



Prevalence of Heart Failure among Young Patients in Al-Wahdah Teaching Hospital, Dhamar City, Yemen

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Abstract

Background: Heart failure is the inability of the heart to maintain adequate cardiac output to meet the demands of the body, it's the end stage of all diseases that affect the heart and it is a major health problem in our society. It measures major challenges in its diagnosis and management. **Aim:** This study aimed at the registry of heart failure in young patients at AL-Wahdah Hospital, Dhamar Governorate, Yemen with its prevalence, major risk factors that can precipitate this condition, and the difference in prevalence between males and females. **Methods:** All patients in the term of heart failure with age between 20 - 40 years old were admitted to AL-Wahdah Hospital in the last two years 2019/2020. All patients are subjected to clinical evaluation, baseline ECG, results of laboratory investigations, and treatment strategies. **Results:** According to our study, the prevalence of study group patients is 25.1% from all other groups with heart failure. Qat chewing was a major risk factor in 74%, smoking at 40.40%, hypertension at 27.90%, rheumatic heart disease at 24%, and family history at 21.20%. Dilated cardiomyopathy was the most common cause that presents in 17.30% and diabetes mellitus at 15.4% on clinical evaluation; dyspnea (NYHA class IV) was the most common presenting symptoms in 95.5%, with the prevalence of males at 58.70% and females at 41.30%. **Conclusion:** This study about heart failure among young people registry for 104 cases (male, female), age group 20 - 40 years old, among duration between 1 January 2019 to 30 December 2020 in Al-Wehdah Teaching Hospital, Dhamar Governorate, Yemen. According to our study, the prevalence of young patients with heart failure from all other age groups with heart failure is 25.1%. In our study, most patients with heart failure are chewing Qat for further studies, as well as those patients who are already known cases of other diseases such as RHD, CHD, and DM with irregular treatment. According to our study, the most common cause of heart failure is dilated cardiomyopathy. Also, the prevalence of HF is more common in males than females.

Subject Areas

Cardiology

Keywords

Heart Failure, Prevalence, Yemen

1. Introduction

1.1. General Introduction

Heart failure describes the clinical syndrome that develops when the heart cannot maintain adequate output, or can do so only at the expense of elevated ventricular filling pressure. In mild to moderate forms of heart failure, cardiac output is normal at rest and only becomes impaired when the metabolic demand increases during exercise or some other form of stress. In practice, heart failure may be diagnosed when a patient with significant heart disease develops the signs or symptoms of a low cardiac output, pulmonary congestion or systemic venous congestion [1].

Because heart failure (HF) predominantly affects the elderly, most reports have appropriately focused on older patients. However, HF also afflicts younger patients, although little is known about the characteristics of these patients and their outcomes. Existing studies have largely defined “younger” as ages <65 or <60 years, probably because most studies have small numbers of adults in the third to sixth decades of life.

As a result, there are few data describing the symptom burden, quality of life, and hospitalization and mortality rates in HF patients aged 20 to 60 years, although in these patients, the estimates of prognosis may be most keenly sought by patients and their families [2].

While ischemic heart disease (IHD) and hypertension are predominant causes of HF among older patients, the etiological makeup of HF in young adults is more heterogeneous. Common causes of HF among the young include adult congenital heart disease (ACHD), different types of cardiomyopathies, myocarditis, or alcohol- or drug-related myocardial lesions [3].

1.2. Study Justification

Although heart failure is a major health problem in old age and too many studies and clinical trials are done, no such study has emerged about heart failure among younger age group. So this research will provide information to the researchers and readers about prevalence, sexual differences and risk factors associated with heart failure in young patients.

1.3. Objectives

- 1) To determine the prevalence of heart failure among young patients between

20 - 40 years of age.

2) To determine the characteristics of young adults with heart failure (HF).

3) To identify potential risk factors for development of heart failure among adult patients.

4) To determine the difference between males and females presented with heart failure.

2. Review of Literature

2.1. Background

Heart failure is not a single pathological diagnosis, but a clinical syndrome consisting of cardinal symptoms (e.g. breathlessness, ankle swelling, and fatigue) that may be accompanied by signs (e.g. elevated jugular venous pressure, pulmonary crackles, and peripheral edema). It is due to a structural and/or functional abnormality of the heart that results in elevated intra-cardiac pressures and/or inadequate cardiac output at rest and/or during exercise. Identification of the etiology of the underlying cardiac dysfunction is mandatory in the diagnosis of HF as the specific pathology can determine subsequent treatment. Most commonly, HF is due to myocardial dysfunction: either systolic, diastolic, or both. However, pathology of the valves, pericardium, and endocardium, and abnormalities of heart rhythm and conduction can also cause or contribute to HF [4].

2.2. Terminology

2.2.1. Heart Failure with Preserved, Mildly Reduced, and Reduced Ejection Fraction

Traditionally, HF has been divided into distinct phenotypes based on the measurement of left ventricular ejection fraction (LVEF).

- Reduced LVEF is defined as <40%, *i.e.* those with a significant reduction in LV systolic function. This is designated as HFrEF.
- Patients with an LVEF between 41% and 49% have mildly reduced LV systolic function, *i.e.* HFmrEF.
- Those with symptoms and signs of HF, with evidence of structural and/or functional cardiac abnormalities and/or raised natriuretic peptides (NPs), and with an LVEF > 50%, have HFpEF [4].

2.2.2. Right Ventricular Dysfunction

Heart failure can also be a result of right ventricular (RV) dysfunction, right ventricle mechanics and function are altered in the setting of either pressure or volume overload [5].

Although the main etiology of chronic RV failure is LV dysfunction-induced pulmonary hypertension, there are a number of other causes of RV dysfunction [e.g. MI, arrhythmogenic right ventricular cardiomyopathy (ARVC), or valve disease].

The diagnosis is determined by a quantitative assessment of global RV function, most commonly by echocardiography, using at least one of the following

measurements: fractional area change (FAC); tricuspid annular plane systolic excursion (TAPSE); and Doppler tissue imaging-derived systolic S0 velocity of the tricuspid annulus [6].

2.2.3. Other Common Terminology Used in Heart Failure

Heart failure is usually divided into two presentations: chronic heart failure (CHF) and acute heart failure (AHF). CHF describes those who have had an established diagnosis of HF or who have a more gradual onset of symptoms. If CHF deteriorates, either suddenly or slowly, the episode may be described as “decompensated” HF.

This can result in hospital admission or treatment with intravenous (i.v.) diuretic therapy in the outpatient setting. In addition, HF can present more acutely. Some individuals with HF may recover completely [e.g. those due to alcohol-induced cardiomyopathy (CMP), viral myocarditis, Takotsubo syndrome, peripartum cardiomyopathy (PPCM)]. Other patients with LV systolic dysfunction may show a substantial or even complete recovery of LV systolic function after receiving drug and device therapy [7].

2.2.4. Terminology Related to the Symptomatic Severity of Heart Failure

The simplest terminology used to describe the severity of HF is the New York Heart Association (NYHA) functional classification (**Table 1**). However, this relies solely on symptoms and there are many other better prognostic indicators in HF. Importantly, patients with mild symptoms may still have a high risk of hospitalization and death. Predicting the outcome is particularly important in advanced HF to guide selection of cardiac transplantation and device therapies [8].

2.3. Epidemiology and Natural History of Heart Failure

2.3.1. Incidence and Prevalence

In developed countries, the age-adjusted incidence of HF may be falling, presumably reflecting better management of CV disease, but due to aging, the overall incidence is increasing [9].

Table 1. New York Heart Association functional classification of heart failure based on severity of symptoms and physical activity.

Class I	No limitation of physical activity. Ordinary physical activity does not cause undue breathlessness, fatigue, or palpitation
Class II	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in undue breathlessness, fatigue, or palpitations.
Class III	Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity results undue breathlessness, fatigue, or palpitations.
Class IV	Unable to carry on any physical activity without discomfort. Symptoms at rest can be present. If any physical activity is undertaken, discomfort is increased.

Currently, the incidence of HF in Europe is about 3/1000 person-years (all age groups) or about 5/1000 person-years in adults.

The prevalence of HF appears to be 12% of adults. As studies only usually include recognized/diagnosed HF cases, the true prevalence is likely to be higher. The prevalence increases with age: from around 1% for those aged <55 years to >10% in those aged 70 years or over [10].

2.3.2. Etiology of Heart Failure

The etiology of HF varies according to geography, and the following are the most common etiologies:

CAD, Hypertension, Valve disease, Arrhythmias. CMPs, Congenital heart disease, Infective Drug-induced, Infiltrative Storage disorders, Endomyocardial disease, Pericardial disease, Metabolic Neuromuscular disease with regard to ischaemic aetiology, HFmrEF resembles HFrfEF, with a higher frequency of underlying CAD compared to those with HFpEF [11].

2.3.3. Clinical Features of Heart Failure

1) Symptoms

a) Typical

Breathlessness, orthopnea, paroxysmal nocturnal dyspnea, reduced exercise tolerance, Fatigue, tiredness and Ankle swelling.

b) Less typical

Nocturnal cough, wheezing, bloated feeling, loss of appetite, confusion (especially in the elderly), depression, palpitation, dizziness, syncope.

2) Signs

a) More specific

Elevated jugular venous pressure, hepat0-jugular reflux, third heart sound (gallop rhythm), and laterally displaced apical impulse.

b) Less specific

Weight gain (>2 kg/week), weight loss (in advanced HF), tissue wasting (cachexia), peripheral oedema (ankle, sacral, scrotal), pulmonary crepitation, pleural effusion, tachycardia, irregular pulse, tachypnea, hepatomegaly, ascites, cold extremities, oliguria, narrow pulse pressure [4].

2.3.4. Investigations in Heart Failure

- Blood tests; Full blood count, urea and electrolytes, liver biochemistry, cardiac enzymes in acute heart failure, BNP or NT-pro BNP, and thyroid function should be tested.
- Chest X-ray, electrocardiogram, echocardiography, cardiac MRI (CMR), cardiac catheterization (rare), cardiac biopsy, Ambulatory 24-hour ECG monitoring (Holter) [12].

2.3.5. Management

1) General management

- Education: Explanation of nature of disease, treatment and self-help strate-

gies.

- Diet: Good general nutrition and weight reduction for the obese, avoidance of high-salt foods and added salt, especially for patients with severe congestive heart failure.
- Alcohol moderation or elimination of alcohol consumption: alcohol-induced cardiomyopathy requires abstinence.
- Smoking cessation.
- Exercise: regular moderate aerobic exercise within limits of symptoms.
- Vaccination consideration of influenza and pneumococcal vaccination.

2) Management of acute heart failure

Acute heart failure with pulmonary oedema is a medical emergency that should be treated urgently.

The patient should initially be kept rested, with continuous monitoring of cardiac rhythm, BP and pulse oximetry. Intravenous opiates can be of value in distressed patients but must be used sparingly, as they may cause respiratory depression and exacerbation of hypoxaemia and hypercapnia, If these measures prove ineffective, inotropic agents such as dobutamine (2.5 - 10 µg/kg/min) may be required to augment cardiac output, particularly in hypotensive patients. Insertion of an intra-aortic balloon pump may be beneficial in patients with acute cardiogenic pulmonary edema and shock.

3) Management of chronic heart failure

The aims of treatment in chronic heart failure are to improve cardiac function by increasing contractility, optimizing preload or decreasing after load, and controlling cardiac rate and rhythm.

This can be achieved by pharmacological and non-pharmacological treatments:

- Non-pharmacological treatment as general management is discussed above in 3.6.1.
- Pharmacological treatment:

Drugs that reduce preload are appropriate in patients with high end-diastolic filling pressures and evidence of pulmonary or systemic venous congestion, whereas those that reduce after load or increase myocardial contractility are more useful in patients with signs and symptoms of a low cardiac output (Diuretics, ACE inhibitors, ARBs, ARNI, Vasodilators, Beta-adrenoceptor blockers, Ivabradine, Digoxin, Amiodarone).

4) Other modalities of treatment

Implantable cardiac defibrillators, Resynchronisation devices, Cardiac transplantation, Ventricular assist devices (VAD) [12].

2.4. Previous Studies

- In previous study which was done in Sweden 2013 by Anders Barasa, Maria Schaufelberger, Georgios Lappas, Karl Swedberg, Mikael Dellborg, and Anika Rosengren and titled (Heart Failure in Young Adults: 20-Year Trends in Hospitalization, Aetiology, and Case Fatality in Sweden) there were 443,995

HF hospitalizations among adults 18 - 84 years. Of these, 4660 (1.0%) and 13,507 (3.0%) occurred in people aged 18 - 44 and 45 - 54 years (31.6% women), respectively. From the first to the last 5-year period, HF incidence increased by 50% and 43%, among people aged 18 - 34 and 35 - 44 years, respectively. Among people ≥ 45 years, incidence peaked in the mid-1990s and then decreased. Heart failure in the presence of cardiomyopathy increased more than two-fold among all age groups. Case fatality decreased for all age groups until 2001, after which no further significant decrease, 55 years was observed [13].

- Another more significant study Was done in Glasgow and Liverpool, United Kingdom; Boston, Massachusetts; Durham, North Carolina; Hamilton, Ontario, Canada; and Gothenburg, Sweden 2013 by Chih M. Wong, published by American College of Cardiology and titled “Clinical Characteristics and Outcomes of Young and Very Young Adults with Heart Failure: The CHARM Programme (Candesartan in Heart Failure Assessment of Reduction in Mortality and Morbidity)”. Patients were categorized into 5 age groups: 20 to 39, 40 to 49, 50 to 59, 60 to 69, and 70 years.
- Results: The youngest patients with HF were more likely to be obese (youngest vs. oldest: body mass index 35 kg/m^2 : 23% vs. 6%), of black ethnicity (18% vs. 2%), and have idiopathic-dilated cardiomyopathy (62% vs. 9%) (all $p < 0.0001$). They were less likely to adhere to medication (nonadherence in youngest vs. oldest: 24% vs. 7%, $p = 0.001$), salt intake, and other dietary measures (21% vs. 9%, $p = 0.002$). The youngest patients were less likely to have clinical and radiological signs of HF during hospitalization. Quality of life was worse, but all-cause mortality was lowest in the youngest age group (3-year mortality rates across the respective age categories: 12%, 13%, 13%, 19%, and 31%, respectively). Compared with the referent age group of 60 to 69 years, both all-cause and cardiovascular mortalities were lower in the youngest group even after multivariable adjustment. Three-year HF hospitalization rates were 24%, 15%, 15%, 22%, and 28% in ages 20 to 39, 40 to 49, 50 to 59, 60 to 69, and 70 years, respectively ($p < 0.0001$) [2].
- Another multicenter study done by Chih M Wong 2017 and titled (Heart Failure in Young Adults Is Associated with High Mortality).
- It shows that the incidence of HF hospitalization decreased over time among patients ≥ 65 years and increased among men aged 20 - 64 years. In the year after the index HF hospitalization, compared with older patients, younger patients were less likely to present to the emergency department (ED) (e.g., 67.2% of those aged 20 - 44 years vs 74.8% of those aged ≥ 65 years) or to be hospitalized for any reason (48.5% vs 61.2%), cardiovascular causes (28.6% vs 34.4%), or HF (14.8% vs 23.6%). Mortality rates were lower in younger patients aged 20 - 44 years but were still substantial: 3.9%, 12.4%, and 27.7% at 30 days, 1 year, and 5 years, respectively [14].
- Another meta-analysis study published in 2014 by Chih M Wong l. Eur Heart

J and titled “Heart Failure in Younger Patients: The Meta-Analysis Global Group in Chronic Heart Failure (MAGGIC)” shows that when comparing young (<40 Years) against elderly (≥ 80 years), younger patients were more likely to be male (71% vs. 48%) and have idiopathic cardiomyopathy (63% vs. 7%). Younger patients reported better New York Heart Association functional class despite more severe left ventricular dysfunction (median ejection fraction: 31% vs. 42%, all $p < 0.0001$). Comorbidities such as hypertension, myocardial infarction, and atrial fibrillation were much less common in the young. Younger patients received more disease-modifying pharmacological therapy than their older counterparts. Across the younger age groups (<40, 40 - 49, and 50 - 59 years), mortality rates were low: 1 year 6.7%, 6.6%, and 7.5%, respectively; 2 years 11.7%, 11.5%, 13.0%; and 3 years 16.5%, 16.2%, 18.2%. Furthermore, 1-, 2-, and 3-year mortality rates increased sharply beyond 60 years and were greatest in the elderly (≥ 80 years): 28.2%, 44.5%, and 57.2%, respectively [15].

- Another prospective study published in 2009 by Kirsten Bibbins-Domingo et al and titled (Racial Differences in Incident Heart Failure among Young Adults) assessed the incidence of heart failure over a 20-year period among 5115 blacks and whites of both sexes who were 18 to 30 years of age at baseline showed that heart failure developed in 27 participants (mean age at onset, 39 ± 6 years), all but 1 of whom were black.
- The cumulative incidence of heart failure before the age of 50 years was 1.1% in black women, 0.9% in black men, 0.08% in white women, and 0% in white men. Among blacks, independent predictors at 18 to 30 years of age of heart failure occurring 15 years, on average, later included higher diastolic blood pressure (hazard ratio per 10.0 mm Hg, 2.1; 95% CI, 1.4 to 3.1), higher body-mass index, lower high-density lipoprotein cholesterol, and kidney disease. Three-quarters of those in whom heart failure subsequently developed had hypertension by the time they were 40 years of age. Depressed systolic function, as assessed on a study echocardiogram when the participants were 23 to 35 years of age, was independently associated with the development of heart failure 10 years, on average, later. Myocardial infarction, drug use, and alcohol use were not associated with the risk of heart failure [16].
- Another study done in Denmark between 1995-2012 Mia N. Christiansen, MD And titled (Age-Specific Trends in Incidence, Mortality, and Comorbidities of Heart Failure in Denmark, 1995 to 2012) show that the annual incidence rates per 10,000 person-years declined among older individuals (rates in 1995 versus 2012: 164 versus 115 in individuals > 74 years, 63 versus 35 in individuals 65 - 74 years, and 20 versus 17 in individuals 55 - 64 years; $p < 0.0001$ for all) but increased among the younger (0.4 versus 0.7 in individuals 18 - 34 years, 1.3 versus 2.0 in individuals 35 - 44 years, and 5.0 versus 6.4 in individuals 45 - 54 years; $p < 0.0001$ for all).
- The proportion of patients with incident heart failure ≤ 50 years of age

doubled from 3% in 1995 to 6% in 2012 ($p < 0.0001$). Sex- and age-adjusted incidence rate ratios for 2012 versus 1996 were 0.69 among people > 50 years of age, and 1.52 among individuals ≤ 50 years of age; it remained essentially unchanged on additional adjustment for diabetes mellitus, ischemic heart disease, and hypertension. Standardized 1-year mortality rates declined for middle-aged patients with heart failure but remained constant for younger (<45 years) and elderly (≥ 65 years) patients. The prevalence of comorbidities (including diabetes mellitus, hypertension, and atrial fibrillation) increased, especially in younger patients with heart failure [17].

- Another nationwide cohort study published in 2019b Thomas Gilljam, 1,2 Zacharias Mandalenakis, 1,2 Mikael Dellborg, 1,2 Georgios Lappas, 1 Peter Eriksson, 1,2 Kristofer Skoglund,1 Annika Rosengren1 in Sweden titled (Development of Heart Failure in Young Patients with Congenital Heart Disease) and show that an extremely high risk of developing HF (more than 100-fold) was found in patients with CHD, compared with matched controls, up to the age of 42 years. Patients with complex congenital heart malformations carried the highest risk and have to be considered as the main risk group for developing HF [18].
- Another study was done in Tennessee (USA) published in 2011 and titled (Race, Sex, and Age Differences in Heart Failure-Related Hospitalizations in a Southern State) show that adult (age 20 years) inpatient hospitalization for primary diagnosis of HF (HFpD) increased from 4.2% in 1997 to 4.5% in 2006. Age-adjusted hospitalization for HF (per 10,000 population) rose by 11.3% (from 29.3 in 1997 to 32.6 in 2006). Parallel changes in secondary HF admissions were also noted. Age-adjusted rates were higher among blacks than whites and higher among men than women. The ratios of black to white by sex admitted with HFpD in 2006 were highest (9:1) among the youngest age categories (20 to 34 and 35 to 44 years). Furthermore, for each age category of black men below 65 years, there were higher HF admission rates than for white men in the immediate older age category. In 2006, the adjusted rate ratios for HFpD in black to white men ages 20 to 34 and 35 to 44 years were odds ratio, 4.75; 95% confidence interval, 3.29 to 6.86 and odds ratio, 5.10; 95% confidence interval, 4.15 to 6.25, respectively. Hypertension was the independent predictor of HF admissions in black men ages 20 to 34 years [19].
- Another study published in 2018 by American Heart Association titled (Heart Failure with Preserved Ejection Fraction in the Young) showed that thirty-seven percent of HFpEF population was <65 years of age. Younger age was associated with male preponderance and a higher prevalence of obesity (body mass index ≥ 30 kg/m²; 36% in very young HFpEF versus 16% in elderly) together with less renal impairment, atrial fibrillation, and hypertension (all $p < 0.001$). Left ventricular filling pressures and prevalence of left ventricular hypertrophy were similar in very young and elderly HFpEF. Quality of life was better and death and heart failure hospitalization at 1 year occurred less frequently ($p < 0.001$) in the very young (7%) compared with the elderly

(21%) HFpEF. Compared with control subjects, very young HFpEF had a 3-fold higher death rate and twice the prevalence of hypertrophy [20].

3. Material and Method

3.1. Study Design

The study design was a case-series hospital-based retrospective study.

3.2. Study Area

This study was carried out in Al-Wahdah Teaching Hospital, Thamar Government, Yemen.

3.3. Study Sitting

This study was carried out in internal medicine department at Al-Wahdah Teaching Hospital.

3.4. Study Population

Patients who had been admitted with the diagnosis of heart failure to Internal Medicine Department at Thamar University Al-Wahdah Teaching Hospital.

3.5. Data Collection Technique: [Retrospective Data Collection]

Demographic data of study population who were admitted with the diagnosis of heart failure were registered in separate sheets.

Patient's clinical data was documented on a sheet—focusing on symptoms and clinical emanations and the duration of the disease.

Patient's investigation was documented on the sheet including laboratory and radiological tests.

Data that suggested risk factors such as family history, toxin exposure, smoking, and hypertension.

3.6. Duration of the Project

The previous two years (2019 and 2020).

3.7. Inclusion Criteria for the Study

All patients aged between [20 - 40 years] had been admitted with the diagnosis of heart failure in Al-Wahdah Teaching Hospital.

3.8. Exclusion Criteria for the Study

Those patients aged above 40 years and below 20 years were excluded from the study.

3.9. Statistical Analysis of Result

Analysis were performed using the Statistical Package for Social Sciences (SPSS) (V.26.0, IBM, and Armonk, New York, USA).

4. Result and Discussion

Our study about heart failure among young people registry for 104 cases (male, female), age group 20 - 40 years old, among duration between 1 January 2019 to 30 December 2020 in Al_Wehdah teaching hospital, Dhamar governorate, Yemen. The results can be found in **Tables 2-11** and **Figures 1-3**.

According to our study, the prevalence of young patients with heart failure from all other age groups with heart failure is 25.1%.

Heart failure significantly affects young people who chew Qat, smoke and have other risk factor for cardiomyopathy, RHD, HTN, DM, CHD, according to our knowledge, this is the first study in Yemen to evaluate the prevalence of heart failure among young patient.

Incidence of major causes of heart failure in our study is dilated cardiomyopathy 24%, RHD 17.30%, HTN 13.50%, IHD 7.70%, DM 6.70%, CHD 1%, when compared to study in Sweden in 2013, cardiomyopathy was also the first cause.

Another study in 2014 showed that, the patient were more likely to have idiopathic cardiomyopathy (63% vs 7%), and other comorbidities such as HTN, MI, AF, were much less common in the young.

Dilated cardiomyopathy is the most common cause of heart failure among young patients, the possible causes of DCM are, it may be idiopathic, or due to Qat chewing because of its toxic substance causing toxic myocarditis and increase blood pressure, or it may be familial.

Table 2. Prevalence of young patient with HF from all respondents (n = 415).

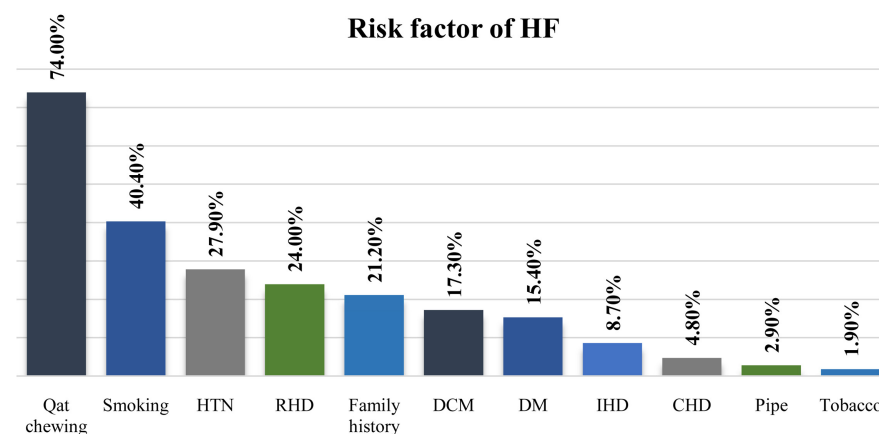
Characteristics	Frequency	Percent (%)
20 - 40 year	104	25.1%
>41 years	311	74.9%
Total	415	100%

Table 3. Socio-demographic characteristics of young respondents with HF (n = 104).

Characteristics	Frequency	%	
Age category	20 - 30 years	27	26%
	31 - 40 years	77	74%
Gender	Male	61	58.70%
	Female	43	41.30%
Marital status	Married	97	93.30%
	Not married	7	6.70%
Educational level	Yes	12	11.50%
	No	6	5.80%
	not mentioned	86	82.70%

Table 4. Clinical data of respondents (multiple answers are possible).

Characteristics		N (%)	
Dyspnea	99 (95.2%)	PND	65 (61.5%)
		At rest	64 (62.5%)
		Orthopnea	59 (56.7%)
		On exertion	59 (55.8%)
Oedema	57 (54.9%)	Generalized	81 (77.9%)
		Lower limb	48 (46.2%)
Chest pain	23 (22.1%)	Central	21 (20.2%)
		Peripheral	2 (1.9%)
Cough		50 (48.1%)	
Palpitation		12 (11.5%)	
Fever		11 (10.6%)	
Fatigue		9 (8.7%)	
Epigastric pain		8 (7.7%)	
Dizziness		6 (5.8%)	
Vomiting		5 (4.8%)	
Right hypochondrium pain		4 (3.8%)	
Hemoptysis		3 (2.9%)	
Diarrhea		1 (1%)	

**Figure 1.** Risk factor of heart failure.

Another cause in our study is RHD 17.30%, it is cardiac inflammation and scarring triggered by an autoimmune reaction to infection by group A streptococci, in the acute stage this condition consists of pancarditis, involving inflammation of the myocardium, endocardium and epicardium, chronic rheumatic heart disease is manifested by valvular fibrosis, resulting in stenosis and/or insufficiency which eventually lead to heart failure.

Table 5. Physical examination of patient with HF.

		Characteristics	N	%
General examination	Body built	Average	35	33.70%
		Underweight	5	4.80%
		Overweight	2	1.90%
		No data found	62	59.60%
	Heart rate	Normal	73	70.20%
		Tachycardia	19	18.30%
		Bradycardia	0	0.00%
		No data found	12	11.50%
	Blood Pressure	Normal	49	47.10%
		Hypertension	24	23.10%
		Hypotension	21	20.20%
	Hepatomegaly	No data found	10	9.60%
Yes		31	29.80%	
	No	73	70.20%	
	Cardiopulmonary examination	Crepitation	32	30.80%
Crepitation		Bilateral	32	30.80%
		Basal	31	29.80%
		All over	19	18.30%
Heart sounds	Unilateral	2	1.90%	
	Normal	33	31.70%	
	Abnormal	71	68.30%	

Table 6. ECG, CXR, ECHO findings.

		Characteristics	Frequency	%
ECG	ECG	Normal	25	24%
		Abnormal	36	34.60%
		No data found	23	22.10%
		not specific	20	19.20%
CXR	CXR	Normal	41	39.40%
		Abnormal	12	11.50%
		No data found	51	49%
ECHO	ECHO	Done	9	9.70%
		Not done	95	91.30%

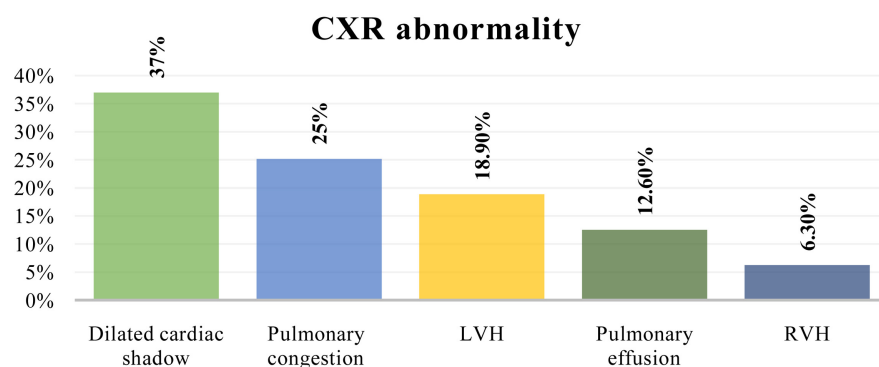


Figure 2. Chest X-ray abnormality (n = 12).

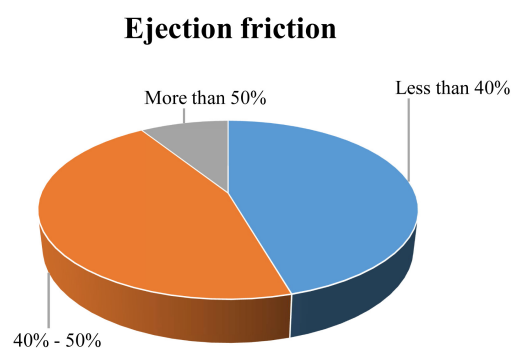


Figure 3. Ejection fraction finding (n = 6).

Table 7. Laboratory investigation.

Characteristics		N (%)	
CBC	Normal	62 (59.6%)	
	Abnormal	24 (23.1%)	
	No data found	18 (17.3%)	
LFT	Normal	20 (19.2%)	
	Abnormal	14 (13.5%)	
	No data found	70 (67.3%)	
RFT	Normal	56 (53.8%)	
	Abnormal	18 (17.3%)	High Creatinine 16 (15.4%)
	No data found	30 (28.8%)	High Urea 13 (12.5%)
Lipid profile	Normal	9 (8.7%)	
	Abnormal	0 (0%)	
	No data found	95 (91.3%)	

Continued

	Normal	11 (10.6%)		
			Low calcium	16 (15.4%)
S. Electrolyte	Abnormal	17 (16.3%)	Low Potassium	5 (4.8%)
			Low Sodium	3 (2.9%)
	No data found	76 (73.1%)		
	Normal	30 (28.8%)		
RBS	High	18 (17.3%)		
	Low	1 (1%)		
	No data found	55 (52.9%)		
	Normal	6 (5.8%)		
ESR	High	2 (1.9%)		
	Low	2 (1.9%)		
	No data found	49 (90.4%)		
	Normal	4 (3.8%)		
CRP	High	8 (7.7%)		
	No data found	92 (88.5%)		

Table 8. Using of regular treatment.

Characteristics	Frequency	%
Yes	23	22.10%
No	81	77.90%

The characteristics chief complaint of a young adult with heart failure, the patient commonly come with dyspnea 95.2%, edema 46.2%, chest pain, and cough, other less common symptoms are palpitation, fever, dizziness, and right hypochondriac pain.

According to our study male, more likely to be affected by heart failure at younger ages 58.70% and females 41.30%.

We faced many difficulties during data collection. The patient files did not provide adequate information, vital signs were not recorded in the file upon patient arrival at the hospital, and investigations were not always available, such as echography, which patients may not have taken. We hope these difficulties will be addressed in the future.

People need access to information about major risk factors of heart failure in order to avoid it. Responsibility lies with doctors who treat patients to decrease the prevalence of heart failure.

Additionally, the study results may have been affected by unmeasured confounding variables, such as socioeconomic status and post-hospital care.

Table 9. Pharmacological treatment.

Characteristics	Frequency	%
Diuretics	93	89.40%
Beta Blocker	75	72.10%
Spiranalactone	70	67.30%
ACE Inhibitors	64	61.50%
Aspirin	60	57.70%
Heparin	45	43.30%
Digitalis	44	42.30%
Antibiotics	41	39.40%
Atrovastatin	31	29.80%
Clopidagrel	21	20.20%
Warfarin	18	17.30%
PPI	10	9.60%
ARBS	8	7.70%
Insulin	6	5.80%
Albumin	6	5.80%
Dopamine	5	4.80%
Amlodipine	4	3.80%
O ₂ Therapy	2	1.90%
Dobutamine	1	1%

Table 10. Reach to definitive etiology.

Characteristics	Frequency	%
Yes	64	61.50%
No	40	38.50%

Table 11. The common etiologies lead to HF.

Characteristics	Frequency	%
Dilated cardiomyopathy	25	24%
Rheumatic heart disease	18	17.30%
Hypertension	14	13.50%
Ischemic heart disease	8	7.70%
Diabetes mellitus	7	6.70%
Valvular heart disease	4	3.80%
Anemic heart failure	1	1%
Atrial Fibrillation	1	1%
Congenital heart disease	1	1%

5. Conclusion and Recommendation

The conclusion of this study includes:

- The most common cause was dilated cardiomyopathy.
- Most patients with heart failure were chewing Qat and need further studies.
- Patients who already had the underlying disease such as RHD, CHD, HTN and DM were under irregular treatment.
- Males were commonly affected by HF than females.
- Further studies are needed to detect the common cause of dilated cardiomyopathy in this age group.
- We need further studies to determine the effect of Qat chewing on cardiac disease and its effect on medication and educate the patients about the effect of bad habits such as Qat chewing and smoking on cardiac disease.
- We need to educate the patients about the importance of taking medication regularly, and take regular follow-up.
- Screening for rheumatic fever and rheumatic heart disease for early prevention can be conducted to as a form of reducing the prevalence of heart failure.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Newby, D.E., Grubb, N.R. and Bradbury, A. (2014) Cardiovascular Disease. In: Brian, N.R. and Walker, R., Eds., *Davidson's Principles and Practice of Medicine*, 22nd Edition, Elsevier, London, 546.
- [2] Wong, C.M., *et al.* (2013) Clinical Characteristics and Outcomes of Young and Very Young Adults with Heart Failure: The CHARM Programme (Candesartan in Heart Failure Assessment of Reduction in Mortality and Morbidity). *Journal of the American College of Cardiology*, **62**, 1845-1854.
<https://doi.org/10.1016/j.jacc.2013.05.072>
- [3] Barasa, A., *et al.* (2013) Heart Failure in Young Adults: 20-Year Trends in Hospitalization, Aetiology, and Case Fatality in Sweden. *European Heart Journal*, **35**, 25-32.
<https://doi.org/10.1093/eurheartj/ehz278>
- [4] McDonagh, T.A., *et al.* (2021) 2021 ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure. *European Heart Journal*, **42**, 3599-3726.
<https://doi.org/10.1093/eurheartj/ehab368>
- [5] Galderisi, M., Cosyns, B., Edvardsen, T., Cardim, N., Delgado, V., Di Salvo, G., *et al.* (2017) Standardization of Adult Transthoracic Echocardiography Reporting in Agreement with Recent Chamber Quantification, Diastolic Function, and Heart Valve Disease Recommendations: An Expert Consensus Document of the European Association of Cardiovascular Imaging. *European Heart Journal: Cardiovascular Imaging*, **18**, 1301-1310. <https://doi.org/10.1093/ehjci/jex244>
- [6] Arrigo, M., Huber, L.C., Winnik, S., Mikulicic, F., Guidetti, F., Frank, M., Flammer, A.J. and Auschwitz, F. (2019) Right Ventricular Failure: Pathophysiology, Diagnosis and Treatment. *Cardiac Failure Review*, **5**, 140-146.
<https://doi.org/10.15420/cfr.2019.15.2>
- [7] Gorter, T.M., van Veldhuisen, D.J., Bauersachs, J., Borlaug, B.A., Celutkiene, J.,

- Coats, A.J.S., et al. (2018) Right Heart Dysfunction and Failure in Heart Failure with Preserved Ejection Fraction: Mechanisms and Management. Position Statement on Behalf of the Heart Failure Association of the European Society of Cardiology. *European Journal of Heart Failure*, **20**, 1637. <https://doi.org/10.1002/ejhf.1029>
- [8] Caraballo, C., Desai, N.R., Mulder, H., Alhanti, B., Wilson, F.P., Fiuzat, M., et al. (2019) Clinical Implications of the New York Heart Association Classification. *Journal of the American Heart Association*, **8**, e014240. <https://doi.org/10.1161/JAHA.119.014240>
- [9] Dunlay, S.M. and Roger, V.L. (2014) Understanding the Epidemic of Heart Failure: Past, Present, and Future. *Current Heart Failure Reports*, **11**, 404-415. <https://doi.org/10.1007/s11897-014-0220-x>
- [10] MeyerMeyer, S., Brouwers, F.P., Voors, A.A., Hillege, H.L., de Boer, R.A., Gansevoort, R.T., van der Harst, P., Rienstra, M., van Gelder, I.C., van Veldhuisen, D.J., van Gilst, W.H. and Van der Meer, P. (2015) Sex Differences in New-Onset Heart Failure. *Clinical Research in Cardiology*, **104**, 342-350. <https://doi.org/10.1007/s00392-014-0788-x>
- [11] Van Riet, E.E., Hoes, A.W., Wagenaar, K.P., Limburg, A., Landman, M.A. and Rutten, F.H. (2016) Epidemiology of Heart Failure: The Prevalence of Heart Failure and Ventricular Dysfunction in Older Adults over Time. A Systematic Review. *European Journal of Heart Failure*, **18**, 242-252. <https://doi.org/10.1002/ejhf.483>
- [12] Ralston, S.H., et al. (2018) Davidson's Principles and Practice of Medicine. 23rd Edition, Elsevier, Amsterdam.
- [13] Anders Barasa, et al. (2014) Heart Failure in Young Adults: 20-Year Trends in Hospitalization, Aetiology, and Case Fatality in Sweden. *European Heart Journal*, **35**, 25-32. <https://doi.org/10.1093/eurheartj/eh278>
- [14] Wong, C.M., et al. (2017) Heart Failure in Young Adults Is Associated with High Mortality: A Contemporary Population-Level Analysis. *The Canadian Journal of Cardiology*, **33**, 1472-1477. <https://doi.org/10.1016/j.cjca.2017.05.009>
- [15] Wong, C.M., et al. (2014) Heart Failure in Younger Patients: The Meta-Analysis Global Group in Chronic Heart Failure (MAGGIC). *European Heart Journal*, **35**, 2714-2721. <https://doi.org/10.1093/eurheartj/ehu216>
- [16] Bibbins-Domingo, K., et al. (2009) Racial Differences in Incident Heart Failure among Young Adults. *The New England Journal of Medicine*, **360**, 1179-1190. <https://doi.org/10.1056/NEJMoa0807265>
- [17] Christiansen, M.N., et al. (2017) Age-Specific Trends in Incidence, Mortality, and Comorbidities of Heart Failure in Denmark, 1995 to 2012. *Circulation*, **135**, 1214-1223. <https://doi.org/10.1161/CIRCULATIONAHA.116.025941>
- [18] Gilljam, T., et al. (2019) Development of Heart Failure in Young Patients with Congenital Heart Disease: A Nation-Wide Cohort Study. *Open Heart*, **6**, e000858. <https://doi.org/10.1136/openhrt-2018-000858>
- [19] Husaini, B.A., et al. (2011) Race, Sex, and Age Differences in Heart Failure-Related Hospitalizations in a Southern State. *Circulation: Heart Failure*, **4**, 161-169. <https://doi.org/10.1161/CIRCHEARTFAILURE.110.958306>
- [20] Pfeffer, M.A., Shah, A.M. and Borlaug, B.A. (2019) Heart Failure with Preserved Ejection Fraction in Perspective. *Circulation Research*, **124**, 1598-1617. <https://doi.org/10.1161/CIRCRESAHA.119.313572>

List of Abbreviations

HF: Heart Failure
 IHD: Ischemic Heart Disease
 ACHD: Adult Congenital Heart Disease
 LVEF: Left Ventricular Ejection Fraction
 LV: Left Ventricle
 RV: Right Ventricle
 HFrEF: Heart Failure with Reduced Ejection Fraction
 HFmrEF: Heart Failure with Mildly Reduced Ejection Fraction
 HFpEF: Heart Failure with Preserved Ejection Fraction
 NPs: Natriuretic Peptide
 ARVC: Arrhythmogenic Right Ventricle Cardiomyopathy
 FAC: Fractional Area Change
 TAPSE: Tricuspid Annular Plane Systolic Excursion
 CHF: Chronic Heart Disease
 MI: Myocardial Infarction
 AHF: Acute Heart Failure
 CMP: Cardiomyopathy
 IV: Intra venous Injection
 PPCM: Peripartum Cardiomyopathy
 NYHA: New York Heart Association
 CV: Cardiovascular
 CAD: Coronary Artery Disease
 BNP: Brain Natriuretic Peptide
 NT-PRO: N-Terminal Pro-B Type Natriuretic Peptide
 MRI: Magnetic Resonance Imaging
 CMR: Cardiac Magnetic Resonance Imaging
 ECG: Electrocardiogram
 BP: Blood Pressure
 ACE: Angiotensin-Converting Enzyme inhibitor
 ARBs: Angiotensin Receptors Blockers
 ARNI: Angiotensin Receptors Neprilysin Inhibitor
 VAD: Ventricular Assist Devices
 ED: Emergency Department
 CHARM: Candesartan in Heart Failure Assessment of Reduction in Mortality
 and Morbidity
 MAGGI: Meta-Analysis Global Group in Chronic Heart Failure
 CHF: Congenital Heart Failure
 HFPD: Hospitalization for Primary Diagnosis
 SPSS: Statistical Package for Social Sciences
 RHD: Rheumatic Heart Disease
 HTN: Hypertension
 DM: Diabetes Mellitus
 IHD: Ischemic Heart Disease
 AF: Atrial Fibrillation
 DCM: Dilated Cardiomyopathy
 PND: Paroxysmal Nocturnal Dyspnea

HR: Heart Rate
CXR: Chest X-Ray
ECHO: Echocardiography
LVH: Left Ventricle Hypertrophy
RVH: Right Ventricle Hypertrophy
CBC: Complete Blood Count
HB: Hemoglobin
LFT: Liver Function Test
T. BILIRUBIN: Total Bilirubin
AST: Aspartate Aminotransferase
ALT: Alanine Aminotransferase
RFT: Renal Function Test
S. ELECTROLYTE: Serum Electrolyte
RBS: Random Blood Sugar
ESR: Elevated Sedimentation Rate
CRP: C-Reactive Protein
PPI: Proton Pump Inhibitor
O₂: Oxygen
PCI: Percutaneous Coronary Intervention