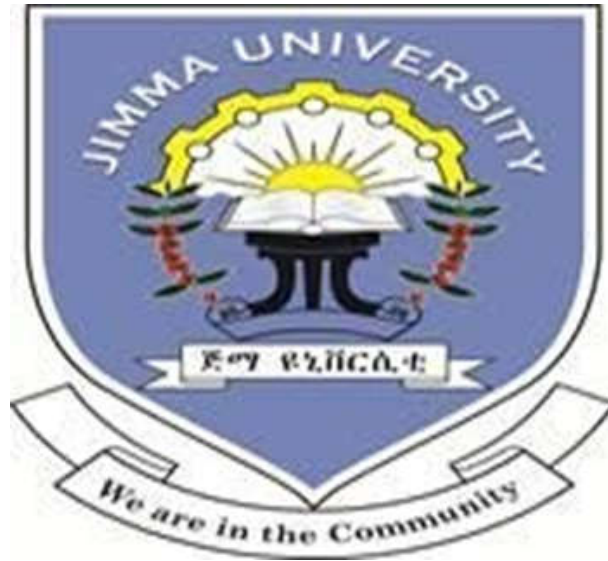


**PATTERNS OF CAUSES OF HEART FAILURE AND RELATED FACTORS AMONG
HEART FAILURE PATIENTS ADMITTED TO JIMMA UNIVERSITY SPECIALIZED
HOSPITAL MEDICAL WARD, JIMMA, ETHIOPIA**



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Patterns of causes of heart failure among heart failure patients admitted to Jimma
University specialized hospital medical ward, Jimma, Ethiopia

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Abstract

Background: Heart failure is a burgeoning problem worldwide; with more than 20 million people affected. As developing nations undergo socioeconomic development, the epidemiology of HF is becoming similar to that of Western Europe and North America, with CAD emerging as the single most common cause of HF. There are no documented data on the etiology of heart failure among adult heart failure patients admitted to medical wards in Jimma University Specialized Hospital.

Objective; The main objective of this study is to assess the cause of heart failure and related risk factors in adult patients admitted to JUSH medical wards with the diagnosis of heart failure from July, 8, 2015 to July 7, 2016.

Methods: Institutional based cross-sectional study was conducted on adult patients admitted with the diagnosis of heart failure to JUSH internal Medicine wards from. July 8, 2015 to July 7, 2016. Systematic random sampling method was used to collect the data from 320 heart failure patients admitted in internal medicine wards in JUSH. Secondary data were used as data source and data were collected using a data collection format clinical parameters and investigation results. The data were analyzed using SPSS version 20.0. Frequency distributions of the socio-demographic characteristics and other variables were portrayed.

Results: One hundred twenty (37.5%) of heart failure patients who were admitted in JUSH are caused by Ischemic heart disease (IHD), followed by rheumatic heart disease (RHD) accounts 66 (20.6%), Cardiomyopathy 62(19.4%), Hypertensive heart disease (HHD) 30(9.4%) ,corpulmonale 19(5.9%),hypertensive heart disease and ischemic heart disease combined together 6 (1.9%) and others contribute 17(5.3%). From 320 Heart failure patients 74 (23.1%) of them are known hypertensive patients, fourteen (4.4%) of HF patients are diabetic and only 29(9.1%) of heart failure patients are smokers.

Conclusion and recommendation: The results of this study indicated that epidemiology of causes of heart failure has changed from rheumatic heart diseases to ischemic heart diseases becoming almost similar to western developed countries. Prevention strategies should also focus to the newly emerging cause of HF.

Key words; Heart failure, JUSH medical wards, Coronary artery disease

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Acronyms and Abbreviations

CAD	Coronary Artery Disease
DCMP	Dilated Cardiomyopathy
HF	Heart Failure
HHD	Hypertensive Heart Disease
IHD	Ischemic Heart Disease
IVP	Increased venous pressure
MDG	Millennium Developmental Goal
NCD	Non Communicable Diseases
NRVHD	Non-Rheumatic Valvular Heart Disease
PND	Paroxysmal nocturnal dyspnea
RVHD	Rheumatic Valvular Heart Disease
SSA	Sub Saharan Africa
USA	United States of America
WHO	World Health Organization

Chapter One

1. Introduction

1.1 Background

Heart failure (HF) is a clinical syndrome that occurs in patients who, because of an inherited or acquired abnormality of cardiac structure and/or function, develop a constellation of clinical symptoms of heart failure include: Shortness of breath during daily activities(dyspnea), Having trouble breathing when lying down(orthopnea), Weight gain with swelling in the feet, legs, ankles, or stomach (edema and rales) , Generally feeling tired or weak (Fatigue) and signs that lead to frequent hospitalizations, a poor quality of life, and a shortened life expectancy (1).

It is a chronic disease characterized by the inability of the heart to pump an adequate amount of blood to achieve the demand of the different organ systems and/or doing so at increased filling pressures. It is a serious condition representing the end-stage of a myriad of other cardiac diseases without a curative treatment. Once diagnosed, medication is required for the rest of the patient's life to improve their life quality and survival (2).

Heart failure (HF) is a common cardiovascular condition with increasing incidence and prevalence Heart failure is a burgeoning problem worldwide, with more than 20 million people affected (3).

Data from the Framingham study into the natural history of coronary heart disease, commenced in the US in 1949, provided insight into the modifiable risk factors of CHF. When these are examined in relation to CHF, the population attributable fraction (PAF) for high blood pressure is greatest, accounting for 39% of CHF in men and 59% in women. Previous myocardial infarction, despite its much lower prevalence in the population, (3-10%), was the second commonest contributor to CHF in men (34%) and in women (13%). Valvular heart diseases accounted for 7-8% of CHF (4). Other less common but serious risk factors for CHF are diseases of the heart muscle (cardiomyopathy) due to alcohol abuse or infections, diabetes and obesity. However, the effect of diabetes and obesity on CHF events is generally mediated through high blood pressure (5)

Several criteria have been proposed for diagnosis of heart failure, including the Framingham criteria, the Boston criteria, the Gothenburg criteria and the European Society of Cardiology criteria but, all rely on similar indicators of symptoms and elevated filling pressures and combine data from the medical history, physical examination and chest X-ray. Altogether, the Framingham criteria offer good performance and it has Major and minor criteria (6) (Table 1).

Table 1: Framingham criteria for diagnosis of Heart Failure

Framingham criteria for clinical diagnosis of Congestive Heart failure		
Major criteria	Minor criteria	Major or Minor
Paroxysmal nocturnal dyspnea	Bilateral extremity edema	weight loss of ≥ 4.5 kg over 5 days in response to treatment
Jugular venous distention	Night cough	
Rales	Dyspnea on exertion	
Cardiomegaly	Hepatomegaly	
Acute pulmonary edema	Pleural effusion	
S3 gallop	Reduced vital capacity by one third from the maximal value recorded	
Increased venous pressure (> 16 cm H ₂ O)	Tachycardia (rate of ≥ 120 bpm).	
Positive hepatojugular reflux		
Criteria for diagnosis of CHF is two major or one major plus two minor criteria		

Coronary artery disease (CAD) and hypertension are the two major risk factors for the development of HF in older persons. Other common etiologies include diabetes mellitus, valvular heart disease, especially aortic stenosis and mitral regurgitation, and nonischemic cardiomyopathies. Frequently, HF in older persons is multifactorial. Older patients with hypertension and echocardiographic left ventricular (LV) hypertrophy had a 2.6 times higher incidence of HF than those with hypertension and no left ventricular (LV) hypertrophy (7).

Common Precipitating Factors of Heart Failure are Dietary sodium excess, Excess fluid intake ,Inadequate treatment ,Non adherence to appropriate drugs ,Uncontrolled hypertension ,Use of inappropriate drugs such as nonsteroidal anti-inflammatory drugs, Anemia. Infection, Fever, Hypoxia, Hot, humid environment,Alcohol,Bradycarrhythmias,Tachycarrhythmias,Myocardial infarction or ischemia, Pulmonary embolism ,Renal insufficiency ,Hyperthyroidism. Hypothyroidism (7)

The American College of Cardiology (ACC)/American Heart Association (AHA) guidelines for the evaluation and management of HF state that there are 4 stages of HF. Patients with stage one HF are at high risk of developing HF because of the presence of conditions strongly associated with the development of HF. These patients have hypertension, CAD, diabetes mellitus, a history of cardio toxic drug therapy, alcohol abuse, a history of rheumatic fever, or a family history of cardiomyopathy. These patients have no evidence of structural heart disease. Patients with stage two HF have structural heart disease associated with the development of HF but have never shown symptoms or signs of HF. These patients have a prior myocardial infarction (MI), LV hypertrophy or fibrosis, LV dilatation or hypo contractility, or asymptomatic valvular heart disease. Patients with stage three HF have current or prior symptoms of HF associated with structural heart disease. Patients with stage four HF have advanced structural heart disease and marked symptoms of HF at rest despite maximal medical therapy and who require specialized interventions (7). This study is designed to assess the distribution of causes among heart failure patients admitted with heart failure to Jimma University Specialized Hospital.

1.2 Statement of the problem

Heart failure is a major public health problem worldwide. Heart failure affects an estimated 23 million people worldwide, and leads to substantial numbers of hospitalizations and health care costs(8). The available data suggest that while the morbidity due to HF is great in many parts of the world and the etiologies differ from country to country (9). The most common underlying cause of HF in high-income countries or industrialized countries is coronary artery disease (CAD) in men and women and is responsible for 60–75% of cases of HF. Hypertension contribute to the development of HF in 75% of patients, including most patients with CAD. Both CAD and hypertension interact to augment the risk of HF (10) In sub Saharan Africa (SSA), the predominant causes have traditionally been ascribed to rheumatic heart disease, hypertensive heart disease and cardiomyopathy (11).

Heart failure (HF) affects approximately 5 million persons in the United States and more than 500,000 new cases of HF are reported each year. Approximately 300,000 persons die of HF each year. HF is predominantly a disease of the elderly with prevalence rates ranging from 1% in persons younger than 50 years to 10% in persons aged 80 years and older. Approximately 80% of patients hospitalized with HF are older than 65 years. HF is not only the most common cause of hospitalization in the United States, but is also the most costly with annual expenditures of more than \$40 billion spent each year (7).

Heart failure is third most common cardiovascular disease in the US affecting 2 per cent of the U.S. population, or almost 5 million people. The prevalence of heart failure increases with the age from less than 1 per cent in the 20-39 yr old age group to over 20 per cent in the people age 80 yr or older. The life time risk of developing heart failure is estimated at about 20 per cent both in men and women. The lifetime risk of developing HF at the age of 40 yr is 11.4 per cent for men and 15.4 per cent for women. More than 500,000 new cases are diagnosed each year. Around 30 to 40 per cent of patients die from heart failure within 1 year after receiving the diagnosis. Heart failure can be disabling and it can severely reduce a patient's quality of life (3).

Heart failure has been recognized as a contributor to cardiovascular disease burden in Africa for many years, in internal medicine services in Africa, heart failure has been described as the fifth to sixth cause of hospital admission (12).

Rheumatic heart disease remains a major cause of HF in Africa and Asia, especially in the young. Hypertension is an important cause of HF in the African and African-American populations. As developing nations undergo socioeconomic development, the epidemiology of HF is becoming similar to that of Western Europe and North America, with CAD emerging as the single most common cause of HF (13)

Few data are available on the causes of HF in low to middle income countries. HF in Africa has been conventionally thought to be caused predominantly by untreated rheumatic valvular disease, peripartum and idiopathic cardiomyopathy, and hypertension (14)

Factors unique to developing regions such as sub Saharan Africa make HF an especially challenging condition. Compared to other parts of the world, HF in SSA tends to occur at a much younger age. This finding could be due to the major contribution of rheumatic heart disease or early presentation of other degenerative causes. Misdiagnosis or under-diagnosis of HF is likely to occur where access to echocardiography or serologic markers is poor and the treatment patterns suggest that evidence-based medications are underutilized and compliance is poor (11). The hospital case-fatality rate among those with HF ranges from 9-12.5% [15]

Ethiopia, as one of the African countries also shares the burden of cardiac disease. Studies indicated that the two major causes of for heart failure are Rheumatic heart disease (RHD) and hypertensive heart diseases and (HHD) (15). Determining the etiology and its associated factors of heart failure in our setting is required which can also be considered as the beginning of efforts to put forward in characterization of the most common causes of heart failure in our setting and ultimately improve its detection, treatment and possibly prevention (4).

There are no documented data on the etiology of heart failure among adult patients in -patients admitted to medical wards in Jimma University Specialized Hospital. This study was therefore designed to determine the etiology and related factors of heart failure among CHF patients admitted in internal medicine wards in Jimma University Specialized Hospital (JUSH).

Chapter Two

2.1 Literature review

The risk factors that contribute to the development of heart failure are similar to risks of coronary artery disease, stroke, and peripheral artery disease. In fact, coronary artery disease and previous history of myocardial infarction (heart attack) is one of the major risk factors in developing HF. Based on the data from the Framingham study, hypertension (high blood pressure) is the most important risk factor accounting for approximately 39% of cases in men and 59% in women. Previous history of heart attack was the second most common risk accounting for 34% in men and 13% in women (9). Cigarette smoking, elevated cholesterol, obesity, and diabetes are the major preventable risk factors for both congestive heart failure and coronary artery disease. Other less common diseases and risk factors are valvular heart disease, cardiomyopathy (the diseases of the heart muscle), alcohol abuse, or infections.

2.1.1 The prevalence of heart failure

A study done in Ghana according to the modified Framingham criteria for the diagnosis of heart failure a prevalence of 76% patients had heart failure. The heart failure patients were aged between 13-97 years with the mean age of 56.5 (\pm 19) years. There were more females 53.6% than males 46.4%. The main etiologies of heart failure were: hypertension (45%), rheumatic heart disease (23%) and cardiomyopathy (15%). Other etiologies of heart failure seen in these patients were degenerative valvular disease (7.6%) and ischemic heart disease (2.3%) (12).

Study conducted in different African countries like Kumasi, Ghana and Oyoo and Ogola in Nairobi, Kenya found three quarters of their patients with hypertensive heart failure to be above the age of 50 years, over all the mean age of patients presenting with heart failure in sub-Saharan Africa is generally lower than the mean age heart failure patients reported in the general European population (74 years) and also when we compare the cause of heart failure in Sub Saharan Africa countries causes such as rheumatic heart disease and dilated cardiomyopathy occur at a relatively early age than hypertensive heart disease occurs at a later age. Finally in the study of among hypertensive heart diseases patients in Ghana the prevalence of heart failure with preserved ejection fraction (HFPEF) among the patients were high (11).

Heart failure is a common cause of hospitalization in medical departments in Portugal, like as many other European countries with a prevalence of (40%), with half the patients admitted to medical departments (50%) and the mean age of patients admitted for HF ranged between 63 and 75 years (16)

2.1.2 Major etiology related with heart failure

A study done in Japan Tokyo among 4,255 who visited the hospital 597 patients with male 414 female 183 ratio mean age of 65.1+12.9 years were diagnosed with symptomatic HF. Ischemic heart diseases was present in 305(51.1%), valvular heart disease in 212(35.5%), dilated cardiomyopathy in 59(9.9%), hypertrophic cardiomyopathy in 24(4.0%), hypertensive heart disease in 14 (2.3%) and others in 67 (11.2%).(17)

Acute rheumatic fever (RF)/rheumatic heart disease (RHD) is the leading cause of acquired heart disease in children and young adults worldwide. Globally, the incidence of RF and prevalence of RHD decreased in the past few decades. However, the decrement is uneven where it remains one of the major medical and public health problems in low and middle income countries (5). With an estimated of half million new cases each year globally, RHD remains among the most common causes of cardiovascular morbidity and mortality in developing countries. It is estimated that more than 15 million people have the disease, and over 300,000 of them die from it every year (5,6). It is also posing economic problem by costing the precious productive years of many adolescents and young adults. Nearly half of the 2.4 million children affected with RHD in the world live on the African continent where only 8% of the world population resides (5-7).

Rheumatic heart disease is the most important cardiovascular disease in hospital practice in Ethiopia. study done on the pattern of cardiac diseases in Jimma University hospital result showed that nearly a third of the adult cardiac patients were due to RHD. However, very little accurate information is available on rheumatic heart disease prevalence. Few studies done in the past demonstrated that the burden is not different from other low income countries (4, 5).

A study conducted in Jimma specialized hospital Rheumatic heart disease was major cause for cardiac cases and it accounts (32.8%) of the cardiac cases on follow-up clinic followed by hypertensive heart disease and cardiomyopathy accounting for (24.2%) and (20.2%) of cases, respectively, hypertension contributed for a total of (30.9%) of cardiac patients that included

(24.2%) hypertensive heart disease and (6.7%) as one major risk factor for ischemic heart disease (18).

A different distribution of causes suggestive of an epidemiological transition was found in a later study of 844 de novo presentations of HF at an urban African hospital. The mean age was 55 years and women 57% and black Africans 88% predominated. The most common diagnoses were hypertensive HF 33% idiopathic dilated cardiomyopathy 28% right-sided HF 27%, nearly half with isolated right heart involvement), ischemic cardiomyopathy 9%, and valvular heart disease 8%. Black Africans had less ischemic cardiomyopathy but more idiopathic and other causes of cardiomyopathy than white Africans (19).

A study in Nigeria teaching hospital among admitted heart failure patients showed that 56.3% were admitted and managed for heart failure secondary to hypertension. other various causes includes various cardiomyopathies, the predominant types were idiopathic dilated cardiomyopathy (7.3%), diabetes mellitus (2.1%), HIV (1.4%), alcohol (1.2%), and restrictive idiopathic cardiomyopathy (0.2%)(20).

Hypertension and coronary artery disease were the most common etiological factors, as in all industrialized countries and in the study conducted in Portugal the Etiological risk factors and comorbidities in patients hospitalized for HF in the Medical Department are . HT: hypertension; CAD: coronary artery disease; AF: atrial fibrillation; COPD: chronic obstructive pulmonary disease; CRF: chronic renal failure but HT is the main etiological risk factor for all types of HF due to ventricular failure (16).

The commonest cause of heart failure identified in three hundred and forty subjects with heart failure patients study in Nigeria was hypertension in 213 (62.6%) patients while idiopathic dilated cardiomyopathy accounted for heart failure in 37 (13.8%) cases. Rheumatic heart disease was responsible in 25 (7.4%) patients and peripartal heart disease was responsible in 11 (3.2%) cases. Other causes of heart failure identified were infective endocarditis, ventricular septal defect and use of cytotoxic drugs, each accounting for one (0.29%) each of the cases. of heart failure, which accounted for the rest (13.0%), included degenerative valvular disease in 14 (4.1%) cases. Constrictive pericarditis, corpulmonale, endomyocardial fibrosis, thyrotoxicosis, alcoholic cardiomyopathy and retroviral disease accounted (21)

In a study done in Nigeria teaching hospital which is retrospective study of CCF cases found that the commonest causes of CCF were hypertension (56.3%) and cardiomyopathy (12.3%). Chronic renal failure, rheumatic heart disease, and ischemic heart disease accounted for 7.8%, 4.3%, and 0.2% of CCF, respectively (20).

Study in Ghana teaching Hospital among the 524 patients, 398 of the patients had heart failure according to the modified Framingham criteria for the diagnosis of heart failure; giving rise to a prevalence of 76% with the mean age of 56.5 (\pm 19) years. The main etiologies of heart failure were: hypertension (45%; n=179), rheumatic heart disease (23%; n=90) and cardiomyopathy (15%; n=58). Other etiologies of heart failure seen in these patients were degenerative valvular disease (7.6%; n=31) and ischemic heart disease (2.3%; n=10) (22).

2.1.3 Outcome of heart failure in patients admitted to hospital

A large, population-based cohort study done in Canada where examining the clinical features and outcomes of patients admitted to the hospital for the first time with heart failure and the result shows that the mortality rate among patients with reduced ejection fraction was 7.1 percent, as compared with 5.3 percent among those with preserved ejection fraction, but this difference was not significant ($P = 0.08$). The mortality rates at one year were 25.5 percent and 22.2 percent, respectively ($P = 0.07$). The one-year rate of readmission for heart failure was 16.1 percent among patients with reduced ejection fraction and 13.5 percent among those with preserved ejection fraction ($P = 0.09$), and The predictors of death among patients with preserved ejection fraction included age, systolic blood pressure, the presence of peripheral vascular disease, hyponatremia, a history of cancer, dementia, renal dysfunction, dialysis, anemia, and respiratory rate (23).

2.2 Significance of study

Heart failure is a common cardiovascular disease with high morbidity and mortality. Unlike western countries where heart failure is predominantly a disease of the elderly, in Ethiopia it affects younger age group.

Heart failure is the common end point of most cardiovascular diseases. As studies showed that major causes of heart failure in developing countries is rheumatic heart diseases but now a days there are also other factors which contributes to the increment of incidence of heart failure like hypertensive heart disease ,ischemic heart diseases and cardiomyopathies . Hence heart failure is a major health and socio-economic burden in SSA due to its high prevalence, because of high impact on the young working class and high mortality rates. The constantly increasing incidence and prevalence of heart failure in economically poor African countries like Ethiopia calls for an urgent need for increased public awareness, provision of access to health care including prophylactic medical care, community screening programs for common risk factors such as hypertension and diabetes and implementation of field-friendly point-of-care tests to aid diagnosis and direct therapies for disorders such as cardiomyopathy and heart failure, all of which are currently limited or unavailable in economically challenged African countries including Ethiopia. One reason for this is the paucity of available data regarding to heart failure and associated factors.

The study accessed epidemiologic changes that might have occurred due to socioeconomic changes in our country in recent years and it generated baseline data for further larger study and Health planners, on epidemiologic features of heart failure patients in Ethiopia.

Chapter Three

Objectives

3.1 General Objective

To asses' distribution of causes of heart failure among heart failure patients admitted to JUSH medical wards from July 8, 2015 1 to July 7, 2016.

3.2 Specific objective

- To identify the pattern of major cause of heart failure patients admitted to JUSH medical wards.
- To asses related physiologic risk factors among heart failure patients admitted to JUSH medical wards.

Chapter four

4. Methodology

4.1 Study area and period

The study was conducted at Jimma University specialized hospital (JUSH), located in Jimma town in southwest of Ethiopia, in Oromia region, 350km southwest of the capital, Addis Ababa. Jimma zone comprises Jimma town and its nearby woredas with estimated population of 2,486,155. JUSH is the only referral teaching hospital in this largest region of the country. The hospital gives health service at inpatient and outpatient level as a referral Hospital with catchment area of 15 million populations in the South West of the country. The department of internal medicine has a total of 100 beds with about 2781 annual admission. The service is given by internists, medical residents, general practitioners and medical interns. There are two echocardiogram machine, and four ECG machines and laboratory investigations like cardiac troponin and CK-MB, renal function tests, liver function tests among many others used as supplements for the diagnosis of heart failure in the hospital.

The study was conducted from July 8, 2015 1 to July 7, 2016.

4.2 Study design

Institution based cross-sectional study.

4.3 Population

4.3.1 Source population

All heart failure patients who were admitted to JUSH internal medicine wards from July, 8, 2015 to July 7, 2016.

4.3.2 Study population

Randomly selected adult patients with the diagnosis of heart failure to medical wards during the study period were included in the study.

4.4 Inclusion and Exclusion criteria

4.4.1 Inclusion criteria

All patients admitted with heart failure, who met the modified Framingham criteria (Having two major criteria or one major and two minor criteria) for clinical diagnosis are included in the study.

4.4.2 Exclusion Criteria-

Patients already part of these studies who were again readmitted during the study period.

4.5 Sample size determination and sampling technique

4.5.1 Sample size determination

The sample size was determined by using single population proportion formula. Taking 0.05 margins of errors at 95% confidence interval and taking prevalence of heart failure among adults 50% then the final sample size was calculated as follows

$$n = [Z_{\alpha/2}^2 * P * (1-P)] / d^2$$

$$n = 1.96^2 * 0.5 * 0.5 / 0.05^2 = 384$$

Because of the total number of Heart failure patients are less than 10,000 or n/N is > 0.05 , we use correction formula.

$$n = \frac{384}{(1 + (n/N))} = \frac{384}{(1 + (384/1920))} = 320$$

Therefore, the final sample size was $n=320$

Where: - n =minimum sample size.

P = prevalence of heart failure 50%

$Q=1-p=0.5$

$Z_{\alpha/2}$ = critical value at 95% confidence level of certainty (1.96) (a constant).

d = the margin of error (tolerance) between the sample and population= 0.05

4.5.2 Sampling technique

Systematic random sampling technique was used to select study participants or patients with diagnosis of heart failure from the total of 14426 admitted patients during the study period.

4.6 Study Variables

Socio Demographic characteristics

- ❖ Age
- ❖ Sex
- ❖ Occupation

Behavioral risk factors

- ❖ Tobacco smoking

Genetic factors

- ❖ Family history of heart failure

Physiological factors

- ❖ Diabetes mellitus
- ❖ Hypertension

Laboratory investigations

- ❖ Echocardiographic findings
- ❖ Electrocardiographic findings
- ❖ Arrhythmias
- ❖ Ejection fraction

Vital sign measurement

- ❖ Blood pressure measurement

4.7 Data Collection instrument and Process

Data were collected with structured checklist, from secondary data source by reviewing of recorded data.

Height, weight and blood pressure measurements: Height and weight measurements of sample population were taken from patient records. The average value of two consecutive blood pressure readings was taken as the blood pressure value. Body mass index was calculated as weight (kg)/height (m) ²

ECG - A standard 12-lead electrocardiogram (ECG) was recorded and interpreted by an internist. Echocardiography findings were revised from patient charts.

During data collection, the supervisors followed data collectors and performed quality checks with principal investigator.

4.8 Data analysis, processing, and Interpretation

Each day, the investigator checked the completeness and consistency of data collected by each data collector and the data were compiled. The data were organized, coded, entered and analyzed using SPSS version 20.0. Data were organized and summarized in terms of frequencies and the results of the Study presented in a descriptive measure such as tables and graphs.

4.9 Data quality assurance

To ensure data quality adequate training was provided for data collectors, and the compilation format were prepared in simple English to maintain clarity and easier understanding by those data collectors.

The collected data were checked for completeness and consistency on the day of collection by the principal investigator and any inconsistency, inaccuracy, or missing data were implied returned for correction on same day.

4.10 Ethical consideration

Prior to data collection, letter of support were obtained from the ethical Review Board of Jimma University, before official commencement of the data collection process. A letter of recommendation was obtained from the above responsible office to the head of each medical

ward. Moreover, to ensure confidentiality the name of respondents were not written in the questionnaire form.

4.11 Operational definition

Heart failure - a clinical syndrome that occurs in patients who, were because of an inherited or acquired abnormality of cardiac structure and/or function, develop a constellation of clinical symptoms (dyspnea and fatigue) and signs (edema and rales) that lead to frequent hospitalizations, a poor quality of life, and a shortened life expectancy.

Ischemic heart disease Any regional wall motion abnormality of the heart as seen by echocardiogram.

Hypertensive heart disease Heart failure and any other cardiac complications of hypertension.

Rheumatic heart disease - anatomic changes of the heart valves include leaflet thickening, commissural fusion, and shortening and thickening of the tendinous cords which occurs as chronic complication of rheumatic fever.

Dilated cardiomyopathy (DCM) – a heart disease in which the left ventricular cavity is enlarged and global systolic function is decreased as evidenced by global hypokinesis on echocardiogram.

Diabetes mellitus- Fasting blood sugar level ≥ 126 mg/dl or Random blood sugar level ≥ 200 mg/dl

Hypertension- Blood pressure measurement with Systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg and / or taking antihypertensive medication.

Atrial fibrillation: an abnormal rhythm of the heart that can result in an increased risk of stroke because of the formation of emboli (blood clots) in the heart.

Endocarditis: inflammation of the lining of the heart and its valves

Cor pulmonale:-hypertrophy of the right ventricle resulting from diseases affecting the function and/or structure of the lungs.

4.12 Dissemination plan

The results of the study will be disseminated to JUSH from which data were collected, Jimma University College of health science, department of internal medicine, regional health bureau and zonal health departments and respective bodies. Finally to federal ministry of health and moreover the results will be sent for publication in reputable Journals.

Chapter-five Result

5.1. Socio-demographic characteristics of study participants

A total of 320 Heart failure patients aged between 15 to 86 years old were included in the study with the 100% rate. Large number of study participants were from rural area 244 (76.3%) and the majority of study participants were in the age group of 55-64(21.9%). The mean (X+SD) age of study the participants was 48.74(+17.662). Majority of 241 (75.3%) of study participants belong to Oromo ethnic group. The religion of study the participants were: Islam 212(66.3. %), Orthodox 86(26.9%), and Protestant 22(6.9%) respectively. Majority of participants were female 175(54.7). (Table 1)

Table 1, Socio demographic characteristics of CHF patients who were admitted in JUSH medical ward Jimma 2016.

Variables		Frequency	Percent (%)
Age	15-24	26	8.1
	25-34	51	15.9
	35-44	46	14.4
	45-54	59	18.4
	55-64	70	21.9
	65-74	41	12.8
	75-84	22	6.9
	85-94	5	1.6
Ethnicity	Oromo	241	75.3
	Amhara	47	14.7
	Guragie	9	2.8
	Dawuro	19	5.9
	Tigre	3	0.9
	Others	1	0.3
Religion	Orthodox	86	26.9
	Muslim	212	66.3
	Protestant	22	6.9
Place of Residence	Urban	76	23.8
	Rural	244	76.3
Sex	Male	145	45.3
	Female	175	54.3

5.2, Distribution of Major and Minor criteria for the diagnosis of heart failure

From the major criteria majority of heart failure patients 256 (80%) had proximal nocturnal dyspnea (PND). More than half of heart failure patients 199(62.2%) had clinical presentation of jugular venous distention and increased venous pressure 200(62.5%). Nearly half 154(48.1. %) of heart failure patients had cardiomegaly.

From the minor criteria majority of heart failure patients 275(85.9%) experienced dyspnea on exertion. Greater than three fourth 245(76.6%) patients presented with bilateral extremity edema One hundred thirty (40.6%) patients had pleural effusion. Small number 28(8.8%) of heart failure patients reported that they had weight loss over five days in response to treatment (Table 2).

Table 2, Major and minor criteria found in heart failure patients who were admitted in JUSH, medical ward, Jimma, 2016.

Variables	Frequency	Percent (%)
Major criteria		
PND	256	80.0
JVD	199	62.2
Rales	157	49.1
Cardiomegaly	154	48.1
Pulmonary Edema	54	16.9
S3 gallop	38	11.9
IVP	200	62.5
HJR	61	19.1
Minor criteria		
Bilateral extremity edema	245	76.6
Night cough	192	60.0
Dyspnea on exertion	275	85.9
Hepatomegaly	121	37.8
Pleural effusion	130	40.6
Tachycardia	44	13.8
Major or minor		
Wt loss \geq 4.5kg	28	8.8

5.3 Causes of heart failure among heart failure patients who were admitted in JUSH.2016.

From 320 heart failure patients who were included in the study 120 (37.5%) of the heart failure cases were caused by Ischemic heart disease (IHD) followed by rheumatic heart disease (RHD) 66 (20.6%). Sixty two (5.9%) heart failures were caused by cardiomyopathies. Small number 19(5.9%)of heart failure patients were due to corpulmonale and 6(1.9%) heart failure patients had ischemic heart disease and hypertensive heart disease as a cause (figure 1).

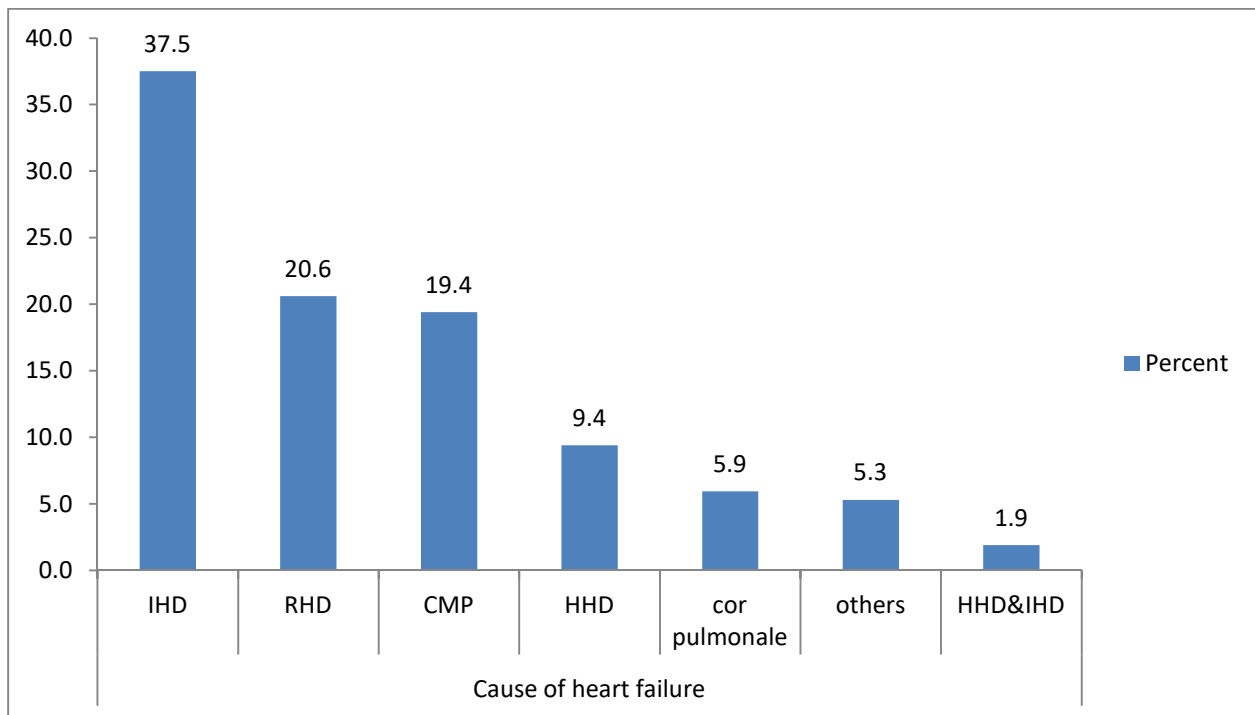


Fig1. Identified cause of heart failure among HF patients admitted in medical ward JUSH, 2016.

5.4 Prevalence of risk factors related to heart failure

Few 14(4.4%) of heart failure patients were known diabetes mellitus patients. Almost one forth 74(23.1%) of heart failure patient were hypertensive. Small number of heart failure patients 29(9.1%) were smokers. (Table 3)

Table 3, Prevalence of Risk factors which are related to heart failure among heart failure patients admitted to medical in JUSH

Variable		Frequency	Percent (%)
Diabetes mellitus	Yes	14	4.4
	No	306	95.6
Hypertension	Yes	74	23.1
	No	246	76.9
Cigarette smoking	Yes	29	9.1
	No	291	90.9

5.5 Risk factors among heart failure patients that were related to Ischemic heart disease

In bivariate analysis, when compared to other causes, Ischemic heart disease was associated with socio-demographic factors such as age, sex and physiologic risk factors such as diabetes mellitus, cigarette smoking and hypertension. But variables such as religion, ethnicity, and place of residence, occupation and family history of cardiac illness were not associated with Ischemic heart disease. The variable which had a p-value < 0.25 were candidate for multi variable logistic regression (Table 4).

Table 4, Bivariate analysis factors related with Ischemic heart disease among heart failure patients admitted in JUSH medical ward 2016

Variable	Frequency (%)	COR(95%CI)	P value
Age			
15-49	148(46.3)	1.0	
50-86	172(53.8)	10.524(5.897-18.781)	0.0001
Sex			
Male	145(45.3)	1.872(1.184 2.959)	0.007
Female	175(54.7)	1.0	
Place of residence			
Rural	244(76.3)	1.205(0.703-2.067)	0.498
Urban	76(23.8)	1.0	
Family hx of cardiac illness			
Yes	7(2.2)	1.256(0.276-5.712)	0.768
No	313(97.8)	1.0	
Diabetes			
Yes	14(4.4)	3.162(1.034-9.670)	0.044
No	306(95.6)	1.0	
Hypertension			
Yes	74(23.1)	1.700(1.004-2.878)	0.048
No	246(76.9)	1.0	
Cigarette smoking			
Yes	29(9.1)	2.586(1.189-5.624)	0.017
No	291(90.9)	1.0	

*All variables with p-value <0.25 were candidate for the final model

In multivariable logistic regression analysis, when compared to other causes of heart failure, the most important variables predicting Ischemic heart disease among heart failure patients admitted in JUSH medical wards were diabetes mellitus and cigarette smoking. In contrast, no significant relationship was established among hypertension and socio-demographic factors such as sex, place of residence, family history of cardiac illness.

In the multi variable logistic regression model findings of this study showed that heart failure patients who have diabetes mellitus were three times more likely to have ischemic heart disease when compared to other causes of heart failure (AOR. 3.5 95%CI =1.142,10.752).

Heart failure patients who have history of cigarette smoking were three times more likely to have ischemic heart disease when compared to other causes of heart failure (AOR.2.75, 95% CI=1.265, 6.015) (Table 5).

Table 5 Multivariable logistic regression showing factors associated with Ischemic heart disease among heart failure patients admitted in JUSH medical wards 2016.

Variable	Frequency (%)	COR	AOR(95%CI)	P value
Diabetes				
Yes	14(4.4)	3.162	3.504(1.142-10.752)	0.028*
No	306(95.6)	1.0	1.0	
Cigarette smoking				
Yes	29(9.1)	2.586	2.758(1.265-6.015)	0.011*
No	291(90.9)	1.0	1.0	

*p-value <0.05 was considered as statistically significant.

CHAPTER SIX: DISCUSSION

The study demonstrated that the major etiology of heart failure among heart failure patients who were admitted to medical wards in JUSH was ischemic heart diseases (IHD) accounting for 37.5% followed by RHD and CMP which accounted for 20.6% and 19.4% respectively. The mean age of heart failure patients was 48.74 ± 17.66 . And women account for 53.4% of the patients.

The present study revealed that prevalence of Ischemic heart disease among heart failure patients was 37.5% which is lower than study done in Japan Tokyo where heart failure due to Ischemic heart diseases was present in 305(51.1) and this may be due to difference in context of the study areas.

According to the study finding, Rheumatic heart disease was another major cause for heart failure found in 66 (20.6%) patients and it is consistent with study done in Ghana 90 (23%). But it is high compared to a Nigerian study where only 25 (7.4%) patients were due to RHD. This difference might be due to differences in health care infrastructure, living conditions, and health seeking behavior.

This study's finding showed that hypertension is another cause of HF which accounts 30(9.4%) which is lower than study done in Nigeria 213(62.6%)and Ghana 179 (45%); this difference is might be the socio economic difference and difference in dietary habits of the study participants.

Dilated cardiomyopathy accounted for heart failure in 62(19.4%) of patients which is higher than the study in Nigeria 37 (13.8%) and Ghana teaching hospital 58(15%). This is might be due to genetics, cultural dietary difference and differences in diagnostic capability.

This study also showed that ischemic heart disease is emerging as a major cause of heart failure in our setting and the epidemiology of major causes of heart failure has changed from rheumatic heart disease to ischemic heart disease, almost similar to the western developed countries where IHD is the commonest cause of heart failure. Therefore, it is more likely that ischemic heart disease was under-diagnosed in our country, due to largely unavailability of echocardiography and other laboratory investigations important to diagnose IHD or is correlated with changes in personal and collective wealth (the economic transition), changes in lifestyle habits, social structure transition, and demographic transition that have resulted in a dramatic shift in the causes of the illness.

There are many risk factors related to heart failure like increased blood pressure, increased cholesterol level, decreased physical activity and life style change but in this study only some factors are studied and from the total of 320 heart failure patients 74 (23.1%) of them were

known hypertensive patients, diabetes mellitus was found in 14(4.4%) of HF patients, and a history of cigarette smoking was found in 29(9.1%) of the patients.

According to the modified Framingham criteria for the diagnosis of heart failure from the major criteria most of patients 256(80%) had experienced Paroxysmal nocturnal dyspnea ,increased jugular venous pressure 200(62.5%) and jugular Venous distention 199(62.2%).from the minor criteria majority of HF patients had shortness of breath 275(85.9%) which is the most common symptom of heart failure patients when they presented to health facility followed by bilateral extremity of edema 245(76.6%).Night cough, another symptom used for the diagnosis of heart failure, was documented in 192(60%)of HF patients.

Genetic factor is one related risk factor for heart failure but in this study majority of HF patients 313(97.8%) said no family history of cardiac illness this may be due to low screening level or poor health seeking behavior in the family.

Limitation of the study

There are various factors that are associated with heart failure and all factors are not addressed in this study since the information was collected retrospectively we cannot find all factors.

Outcome of admitted heart failure patients was not included in the checklist making it difficult to determine predictors of outcome.

Chapter seven

7. Conclusion and Recommendation

7.1 Conclusion

The results of this study indicated that the main etiology of heart failure among heart failure patients who were admitted in JUSH is ischemic heart disease and this indicates epidemiology of etiology of heart failure has changed from rheumatic heart diseases to ischemic heart diseases almost similar to western developed countries. Physiologic and behavioral risk factors such as diabetes mellitus and cigarette smoking contribute for the development of Ischemic heart disease in heart failure patients as compared to other causes of heart failure.

7.2 Recommendation

Based on the findings of this study it is recommended that;-

To Federal Ministry of Health

FMOH should know the prevalence of heart failure patients secondary to ischemic heart disease has increased through time therefore Prevention strategies should also focus directly to address this cause of HF.

To Oromia Regional health office

Health education should be given to the community through health extension workers to create awareness on the increasing number of non-communicable diseases.

Early screening and management of risk factors at health facilities.

Encouraging physical activity and improvement in dietary habits.

To researchers

Further comprehensive research is suggested that shows relation between heart failure and risk factors like lipid profile, level of physical activity, waist circumference and life style among heart failure patients as well as predictors of outcome.

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Annex I

Data collection format

Jimma University

College of Health Science

Department of Internal Medicine

Data collecting format for heart failure patients admitted to JUSH medical wards

A. Please record the Background information (Identification and socio demographic characteristics) from the patient card.						
A0. Medical record number (MRN)						
A1. Age						
A2. Sex:		1. Male	2. Female			
A3. Ethnicity	1. Oromo	2. Amhara	3. Guragie	4. Dawuro	5. Tigre	6. other
A4. Religion	1. Orthodox	2. Muslim	3. Protestant	4. Catholic	5. Other (specify)	
A5. Place of residence						
A6. Occupation	1. House wife	2. Farmer	3. Government employee	4. NGO employee	5. Merchant 6. Daily laborer	
B. The diagnosis of heart failure on admission (Using Modified Framingham's criteria)						
B1. Major criteria						
a. Paroxysmal nocturnal dyspnea		1, Yes	2, No			
b. Jugular venous distention		1, Yes	2, No			

c. Rales	1, Yes	2, No		
d. Cardiomegaly	1, Yes	2, No		
e. Acute pulmonary edema	1, Yes	2, No		
f. S3 gallop	1, Yes	2, No		
g. Increased venous pressure (> 16 cm H ₂ O)	1. Yes	2. No		
h. Hepato-jugular reflux	1. Yes	2. No		
B2.Minor criteria				
A, Bilateral extremity edema	1. Yes	2. No		
B, Night cough	1. Yes	2. No		
C, Dyspnea on exertion	1. Yes	2. No		
D, Hepatomegaly	1. Yes	2. No		
E, Pleural effusion	1. Yes	2. No		
F. Reduced vital capacity by one third from the maximal value recorded	1. Yes	2. No		
G, Tachycardia (rate of ≥ 120 bpm)	1. Yes	2. No		
B3.Major or minor				
weight loss of ≥ 4.5 kg over 5 days in response to treatment	1. Yes	2. No		
2. Echocardiographic diagnosis report				
3. ECG diagnosis report				
4. CXR diagnosis report				

5.Ejection fraction in %.			
C. Physiologic and Personal risk factors related to heart failure			
C1. Diabetes Mellitus	1. Yes If yes, for how long..... (Years)	2. No	
C2. Hypertension	1. Yes If yes, for how long..... (Years)	2. No	
C3. Cigarette smoking	1. Yes If yes, how many pack per years.....	2. No	
C4. Family history of heart disease	1. Yes	2.No	
C5. Weight of the patient -----			
D. Recorded Vital sign of the patient on admission from the chart			
D1. Blood pressure in mmhg	1 st record..... mmhg	2 nd record.....mmhg	Average of the two records
D2. Heart rate			
Condition of the patient on discharge			

Data collectors name and signature.....

A7. Family history of heart disease: 1. Yes 2. No

. Arrhythmia 1. Yes 2. No

If yes, specify.....

Dummy table

FREQUENCY TABLE OF SCIOIDEMOGRAPHIC CHARACTERSTICS OF STUDY
POPULATION.

VARIABLE		FERQUENCY	PERCENTAGE
SEX	MALE		
	FEMALE		
AGE	18-19		
	20-24		
	25-29		
	30-34		
	35-39		
	40-44		
	45-49		
	50-54		
	54-59		
	60-64		
	>=65		
OCCUPATION	EMPLOYED		
	UNEMPLOYED		
	OTHERS		
INCOME	LOW		
	MIDDLE		
	HIGH		
FAMILY HISTIRY OF HEART DISEASE	YES		
	NO		

Age in years		Echocardiographic diagnosis						
		RVHD	HHD	CAD	DCMP	NRVHD	Cor pulmonale	others
18-30	M(%)							
	F(%)							
31-40	M(%)							
	F(%)							
41-50	M(%)							
	F(%)							
51-60	M(%)							
	F(%)							
61-70	M(%)							
	F(%)							
>70	M(%)							
	F(%)							
Total								

BMI	<16		
	16-24		
	25-30		
	30-35		
	35-40		
	≥40		
WASIT CIRCUMFERENCE			
ARRHYTHMIA	YES		
	NO		
EJECTION FRACTION	NORMAL		
	DEPRESSED		
ECHOCARDIOGRAPHIC DIAGNOSIS	RVHD		
	IHD		
	DCM		
	HHD		
	NRVHD		
	OTHERS		