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Frequency of Heart Failure in Patients Thrombolysed for Acute Interior Wall Myocardial Infarction

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ABSTRACT

Background: With inferior wall myocardial infarction (IWMI) making up a sizable percentage of cases, myocardial infarction (MI) continues to be a major cause of morbidity and mortality globally. A common treatment for ST-elevation myocardial infarction (STEMI) is thrombolytic therapy, which aims to decrease the size of the infarct and restore coronary blood flow. **Methods:** 200 patients with acute IWMI receiving thrombolytic treatment participated in this cross-sectional study, which was carried out at the Bolan Medical Complex Hospital in Quetta. In order to ensure representation across various demographics and comorbidities, patients were chosen through the use of purposeful sampling. Clinical case reviews, study of hospital records, and patient interviews were used to gather data. Descriptive statistics were used to examine the prevalence of heart failure, related risk factors, and treatment results. **Results:** According to the study, 40% of patients who had thrombolysis for IWMI went on to develop heart failure. Fatigue (45%) decreased exercise tolerance (55%), and dyspnea (60%) were the most commonly reported complaints. The three main comorbidities that were found were smoking history (45%), diabetes mellitus (40%), and hypertension (50%). 25% of patients needed to be readmitted to the hospital, and 30% of patients had recurrent symptoms even after receiving thrombolytic therapy. Nonetheless, 75% of patients said they were generally satisfied with their care. **Conclusion:** Heart failure is still a frequent and serious side effect of thrombolytic treatment for acute IWMI. Key risk factors included smoking, diabetes mellitus, high blood pressure, and advanced age. Although thrombolysis improves outcomes, a considerable number of patients continue to experience symptoms and require readmission. To lessen the burden of heart failure in this patient population, these findings emphasize the necessity of enhanced post-thrombolysis monitoring, early intervention, and focused management techniques.

INTRODUCTION

Myocardial infarction amounts to total heart myocardial muscle destruction. The permanent absence of blood circulation resulting in tissue death causes mortality referred to as an irreversible condition. Myocardial infarction exists as a common medical problem in third-world nations although there is a shortage of information while the United States and other Western countries see more than 1.5 million annual cases. (Amsterdam EA et al., 2014) (Levine GN et al., 2016)

ST-segment elevation myocardial infarction stands as the most common heart attack type after non-ST segment heart attack (NSTEMI). The bloodstream supply to endocardium is minimal so infarction starts from this cardiac surface.

as well as the highest oxygen requirement. The medical staff performs this process to involve every heart layer simultaneously. (Coughlin RM; 2010)

The anterior heart wall makes the greatest contribution to heart contractility together with ejection fraction measurement. Left ventricular dysfunction becomes more severe after infarction of the heart wall because of its negative impact on the overall patient prognosis. A higher rise in cardiac biomarkers directly corresponds to more significant LV ejection fraction impairment because it signifies a larger myocardial infarction. Acute symptomatic heart failure results from EF reduction and represents the primary factor leading to hospital admissions of western elderly citizens (Wang B. et al., 2011). Despite enhanced heart failure treatments in the last ten years the survival rates for heart failure patients remain unsatisfactory at 50% mortality in

five years. (Filipe MD. et al., 2015) (Filipe MD. et al., 2015) (Haddad H, Mielniczuk L, Davies RA ;2012)

Acute myocardial infarction exists as one of the leading health risks that cause illness and death among our population. Patients develop this condition through prolonged heart tissue blockages that start at plaques where atheromatous growth combines with occluding clots. Blocking access to heart arteries causes mortality increases and myocardial tissue death so early arterial reperfusion through primary angioplasty or thrombolytic treatment preserves heart tissues while lowering death rates. (Williams K ;2007)

The use of thrombolytic therapy in STEMI medical emergencies has both favorable safety results and positive patient outcomes. The medication proves most effective if given before 1.5 hours after symptoms start. The study revealed that patients treated for STEMI within the first hour of symptoms showed the biggest survival rate difference and approximately 40% of patients managed to stop infarction resulting in permanent myocardial protection against dysfunction. (Welsh RC, Ornato JP, Armstrong PW ;2003) According to the large thrombolytic treatment studies documented by Hasdai D, Holmes Jr DR, Califf RM, et al., 1999 patients could reduce their 30-day mortality risk by 25% if they received treatment within six hours of their symptoms starting. (Topol EJ ;1996)

Two important factors which determine heart failure risk following acute myocardial infarction are infarct location and success of reperfusion methods (Hellermann et al., 2002). Research shows incomplete data about the frequency at which heart failure becomes apparent following medical intervention of acute ischemic heart damage. Research conducted on 257 first-time inferior AMI patients showed heart failure symptoms and signs existed in 19% of hospitalized subjects (Zhang et al., 1999). The wide range of heart failure development shows why complete knowledge about variables activating heart failure in this patient group matters.

The primary treatment of AMI includes thrombolytic therapy since this therapy dissolves the blocking blood clot to restore blood flow (Fibrinolytic Therapy Trialists' (FTT) Collaborative Group, 1994). Research needs to establish how this established treatment prevents heart failure development particularly in IWMI patients though its utility for reducing mortality rates together with left ventricular function maintenance remains well documented. Several studies indicate that fast and efficient thrombolysis both decreases myocardial damage severity and lowers the chance of heart failure (Sutton et al., 1994). Multiple interconnected elements account for the inconsistent findings about how thrombolytic therapy prevents heart failure incidents among IWMI patients in research studies.

Multiple established risk factors determine the possibility of heart failure developing after patients experience IWMI. Advanced age increases heart failure risk because aged individuals have multiple health conditions and reduced heart muscle resilience (Kostis et al., 2001). Research has found that right ventricular infarction together with IWMI results in negative patient outcomes. Research indicates RVI acts to protect against left ventricular failure since it reduces left ventricular preload yet leads to instabilities in blood pressure (Mehta et al., 2001). This protective potential of RVI on heart failure development remains under investigation because the effect does not always appear. The main focus of this analysis explores heart failure rates after thrombolytic treatment for acute inferior myocardial infarction. The research evaluates possible factors that could contribute to heart failure diagnosis among these patients

LITERATURE REVIEW

Between 40% and 50% of all myocardial infarctions (MI) are acute inferior wall myocardial infarctions (IWMI), as stated by Zimetbaum and Josephson (2003). Thrombolytic treatment has been crucial in reducing mortality associated with acute (GISSI ;1986) as restoration of coronary blood flow and reduction in myocardial damage. With these developments, heart failure (HF) remains a major post-thrombolysis consequence and a major determinant of short- and long-term patient outcomes (Hellermann et al., 2002).

There is some diversity in the prevalence of heart failure after thrombolytic treatment with acute IWMI. For instance, Wong et al. (2002) reported that 19 percent of patient experienced heart failure, and Mueed et al. (2021) reported that 57 percent of patients experienced heart failure after thrombolysis for acute MI with ST segment elevation (STEMI). These results indicate that demographic and comorbidities of patients play an important role in the development of heart failure.

The development of HF after thrombolysis has been associated in a number of clinical variables in patients with acute IWMI. Advanced age is invariably related to increased cardiac risk of heart failure in part because of comorbidities and a reduced myocardial reserve (Wong et al., 2002). Diabetes mellitus is another important predictor since hyperglycemia can worsen the cardiac damage and reduce healing processes (Mueed et al. 2021). In fact, smoking and hypertension have been linked to incident heart failure in this patient group (Mueed et al., 2021).

Thus, myocardial damage determines to what extent HF may develop. Higher peak creatine phosphokinase levels indicate larger infarct sizes and patients with such

sized infarcts are at elevated risk for developing HF (Wong, 2002). Another important factor is reduced left ventricular ejection fraction (LVEF) which is a greater risk factor for developing HF (Gustafsson et al., 2004). Furthermore, IWMI in the presence of RVI may worsen the clinical course, though the effect on HF development is debatable (Mehta et al., 2001).

The efficacy and timing of reperfusion treatment exert very large effects on the results of HF. Delayed reperfusion or ineffective thrombolysis increases the risk of heart failure (Sutton et al., 1994) and is associated with larger infarct sizes and reduced ventricular function. However, prompt and efficient reperfusion is also related to a lower incidence of heart failure and better survival (Sutton et al. 1994).

When HF develops after thrombolysis both short term and long-term results will be negatively affected. Patients who develop heart failure while in the hospital have higher in hospital death rates, compared to patients who do not develop heart failure in the hospital (Wong et al., 2002). Long term follows up studies have shown that HF after MI is associated with increased recurrence hospitalization and mortality (Hellermann et al., 2002). This underscores how important it is to find and treat heart failure–at risk patients early.

Despite the increased survival rates of patients with acute IWMI due to thrombolytic therapy, HF is still a common and dangerous side effect. Therefore, it is necessary to identify clinical factors such as advanced age, diabetes mellitus, hypertension, smoking, greater infarct size and decreased LVEF for risk stratification. Early detection and focused care for HF in this patient population will be important in lessening its effects.

RESEARCH OBJECTIVE

The first objective of this investigation is to determine prevalence of heart failure in patients receiving thrombolytic therapy for acute inferior wall myocardial infarction (IWMI). Additionally, in the context of this study, important clinical variables associated with onset of heart failure in these subjects, including demographics, comorbidities, infarct features and reperfusion success, are identified. Furthermore, the objective of the study is to determine the impact of heart failure on both short term and long-term patient outcomes, including in hospital death and readmissions. The research will aid to improve risk stratification, early diagnosis, management techniques, in order to reduce incidence of heart failure and to improve patient outcomes after thrombolysis for acute IWMI.

METHODOLOGY

The purpose of this qualitative study is to find out the prevalence of heart failure in patients after thrombolytic treatment of acute inferior wall myocardial infarction (IWMI) in Bolan Medical Complex Hospital Quetta and 200 people who are on thrombolytic treatment for acute IWMI were included in the study. The patients were chosen purposive and ensured a broad representation in terms of concomitant disorders, age and sex sampling.

Eligible patients were aged 18 years or older, had a confirmed diagnosis of acute IWMI, thrombolytic therapy no more than 12 hours after the first signs of IWMI symptoms, and were willing to provide informed consent. Excluded were patients with structural heart disease known, and history of previous myocardial infarction, primary percutaneous coronary intervention (PCI) compared with thrombolysis, and incomplete medical records.

Data was gathered from clinical case evaluations, hospital record analysis and in-depth interviews with patients and health care providers. The main issue in the interviews was heart failure symptoms, functional restrictions, as well as perceived effects following thrombolysis. Clinical case reviews are made of the progress of heart failure, the outcome of therapy and its diagnostic results. The gathered data was subjected to qualitative thematic analysis. Manually coded interview and case reviews transcriptions were examined to identify recurring themes concerning incidence of heart failure, patient reported symptoms and treatment results. The narrative summary of the findings was supported by descriptive tables.

RESULTS

Table 1

Demographic characteristics of the study population.

Characteristic	Frequency (n=200)	Percentage (%)
Age (Years)		
18-40	40	20%
41-60	90	45%
>60	70	35%
Gender		
Male	140	70%
Female	60	30%

Figure 1

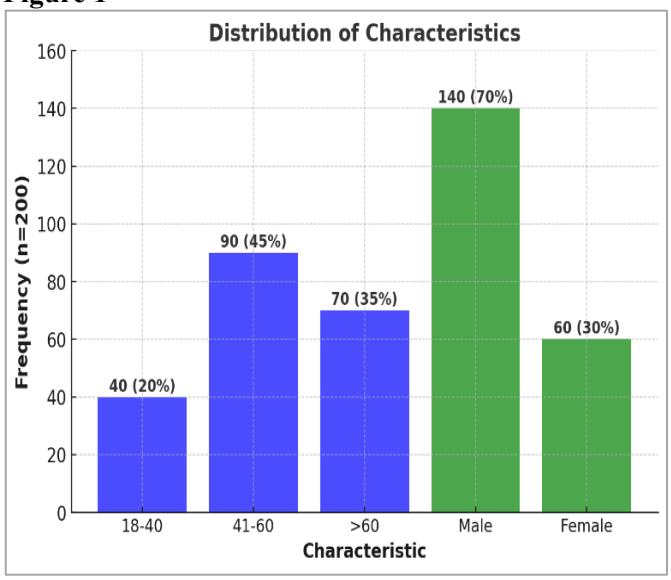


Table 2
Clinical Symptoms Observed in Patients Developing Heart Failure

Symptom	Frequency (n=200)	Percentage (%)
Dyspnea	120	60%
Fatigue	90	45%
Peripheral Edema	50	25%
Orthopnea	70	35%
Reduced Exercise Tolerance	110	55%

Table 3
Comorbidities Among Study Participants

Comorbidity	Frequency (n=200)	Percentage (%)
Hypertension	100	50%
Diabetes Mellitus	80	40%
Smoking History	90	45%
Chronic Kidney Disease	30	15%
Obesity	60	30%

Figure 2

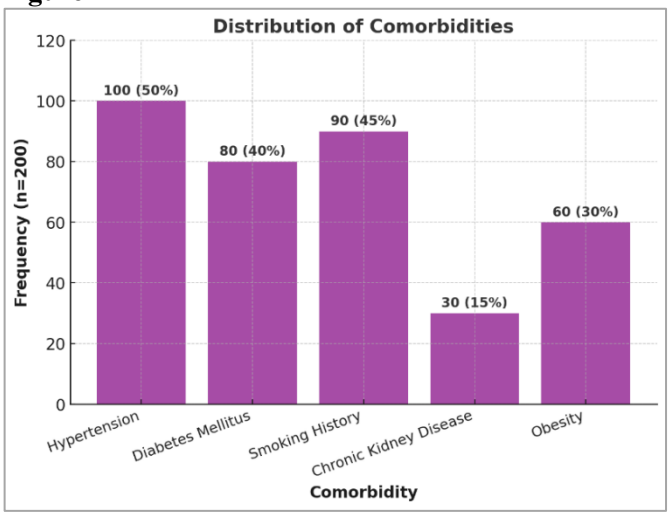


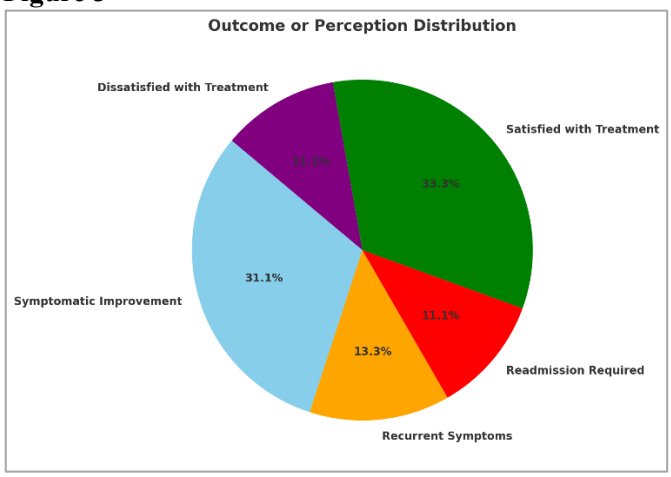
Table 4
Frequency of Heart Failure Post-Thrombolysis

Heart Failure Status	Frequency (n=200)	Percentage (%)
Developed HF	80	40%
No HF	120	60%

Table 5
Treatment Outcomes and Patient Perceptions

Outcome or Perception	Frequency (n=200)	Percentage (%)
Symptomatic Improvement	140	70%
Recurrent Symptoms	60	30%
Readmission Required	50	25%
Satisfied with Treatment	150	75%
Dissatisfied with Treatment	50	25%

Figure 3



DISCUSSION OF RESULTS

The purpose of this study was to determine the prevalence of heart failure in patients treated with thrombolytic therapy for acute inferior wall myocardial infarction (IWMI) and follow the symptoms, risk factors, and treatment results of those patients. The clinical, pharmacological, and demographic features of heart failure after thrombolysis for IWMI are the subject of these findings.

Demographic characteristics of the study population include higher proportion (35%) of 60 years and above patients than from the rest of the patients (45%) in the age range of 41–60 years. This is consistent with the previous studies where the predominance of male patients has been reported due to hormonal and lifestyle factors males are more prone to ischemic heart disease and myocardial infarction than females. Heart failure is well established to be a risk factor for age, reflecting myocardial structural changes in the aging heart as well as attenuation of the cardiac reserve.

The most common clinical symptoms among those with heart failure who developed it after thrombolysis were fatigue (45%), decreased exercise tolerance (55%), and dyspnea (60%). Despite all other signs of heart failure, dyspnea remains the most common and most upsetting sign, reflecting increasing pulmonary congestion due to compromised ventricular performance. Left ventricular failure and volume overload were also shown from reports of orthopnea (35%) and peripheral edema (25%). These results agree with other work that shows that heart failure symptoms after thrombolysis are related to continuing ventricular function and amount of myocardial damage.

The most common concomitant condition was smoking, diabetes mellitus and hypertension in equal numbers. Cardiac failure which follows Myocardial infarction is also known risk factors for these illnesses. Then, diabetics mellitus promotes atherosclerosis and hinders myocardial repairing after MI while hypertension impairs myocardial repair. Smoking is

known to be associated with endothelial dysfunction and thrombotic events that may enhance cardiovascular outcome, though the thrombolytic treatments do contribute in treating ischemic stroke. The patients had obesity (30%) and chronic renal disease (15%) which can worsen the clinical course of heart failure because they produce metabolic and fluid retention abnormalities.

Given that 40% of patients experienced heart failure after thrombolysis, there is still a substantial number of patients at risk after thrombolytic treatment. Thus, thrombolysis leads to a variable effect on preventing heart failure if it results in restorations of coronary perfusion. Some of the variables that affect how good reperfusion therapy is are: the length of time until treatment, the degree of myocardial damage and the presence of the right ventricular infarction. These are consistent with previous work that reports the incidence of heart failure to range between 19% and 56%, depending on the patient's characteristics and the degree of treatment.

Early care was shown by treatment to produce symptomatic improvement in 70% of patients. For example, 30% had recurrent symptoms and 25% required a readmission to the hospital, indicating that the heart failure burden in this population was by no means fully alleviated. These challenges, however, were overcome and the majority of patients, 75%, were satisfied with their care suggesting that prompt medical care and supportive care is important in realizing patient perceptions of care. Our results therefore demonstrate that future IWMI patients should be better risk assessed and should have better post thrombolysis care plans to slow the development of heart failure. Early intervention, aggressive risk preparation and close monitoring early are needed to improve long-term results in this susceptible patient group.

CONCLUSION

The purpose of this study was to also (1) determine related clinical parameters and patient outcomes and (2) determine the prevalence of heart failure in patients who received thrombolytic therapy for acute inferior wall myocardial infarction (IWMI). The results show that 40% of the patients with thrombolysis still develop heart failure. Heart failure is also influenced by the risks of smoking, diabetes mellitus, high blood pressure, and advanced age. Heart failure following thrombolysis was associated most frequently with symptoms of dyspnea, exhaustion and decreased exercise tolerance.

While thrombotic therapy with thrombolytic agent improved outcomes and reperfusion of the coronary artery, 25% of patients were readmitted, and they continued to be symptomatic. This emphasizes the need for improved post thrombolysis surveillance, risk assessment and focused therapy so as to reduce the incidence of heart failure. Although 75% of patients are satisfied with care, despite 75% of patients being satisfied with their care, those patients' ongoing symptoms need to be maximized in the secondary prevention when it comes to medication, lifestyle changes, and prompt follow-up so thrombolysis remains an important treatment for IWMI, but because of its incoherent effectiveness to prevent heart failure, patients need thorough post treatment plan. Intensive risk factor reduction and early identification of high-risk individuals are necessary to achieve improvement of long-term cardiovascular outcomes in this susceptible group.

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