission as such they were on medication for their 'heart cases'. It is observable thus, because of the overlapping anti hypertensive medication with medications that are given for 'heart cases'; they might have a hypertension that is controlled now. Smoking and history of diabetes mellitus (DM) is small in this study. For DM, Hemoglobin A1c was not done in this study and FBS done during patients stay in the ward was not used to define diabetes as it can erroneously swing during illness as in this study. A minimal threshold for physical activity was taken to label individuals whether physically active or not. Not gauging the level of physical activity in this study might have lessened its association with IHD. Combining all this factors, as a result, only age and being over-weight (BMI) were found to be independent risk factors identified.

Why IHD burden has increased considerably in this study will not be simple to answer. In additions to limitations related to screening for DM and dyslipidemia (discussed above) in this study, here are some of the arguments we need to raise. To start with is age of the individuals in this study, a single important non-modifiable risk factor for ischemic heart disease. There is a general trend that people of this country [Ethiopia] is getting older. As a matter of fact, in 2015 the life expectancy of Ethiopia was much higher, 64.54 years as compared to 43.74 years 35 years ago (59). Coming to modifiable risk factors, obesity as pointed out in this study needs to be highlighted. Looking to dietary habit is noteworthy. As daily consumption of fruits and vegetables were found to be protective of IHD unequivocally (17). Thus in the community where staple food is not inclusive of daily fruits and vegetable, this protective effect will be deprived. Psychosocial stressors which was amongst causes of IHD (17), needs careful attention in countries like Ethiopia which is on transition of move along growth and development.

6.1. STENGTH OF THE STUDY

We believe that this finding will provide invaluable, alarming, information for the local hospital and policy makers at large regarding the general pattern of cardiac disease in our country.

6.2. LIMITATIONS OF THE STUDY

As the data will be derived primarily from the documented note of the treating physician not by principal investigator, there may be bias. There were some of the important laboratory blood tests, specifically fasting blood cholesterol levels and appropriate DM screening which were done in only less than a third of the patients. Because of low literacy level, some of the important demographic data (like age) were guessed by the participants than known for sure

Although our findings are derived from hospital based study, and hence may not be representative of the general Ethiopian population;

CHAPTER SEVEN:

CONCLUSION AND RECOMMENDATIONS

7.1. CONCLUSIONS

IHD is on the rise as a major leading underlying type of heart disease in south west of Ethiopia. Aging and obesity are the two independent risk factors identified

7.2. RECOMMENDATIONS

We insist that there should be a national strategy in creating community awareness. This can be in terms of healthy life style that includes but not limited to personal and environmental hygiene; early treatment seeking of children for sore throat treatment; healthy diets like daily fruit and vegetable consumption and avoidance/ reduction of cholesterol rich and trans-fats; need of regular medical follow up for non-communicable medical conditions like hypertension and diabetes. Health institutions need to build their capacity in terms of screening well and controlling modifiable cardiovascular risk factors like dyslipidemia, hypertension, DM and obesity. At the same time health institutions need to promote healthy life styles to their patients in timely manner. Finally we strongly recommend that multi-centered population based representative study with rigorous risk factor screening tools is needed to have concrete scenario of cardiac disease with its associated risk factors in this country.

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ANNEX II: QUESTIONNAIRE ON PATTERN OF CARDIAC DISEASE AMONG PATIENTS ADMITTED TO JUMC

Part I socio- demographic date

Initial _____
Age (yrs) _____
Sex:
- ☐ Male
- ☐ Female

Occupation:
- ☐ Farmer
- ☐ Employed for wages
- ☐ Self-employed
- ☐ Homemaker
- ☐ Merchant
- ☐ Other, specify; _____

Marrital status
- ☐ Single
- ☐ Married
- ☐ Divorced
- ☐ Widowed

Education status
- ☐ Illiterate
- ☐ Read and write only
- ☐ 1-8th grade
- ☐ 9-12th grade
- ☐ College and above

Residence
Region _____Zone_____
Wereda _____ Kebele_____
- ☐ Urban
- ☐ Rural

Date of Admission: ___/____/2009 E.C.
Date/ month/year

Part II cardiovascular risk factor screening- clinical history

	Yes	No
1. Currently on anti-hypertensive drugs?		
2. Ever smoked Smoked >100 pieces of cigarette **or** Smoked daily ever?		
3. Currently smoking?		
4. On diabetes treatment with medication?		
5. Using alcohol currently?		
6. If yes: on daily bases; is it >3 units (>30 gram of alcohol)? ¥¥		
7. Is he / she physically active? §		

Part II cardiovascular risk factor screening - physical examination

1. SBP (mmHg)_____
2. DBP (mmHg)_____
3. Waist circumference cm)_____
4. BMI (Kg/ m^2) _____

¥¥
one units of alcohol equates with 10 gm of alcohol. So,> 3units (30 gm)/day of alcohol, which can be:
1. *> Two bottles of 300ml beer with 5% alcohol concentration daily*
2. *> Three melekiya of areke daily(30-40% alcohol content)*
3. *> one of 'Tassa' of 'Tej" or 'Tella'*

§
*Individuals is doing at least 30 minutes of moderate physical activity suchlike **brisk walking** a day, through Leisure time **OR** daily tasks **OR** work-related physical activity.*

Part III: Investigations- Laboratory

PIHCT (R/NR)		FBS(mg/dl)		Creatinine (mg/dl)	
Hemoglobin (g/dl)		Total cholesterol (mg/dl)		BUN (mg/dl)	
eGFR(mL/min/1.73 m ^{2}) with MDRD		LDL (mg/dl)		CK-MB	
		HDL (mg/dl)		Troponin	

Part IV: Investigations -IMAGING AND ELECTROCARDIOGRAPHY:

PLEASE MARK (✓) ALL THAT APPLY

CHEST X-RAY

- ☐ Cardiomegally
- ☐ Pulmonary edema
- ☐ Cephalization
- ☐ Bilateral or right side pleural effusion
- ☐ Other; specify_____

ECG

- ☐ Left ventricular hypertrophy (LVH)
- ☐ ST-segment changes: Specify_____
- ☐ Right ventricular hypertrophy (RVH)
- ☐ T-wave changes: specify _____
- ☐ Left atrial abnormality
- ☐ LBBB
- ☐ Right atrial enlargement
- ☐ RBBB
- ☐ Pathologic Q-waves
- ☐ Arrhythmia: specify_____
- ☐ Other ECG changes; specify_____

ECHOCARDIOGRAPHY

Conclusion_____

_____

Ejection fraction (EF) in percent_____ _____

Part IV: patient presentation and clinical diagnosis

1. Underlying type of cardiac disease ‡‡_____
2. Major complaint of patient at presentation‡‡_____

Heart failure?

3. Patient fulfills framinghams heart failure criteria at presentation? **Yes** ☐ **No** ☐
4. If **yes**, what is NYHA class of the patient?_____
5. If yes what are the identified and/ or suspected precipitant(s)? ‡‡_____

‡‡ ***Please use the check list at the end of this questionnaire***

Type underlying of cardiac disease	
IHD	Ischemic cardiomyopathy
	Unstable angina
	NSTEMI
	STEMI Specify Kllip-class:_____
	Chronic stable angina
RHD	MS
	MR
	AS
	AR
HHD	
CMP	Idiopathic
	Identified cause_____
Corpulmonale	Secondary to _____ _____
Congenital heart disease	Specify:_____ _____
Pericardial disease	Secondary to _____ _____
Other	Specify:

Major complaint?

1. Ischemic chest pain or ischemic equivalent features?
2. Shortness of breath?
3. Body swelling?
4. Palpitation?
5. Other?
   5.1. Specify_____

Precipitant(s) identified or suspected?

1. Pneumonia?
2. Pregnancy?
3. UTI?
4. Arrhythmia?
   4.1. Specify_____
5. ACS?
6. Uncontrolled hypertension?
7. Drug discontinuation?
8. Non adherence to dietary advice?
9. Other?
   9.1. Specify_____

Annex III: further explanation of measurements

[a] The Framingham criteria for the diagnosis of heart failure:

Major criteria	Minor criteria
Paroxysmal nocturnal dyspnea Weight loss of 4.5 kg in 5 days in response to treatment Neck vein distention Rales Acute pulmonary edema Hepatojugular reflux S_3 gallop Central venous pressure greater than 16 cm water Circulation time of 25 seconds Radiographic cardiomegaly Pulmonary edema, visceral congestion, or cardiomegaly at autopsy	Nocturnal cough Dyspnea on ordinary exertion A decrease in vital capacity by one third the maximal value recorded Pleural effusion Tachycardia (rate of 120 bpm) Bilateral ankle edema
Diagnosis of heart failure	Presence of either 2 major criteria *or* 1 major and 2

[b] The NYHA classification system of heart failure

Class I	No limitation of physical activity
Class II	Slight limitation of physical activity
Class III	Marked limitation of physical activity
Class IV	Symptoms occur even at rest; discomfort with any physical activity

C ECG criteria of STEMI

ECG MANIFESTATIONS OF ACUTE MYOCARDIAL ISCHEMIA (IN THE ABSENCE OF LBBB)
ST Elevation
New ST elevation at the J point in two contiguous leads with the following cut points: • ≥0.1 mV in all leads (except V2-V3) In leads V2-V3 the following cut points apply: • ≥0.2 mV in men ≥40 years ≥0.25 mV in men <40 years ≥0.15 mV in women
ST Depression and T Wave Changes
• New horizontal or downsloping ST depression ≥0.05 mV in two contiguous leads • T-wave inversion ≥0.1 mV in two contiguous leads with a prominent R wave or R/S ratio >1

ECG MANIFESTATIONS OF ISCHEMIA IN THE SETTING OF LBBB A score of ≥3 had a specificity of 98% for acute MI	
Electrocardiographic Criterion	Points
ST-segment elevation ≥1 mm and concordant with the QRS complex	5
ST-segment depression ≥1 mm in lead V1, V2, or V3	3
ST-segment elevation ≥5 mm and discordant with the QRS complex	2

[d] Infective endocarditis, modified dukes criteria

Major criteria
Positive blood cultures for IE
Typical microorganism for infective endocarditis from two separate blood cultures
Viridans streptococci
Streptococcus gallolyticus (formerly S. bovis)
HACEK group - Haemophilus spp, Aggregatibacter (formerly Actinobacillus actinomycete comitants), Cardiobacterium hominis, Eikenella spp, and Kingella kingae.
Staphylococcus aureus
Community-acquired enterococci, in the absence of a primary focus; **OR**
Persistently positive blood culture, defined as recovery of a microorganism consistent with IE from:
Blood cultures drawn more than 12 hours apart **OR**
All of three or a majority of four or more separate blood cultures, with first and last drawn at least one hour apart
Single positive blood culture for C. burnetii or antiphase I IgG antibody titer >1:800*
Evidence of endocardial involvement
Positive echocardiogram for IE
TEE recommended in patients with prosthetic valves, rated at least "possible IE" by clinical criteria, or complicated IE [paravalvular abscess]; TTE as first test in other patients*
Definition of positive echocardiogram
Oscillating intracardiac mass, on valve or supporting structures, or in the path of regurgitant jets, or on implanted material, in the absence of an alternative anatomic explanation**OR**
Abscess **OR**
New partial dehiscence of prosthetic valve
New valvular regurgitation
Increase in or change in preexisting murmur not sufficient
Minor criteria
Predisposition - predisposing heart condition or intravenous drug use
Fever - 38.0°C (100.4°F)
Vascular phenomena - major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial hemorrhage, conjunctival hemorrhages, Janeway lesions
Immunologic phenomena - glomerulonephritis, Osler's nodes, Roth spots, rheumatoid factor
Microbiologic evidence - positive blood culture but not meeting major criterion as noted previously (excluding single positive cultures for coagulase-negative straphylococci and organisms that do not cause endocarditis) **OR** serologic evidence of active infection with organism consistent with IE
Echocardiographic minor criteria eliminated*

a Definite endocarditis is defined by documentation of two major criteria, of one major criterion and three minor criteria, or of five minor criteria.

[e] Acute rheumatic fever, revised Jones criteria

Diagnostic catagories	Criteria
Primary episode of rheumatic fever	Two major or one major and two minor manifestations plus evidence of preceding group A streptococcal infection
Recurrent attack of rheumatic fever in a patient without established rheumatic heart disease	Two major or one major and two minor manifestations plus evidence of preceding group A streptococcal infection
Recurrent attack of rheumatic fever in a patient with established RHD	Two minor manifestations plus evidence of preceding group A streptococcal infection[c]
Rheumatic chorea Insidious onset rheumatic carditi	Other major manifestations or evidence of group A streptococcal infection not required
Chronic valve lesions of rheumatic heart disease (patients presenting for the first time with pure mitral stenosis or mixed mitral valve disease and/ or aortic valve disease)	Do not require any other criteria to be diagnosed as having rheumatic heart disease
Major manifestations	Carditis Polyarthritis Chorea Erythema marginatum Subcutaneous nodules
Minor manifestations	Clinical: fever, polyarthralgia Laboratory: elevated erythrocyte sedimentation rate or leukocyte count Electrocardiogram: prolonged P-R interval
Supporting evidence of a preceding streptococcal infection within the last 45 days	Elevated or rising ASO or other streptococcal antibody, *or* A positive throat culture, *or* Rapid antigen test for group A streptococcus, *or* Recent scarlet fever

DECLARATION

I THE UNDERSIGNED THIRD YEAR INTERNAL MEDICINE RESIDENT DECLARE THAT THIS THESIS IS MY ORIGINAL WORK IN PARTIAL FULFILLMENT FOR THE REQUIREMENT FOR THE SPECIALTY CERTIFICATE IN INTERNAL MEDICINE. ALL THE SOURCES OF THE MATERIAL USED FOR THIS THESIS AND ALL PEOPLE AND INSTITUTIONS WHO GAVE SUPPORT FOR THIS WORK ARE FULLY ACKNOWLEDGED.

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PLACE OF SUBMISSION: JIMMA UNIVERSITY INSTUTTE OF HEALTH, DEPARTMENT OF INTERNAL MEDICINE

DATE OF ADMISSION: _____

THIS THESIS WORK HAS BEEN APPROVED BY MY ADVISORS.
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