2022-10-29

Factors Affecting Time To Arrival Among Patients with Myocardial Infraction at Emergency Center of Tibebe Ghion Specialzed Hospital and Felege Hiwot Comprehenve Specialized Referal Hospital, Northwest Ethiopia, 2022.

Yahye, Hassan

BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF MEDICINE

DEPARTMENT OF Internal Medicine

Factors Affecting Time To Arrival Among Patients with Myocardial Infraction at Emergency Center of Tibebe Ghion Specialzed Hospital and Felege Hiwot Comprehenve Specialized Referal Hospital, Northwest Ethiopia, 2022.

By: Yahye H. (Md)

A Research Thesis Submitted To Department Of Internal Medicine, College Of Medicine And Health Science, Bahir Dar University, For Partial Fulfillmnet Of Speciality In Internal Medicine.

October, 2022

Bahirdar, Ethiopia

Research Proposal Submission Form

Principal Investigator	**Yahye Hassan (Md, Year 3 Internal Medicine Resident)** **Cell Phone: +251-994867288** Email: **Dr.Yahye@Gmail.Com**
Advisors	**Wubet Hunegnaw (Md, Internist, Cardiologist, Assistant Professor Of Medicine At Bdu)** **Cell Phone:+251-904201010** **Email: Wubethunegnaw21@Gmail.Com**
	Ergoye Melese (Msc, Assistant Professor Of Biostatistics) **Cell Phone:+251-910021249** **Email: Muhammedergoye8@Gmail.Com**
TITLE OF THE RESEARCH PROJECT	**FACTORS AFFECTING TIME TO ARRIVAL AMONG PATIENTS WITH MYOCARDIAL INFRACTION AT EMERGENCY CENTER OF TIBEBE GHION SPECIALZED HOSPITAL AND FELEGE HIWOT COMPREHENVE SPECIALIZED REFERAL HOSPITAL, NORTHWEST ETHIOPIA, 2022.**
DURATION OF THE PROJECT	**DECEMBER 2021- JULY. 2022**
STUDY AREA	**TIBEBE GHION SPECIALIZED HOSPITAL, AND FELEGE HIWOT REFERAL HOSPITAL. BAHIR DAR, ETHIOPIA**
TOTAL COST OF THE PROJECT	**25043.7 ETHIOPIAN BIRR**

ACKNOWLEDGMENT

First, I would like to thank my heartfelt gratitude to Bahirdar University College of Medicine and Health sciences, Department of Medicine and Department of public health, for giving me this opportunity to conduct this research.

Second, I would also like to express my sincere gratitude to my advisers Dr.Wubet Hunegnaw and Ergoye Melese who gave me their precious time and guide me to develop and prepare this thesis.

Lastly, my special thanks goes to data collectors, supervisors, administers of hospital and head of department of emergency center at Tibebe Ghion Specialized Hospital and Felege Hiwot Comprehenve Specialized Referral Hospital.

ABBREVIATION AND ACRONYMS

ACS	Acute Coronary Syndrome
AHA	American Heart Association
CVD	Cardiovascular Disease
ED	Emergency Department
ECG	Electrocardiography
KM	Kilometer
MI	Myocardial Infraction
NSTEMI	Non St Segment Elevation Myocardial Infraction
NHANES	National Health and Nutrition Examination Survey
PCI	Percutaneous Coronary Intervention
SPSS	Statistical Package for the social Sciences
STEMI	St Segment Elevation Myocardial Infraction
TGSH	Tibebe Ghion Specialized Hospital
UA	Unstable Angina

Table of Contents

LIST OF TABLES

LIST OF FIGURE

ABSTRACT

Background: Ischemic heart disease is the leading cause of death worldwide accounting for almost 16% of all deaths. The contributing factors of cardiovascular diseases are multifarious and include smoking tobacco, hypercholesterolemia and diabetes. Timing of treatment is very critical in myocardial infraction patients primarily time of fibrinolysis and reperfusion.

Objective – To determine the factors associated with time on arrival for patients with myocardial infraction at emergency department in Tibebe Ghion Specialized Hospital and Felege Hiwot Comprehenve Specialized Referral Hospital, 2022.

Method- Institutional based cross-sectional study was conducted for Myocardial Infraction patients who visited Tibebe Ghion and Felege Hiwot Comprehenve Specialized Referral Hospital. The quality of the data was assured through careful design and pretesting of the tools, proper training of data collector. The results was displayed by using frequency tables and charts. The sample size was determined using computer-based Epi info7 software Stat Cal by using single population proportion formula with result of 303. Multiple logistic regression analysis was employed to control the possible confounding effect and assess the separate effects of the variables. A p-value of 0.05 and a 95% confidence interval were considered significant.

Result- Total of 303 myocardial infraction patients were involved, the majority of patients were male (187; 61.72%). the mean time of myocardial infraction patients from onset of symptoms to admission in days was 5.83days. Low educational status, smokers, use of ambulance and public transport usage as well as visiting local pharmacy at onset of the initial symptom were significantly associated with Prehospital delay.

Conclusion and Recommendations- The delay occurred more frequently in low educational status patient, smokers, use of ambulance and public transport as well as visiting local pharmacy at the onset of symptoms. There is need for mass commination to teach the people about the danger of myocardial infraction and how patients recognize it so that they may seek early treatment.

Key words: Myocardial Infraction, Emergency Department, Tibebe Ghion Specialized Hospital, Felege Hiwot Comprehenve Specialized Referral Hospital,

1. INTRODUCTION

1.1. Background

Acute coronary syndrome is a disease of the coronary artery caused due to narrowing or blockage of the coronary. The narrowing or blockage of the artery causes myocardial cell death due to decrease oxygen supply which is characterized in the form of unstable angina (UA), non ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI) (1).

The World Health Organization estimated in 2019 that ischemic heart disease is the leading cause of death worldwide accounting for almost 16% of all deaths (2) . In 2009 report that used National Health and Nutrition Examination Survey (NHANES) data, which compares the MI prevalence among different genders in individuals between age of 35-54years shows that MI Prevalence was higher in men than women (3).

The contributing factors of CVD are multifarious and include smoking tobacco, hypercholesterolemia and diabetes. It is been suggested that patients with symptoms and sigs consistent with myocardial infraction, within 12 hours of presentation should be treated with mechanical percutaneous intervention (PCI) or pharmacological reperfusion .(4) Timing of treatment is very critical in such kind of patients primarily time of fibrinolysis and reperfusion. It is been suggested that as early as 2 hours of onset of symptoms will improve the outcome (5). Any delay of getting this facility will result serious consequence to health and outcome of the patient (6).

The risk of death in a patient who was not treated with reperfusion strategy within this time frame is high around 15-25% (7). In sub-Saharan Africa, study done in 2013 shows deaths attributable to CVD is estimated to be 1million, which is 11.3% of all deaths in Africa and 5.5% globally (8).

1.2. Statement of the Problem

Patients with myocardial infraction, if not diagnosed in a timely manner and treatment is not started, it is fatal. Studies shows that every minute of delay increases the 1year mortality not only for thrombolysis but also primary angioplasty. Therefore, all efforts should be made to shorten the total ischemic time (9).

Most of the deaths related to myocardial infraction occur prior to hospital admission, so decreasing this time will have positive outcome if intervention is done early. Prehospital delay increases mortality (10). So the delay on the arrival at hospital is also a great problem in MI patient in our hospital too. Decreasing this delay is essential strategy to improve outcome of such patients. It is also equally important to decrease the time of hospital arrival and the time of management of these patients.

Social and demographic as well as clinical factors had been reported to be associated with this delay. Some of these factors include elderly, female sex, low socioeconomic status, diabetes and hypertension. Study done in Norway assessing factors that contribute Prehospital delay among men and women has enrolled 738 eligible patients, 149 women and 384 men, Over half of both women and men waited over one hour before they called for medical assistance and more than half the patients had a total Prehospital delay exceeding two hours. This Delay was also common in those patients who less information or knowledge about it is symptoms (12,13).

So, it is crucial to identify and trace the probable reason for the delay of arrival particularly in our hospital to minimize the possible preventable cause of mortality in MI patients.

A study was carried out from January 2017 to June 2018, assessing factors Related to Delay in Seeking Medical Care among Patients with Acute Myocardial Infarction in Dhaka, total of 120 patients were conveniently recruited from Ibrahim Cardiac Hospital and Research Institute, which is a tertiary level hospital in Dhaka. Respondents who lived in the rural area ($P = 0.01$), whose pain duration less than 6 hours ($P = 0.01$) and radiation of pain ($P = 0.02$), took self-treatment ($P = 0.04$), misinterpretation of symptoms ($P = 0.04$), living long distance ($P = 0.01$), lack of suitable transport ($P = 0.04$), and faced traffic jam ($P = 0.00$) showed significantly higher delay in seeking medical care (14). It is difficult to

generalize these finding to other countries, since the circumstances may be different in our country. So this study will involve knowing the average time such patients come to emergency department and factors that may contribute this delay in Ethiopia, which is the first time to be studied.

1.3. Justification of the Study

There is a paucity of knowledge related to factors affecting time of arrival of MI patient, and research which identifies these factors is crucial. This study is important for discovering information regarding the factors associated with prehospital delay in patients with MI.

Patient may suffer from complications to it is extreme worst of death, because of lack of timely arrival as well as late diagnosis, which can be partly reduced by giving knowledge about the symptoms and early medical seeking behavior. This put the patient life at risk, and also affects the family, community and the country in economic and health care exhaustion. There is a limited number of studies done in Ethiopia, about the Prehospital delay of myocardial infraction patients at emergency and factors associated with it. Knowing such factors and addressing them will decrease this delay and improve survival of such patients.

This study will in lighten the time that such patients visit the hospital, the associated factors and patient characteristics in Ethiopia, especially in Tibebe Ghion specialized hospital and Felege Hiwot Comprehenve Specialized Referral Hospital.

2. LITERATURE REVIEW

2.1. Magnitude and Determinant of Myocardial Infarction

The term acute coronary syndrome (ACS) is clinical spectrum of pathophysiology & presentation of clinically symptomatic disease. ACS refers to ST-elevation myocardial infarction (STEMI) and non-ST elevation ACS (NSTE-ACS), which encompasses non-ST elevation myocardial infarction (NSTEMI) and unstable angina (UA) (15).

Approximately two thirds of ACS presentations are with NSTE-ACS and the remainder are STEMI. This is mainly from atherosclerotic plaque rupture, ulceration or erosion that results in intraluminal thrombus formation and compromises myocardial blood flow leading to myocardial necrosis and release of cardiac enzymes (16).

Management of this disease involves timely restoration of blood flow as soon as possible. Reperfusion is mainly achieved by thrombolytic therapy or percutaneous coronary intervention (PCI) (17). As for the most guidelines state that timely reperfusion is crucial. Therefore it shouldn't be delayed for more than 30min in the case of Thrombolysis, and within 90min in the case of PCI. Time taken from the onset of pain up to the time of restoration of blood is very important for overall prognosis of the patient (10,18). Study published on 2015 Vietnamese patients hospitalized with a first acute myocardial infarction total of 103 Hanoi residents hospitalized at the largest tertiary care medical center in the city for first AMI, One third of the study sample was women and mean age was 66 years. The mean pre-hospital delay duration were 14.9 hours (19).

Timely administration of reperfusion therapy to patients with an evolving acute myocardial infarction (AMI) is of utmost importance in reducing clinical complications and death (19). Study which was done in Iran, assessing factors influencing pre-hospital delay among patients with acute myocardial infarction, between August 2010 and May 2011, cross-sectional and single-center survey was conducted on 162 consecutive patients with ST-elevation myocardial infarction (STEMI), mean age was (60.11±12.29) years in all patients. Majority of patients (65.4%) were male, had a results of mean delay of 7.4 hours (20).

A study done in Korea assessing Factors Related to Prehospital Time Delay in Acute ST-Segment Elevation Myocardial Infraction, 423 patients with STEMI was enrolled, The mean symptom onset-to-door time was 255±285 (median: 150) min. The patients were analyzed in two groups according to symptom onset-to-door time (short delay group: ≤ 180 min vs long delay group: > 180 min). In hospital mortality was significantly higher in long delay group (6.9% vs 2.8%; P= 0.048). Among sociodemographic and clinical variables, diabetes, low educational level, triage via other hospital and use of private transport were more prevalent in long delay group (21% vs 30%; P= 0.038, 47% vs 59%; P= 0.013, 72% vs 82%; P= 0.027, 25% vs 41%; P<

0.001 and 33% vs 48%; P= 0.002, respectively). In multivariate analysis, low educational level (1.66 [1.08-2.56]; P= 0.021), triage via other hospital (1.83 [1.58-5.10]; P= 0.001) and private transport were significantly associated with Prehospital delay (3.02 [1.81-5.06]; P< 0.001). (21).

An observational study done in china at 2011 to 2014 which asses the Prehospital delays to care and associated factors in patients with STEMI, A total of 7312 patients with STEMI were included. Prehospital delay was defined as time from symptom onset to hospital arrival >120 min. The rates of Prehospital delay, were 67.1%. Patients who were female, older than 65 years old, illiterate and farmers were more likely delayed in the study. Patients who had history of myocardial infarction, hypertension or SBP <90 mm Hg at admission were less likely to have Prehospital delay (22).

Study conducted in India in 2015, studding factors affecting time to arrival in hospital among patients with acute myocardial infarction (MI), 100 patients (74 men & 26 women) of acute MI were interviewed. The mean time from symptom onset to hospital arrival was 28 hrs. 55 min. (+ 96hrs 45min). 51 patients came within 6 hours – 13, 20 and 18 within 1,3 and 6 hours. Using the dependent variable of time as a binomial variable, univariate analysis showed that a perception that the chest pain could be cardiac in origin was more common among the early arrivers (<6 hrs) while, visiting a doctor in the clinic instead of going to an ICU directly, was more common among the late arrivers.(23). Another study which was done in December 2019 at Bangladesh shows that 337 patients enrolled in the study their median pre-hospital delay was 9.0 (13.0) hours (24).

A study which was conducted in patients having MI for the first time between November 2009 and March 2012 which was done at in a northern Swedish population, shows a median of pre-hospital delay of 5.1h. Within this study, it is also implicated that, among patient with primary care as the first medical contact, 67.0 % had a decision time ≥2 h, compared to 44.7 % of patients who self-referred (25). Another study which was done in Spain from 1999 to 2008

showed that Prehospital delay results increased risk of cardiac damage and diminish survival of individual with MI (26).

Study done in San Francisco and East Bayareas between April 2003 and June 2004 assessing Factors associated with Prolonged Prehospital Delay of African Americans with Acute Myocardial infarction, Sixty-one African Americans with acute myocardial infarction were interviewed within 1 month of hospital admission, Delay times were calculated on the basis of the interviews, Median delay was 4.25 hours and did not differ significantly between women and men (4.42 vs3.50 hours). Most patients (69%) experienced their initial signs and symptoms at home, often witnessed by family members or friends (70%). Single, or divorced patients had longer delay times than did married patients (5.33 vs 2.50 hours), and patients with diabetes delayed longer than did those without diabetes (7.29 vs 3.50 hours). Median delay times were substantially longer than the recommended time of less than 1hour, reducing the benefit from reperfusion therapies. Education and counseling of patients and their families should be a major strategy in optimizing patients' outcomes and decreasing the time to definitive treatment (27).

The study done in Bangladesh assessing Prehospital delay revealed that: Around 75% of the patients were male and most of them were from lower- or middle-income families staying in the rural areas. Only one-third of the patients had primary care facilities within 5 km of their residence. Around 78% of them identified chest pain as the predominant clinical symptoms, and 74.5% were diagnosed as STEMI type of MI based on their ECG findings. Only half of the patients visited qualified doctors after onset of symptoms, One-third of the patients arrived in an ambulance. Many patients had history of smoking (61%) hypertension (67%), diabetes mellitus (29.4%), previous history (24.6%) or family history (34.1%) of cardiac diseases. A total of 49 patients recruited in their study died during the hospital stay (in-hospital mortality rate 14.5%). Among them, 41 patients (83.7%) had pre-hospital delay of longer than 6 h, the risk of death was lower among adult patients by 75% (aOR = 0.25, 95% CI: 0.12–0.52; $p < 0.05$) compared to aged patients, the risk was lower by 72% among patients who were admitted into hospitals earlier (pre-hospital delay ≤6 h) (aOR = 0.28, 95% CI 0.12–0.66; $p < 0.05$) compared to those with pre-hospital delay of more than 6 h (28).

A study done in Indonesia from a total of 292 participant, pre-hospital delay was observed in 230 participants. The majority of the participants was men (70.9%) with ST-elevation myocardial infarction (STEMI) (56.8%). More than one third of the participants were university graduates (48.6%), and were working in the private sector (42.1%). Almost two thirds reported taking a rest before going to the ED (65.4%), Spearman testing showed that pre-hospital delay was correlated with gender, education level, transportation and healthcare-seeking behavior. Of these health care-seeking behavior ($p \leq 0.0001$; sr=0.679) was the dominant factor observed in pre-hospital delay. Lower risk of pre-hospital delay was observed in men (odds ratio [OR] 95% CI [confidence interval]: 0.40 [0.19–0.83], p=0.013) (29).

Study which was done at Nairobi, Kenya between the years of 2010 to 2012 shows that nearly 5% of patients at high dependency unit and Intensive care addmition were having acute coronary event (26). This clearly shows the change in prevalence of Ischemic Heart Disease in Africa. Another study conducted in sub Saharan Africa which involved many countries in web based system analyzing the prevalence of Ischemic heart disease in patients admitted to emergency department in 2013 shows the prevalence of IHD ranged from 0.1% in Senegal to 10.4% in Sudan among diabetic patients (30).

Study assessing Prehospital delay, contributing aspects and responses to symptoms among Norwegian women and men with first time acute myocardial infarction, 738 eligible patients, 149 women and 384 men responded to a questionnaire (72%). Over half of both women and men waited over one hour before they called for medical assistance and more than half the patients had a total Prehospital delay exceeding two hours. STEMI symptoms experienced as unbearable and attributed as cardiac reduced patient delay (13).

In Ethiopia, one study done in 2018 shows that prevalence of CVD was 5% (31). A study was conducted at two tertiary hospitals in Ethiopia from March 2018 to November 2018, 181 ACS patients enrolled, about (61%) were presented with ST-elevation myocardial infarction (STEMI). The mean age of the study participant was 55.8 ± 11.9 years and 62.4% were males. The all-cause in hospital mortality rate was 20.4% .Rural residence (AHR: 3.64, 95% CI: 1.81–7.29), symptom onset to hospital arrival > 12 h (AHR: 4.23, 95% CI: 1.28–13.81), and Cardiogenic shock (AHR: 7.20, 95% CI: 3.55–14.55) were independent predictors of time to in-hospital death

among ACS patients (32). Study done in Mekele, Ayder hospital showed that, in hospital mortality of ACS was 24.5%. hypertension was the most common risk factor 46.4%.(33).

2.2. Conceptual Frame Work

This conceptual framework was developed after reviewing different related literatures.

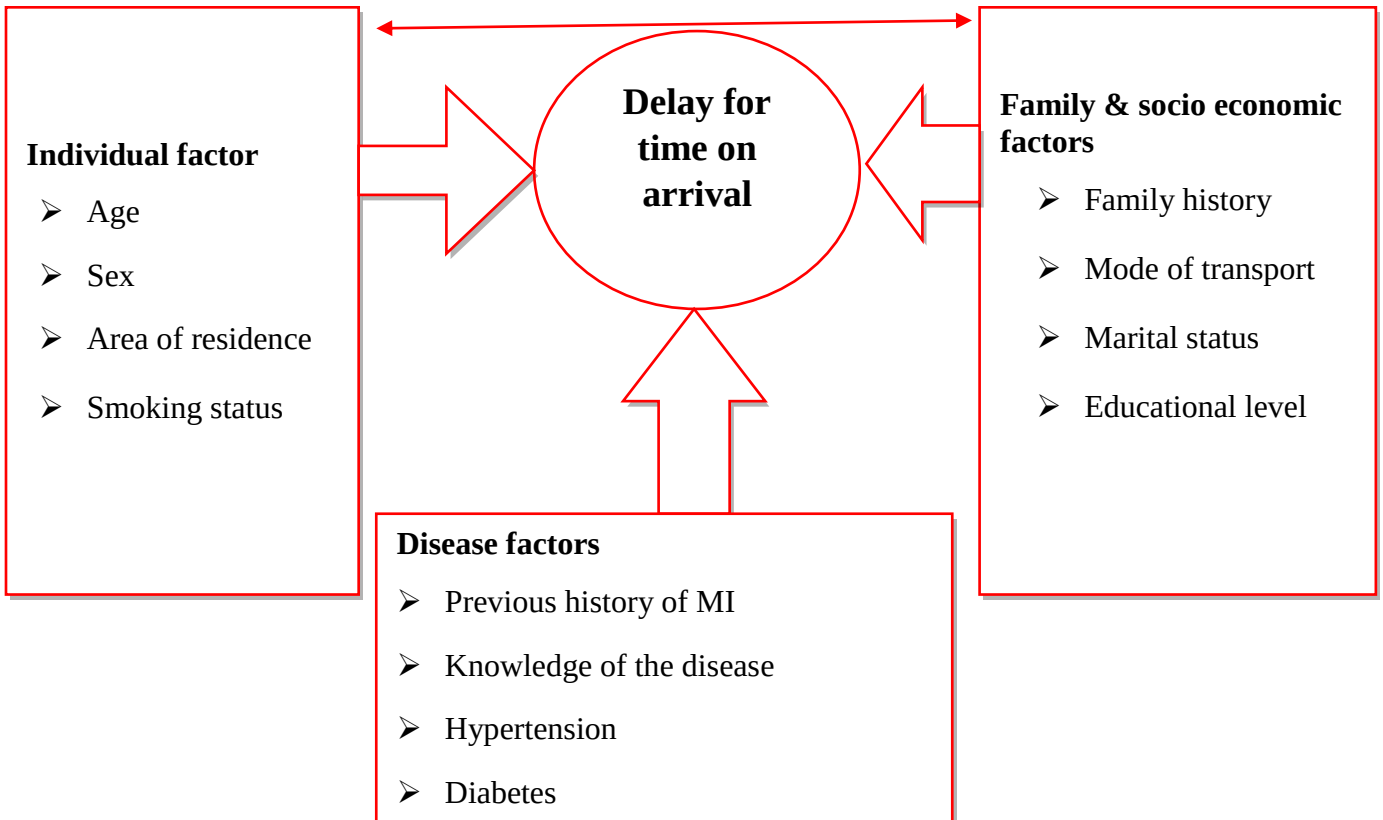


Figure 1: Conceptual frame work of the factors affecting time to arrival for patients with myocardial infraction at emergency department in Tibebe Ghion specialized Hospital and Felege Hiwot Comprehenve Specialized Referral Hospital, Northwest Ethiopia, 2022.

3. OBJECTIVES

3.1. General Objective

- ✓ To assess factors which influence time to arrival to medical emergency service among all MI patients who visited Tibebe Ghion specialized Hospital and Felege Hiwot Comprehenve Specialized Referral Hospital, Northwest Ethiopia, 2022.

3.2. Specific Objectives

- ✓ To identify factors affecting time to arrival to medical emergency service among all MI patients
- ✓ To determine the average time among all MI patients visit the emergency service.

4. MATERIAL AND METHODS

4.1. Study Area and Period

The study was conducted in Tibebe Ghion Referal hospital. It is located in Bahirdar. Bahirdar is the capital city of Amara region in north Ethiopia. It covers 28km2 with 1,820m (5970 ft) elevation above sea level, located 578km away north-northwest of Addis Ababa. Currently about 3,342 health post, 847 health centers and 80 hospital (2 general, 73 primary) are found in the region which feed the 5 referral hospitals including TGSH.

Tibebe Ghion Hospital is located at bahirdar about 10km south from the city center and 7km from the new bus station (adisu meneharia) on the way adet district and about 23km from Blue Nile fall (tis abay).

TGSH has a total of 1315 working staffs (including 703 clinical staff and 211 residents). The hospital has 44 beds in medical ward female and male partition.

Hospital gives the following services; inpatient (internal medicine, surgery, pediatrics, gynecology and obstetrics ophthalmology, maxillofacial and psychiatry), outpatient (internal medicine, surgery, pediatrics, gynecology and obstetrics, ophthalmology, dermatology, radiology, psychiatry, laboratory and pharmacy and cervical cancer screening) and emergency (adult and pediatric).

Felege Hiwot Referal Hospital, is one of the largest referral public hospitals in the country found in bahirdar, Amhara region, 578km North West of Addis Ababa, capital city of Ethiopia. It was established by Emperor Haile Selassie in 1963 to serve the community. Currently it is serving 5-7 million people around the catchment area. It has 9 wards with 435 formal and informal beds and more than 29 different medical service rendering rooms. The information acquired from human resources indicate that the number of workers in the hospital includes 170 men and 256 women and the technical professionals are 230 and 187 supporting staff rendering workers and a total of 426 manpower is available in the hospital. The medical ward has more than 80 beds in the main ward and 8 beds in the intensive care unit (ICU) and serves more than 1400 admissions annually.

The study was conducted among myocardial infraction patients who visited Tibebe Ghion specialized Hospital and Felege Hiwot Comprehenve Specialized Referral Hospital emergency department from Dec. 2020 to July 2022.

4.2. Study Design

Institutional based cross sectional study design was held for all MI patients who visited Tibebe Ghion specialized Hospital and Felege Hiwot Comprehenve Specialized Referral Hospital emergency department from Dec/2020 to July/2022GC.

4.3. Population

4.3.1. Source of Population

All MI patients who were visited Tibebe Ghion specialized Hospital and Felege Hiwot Comprehenve Specialized Referral Hospital emergency department from Dec/ 2020 to July/2022GC will be included.

4.3.2. Study Population

MI patients were selected, who were confirmed with either ECG or cardiac biomarkers or echocardiography in Tibebe Ghion specialized Hospital and Felege Hiwot Comprehenve Specialized Referral Hospital emergency department from Dec/2020 to July/2022 G.C who fulfilled the inclusion criteria.

4.4. Inclusion Criteria

- ✓ All MI patients who were visited Tibebe Ghion specialized Hospital and Felege Hiwot Comprehenve Specialized Referral Hospital emergency department from Dec/ 2020 to July/2022GC with ECG and cardiac biomarker or echocardiography confirmed ischemic changes were enrolled.
- ✓ The presence of symptoms for at least 30 minutes.

4.5. Exclusion Criteria

- ✓ Suspected MI patients who are not confirmed with ECG and cardiac biomarkers or echocardiography.
- ✓ Those patients who had poor documentation of their symptom duration.

4.6. Study Variables

4.6.1. Dependent Variable

The response variable for this study was time from onset of symptoms to admission in hours and categorized and coded as early comers in which patients who admitted below 6 hours and late comers in which patients who admitted after 6 hours. Therefore, such binary outcome was coded as 1=late comers and 0= early comers. Thus the response variable of this study is denoted as:

$$y_i = \begin{cases} 1, \text{if time from onset of symptomsto admission is after 6 hours} \\ 0, \text{if time from onset of symptomsto admission is before 6 hours} \end{cases}$$

4.6.2. Independent Variables

- ✓ Age
- ✓ Sex
- ✓ Residence
- ✓ Transport access

- ✓ Educational level
- ✓ Previous history of MI
- ✓ Knowledge of the diseases entity
- ✓ Family History of heart disease
- ✓ Smoking
- ✓ Marital status
- ✓ Comorbid

4.7. Sample Size and Sampling Procedure

4.7.1. Sample Size

The sample size was determined using computer-based Epi info7 software Stat Cal by using Single population proportion formula used to determine the sample size with a 95% confidence interval within a 5% marginal error (W), design effect of one. P value was obtained from Chinese study was 27%. So the estimated sample size was 303 (34).

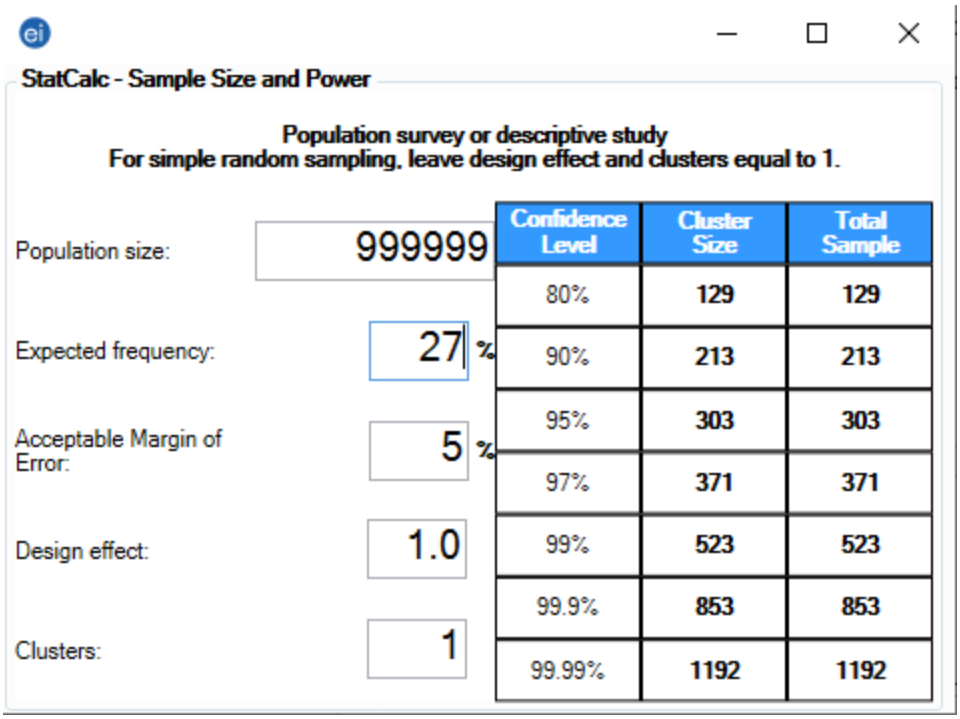
$$n= Z^2p(1-p)/W^2$$

n=desired sample

z=level of significance at 95% confidence interval

p= an estimate of the proportion of 27%

W=marginal error or



4.7.2. Sampling Procedure

From ACS suspected patients who visited TGSH from Dec. 2020 to July 2022 GC 303 patients was taken.

4.8. Data Collection Procedure

Nurses and internes who worked in emergency department were selected and trained for one day about data collection procedure and the purpose of the research to collect data from December, 2020 to July, 2022 under the supervision of the researcher. A structured questionnaire was used to collect data on socio demographic, behavioral and clinical factors that affecting time from onset of symptoms to admission in hours. Data quality was assured by using a pre-tested data collection tool and trained data collectors. The researcher was engaged in continuous supervision and monitoring. Completeness and consistency of data was checked by the researcher every day after data collection and also data clerks and investigators before and after data entry.

4.9. Operational Definition

Chest pain: Discomfort in the chest including a dull ache, a crushing or burning feeling, a sharp stabbing pain and pain that radiates to the neck or shoulder.

Troponin: Troponin is a protein that is integral to muscle contraction in skeletal muscle and cardiac muscle, but not smooth muscle. It is considered elevated when >99^{th} percentile from baseline reference laboratory.

ACS: is a term used to describe a range of conditions associated with sudden, reduced blood flow to the heart.

Early Prehospital delay: time from the onset of symptoms to the hospital presentation <6 hours.

Late Prehospital delay: time from the onset of symptoms to the hospital presentation >6hours.

Onset to door time: time from the onset of symptom to the time the patient reach the hospital.

4.10 Quality Assurance

The quality of the data was assured through careful design and pretesting of the tools, proper training of the data collectors and supervisors, close supervision of the data collectors and proper handling of the data.

In addition to the training which was given to the data collectors, the principal investigator had closely supervised the field activity on daily basis.

At the end of each data collection day, the principal investigator checked the completeness of filled data collection questionnaire and measurements taken; whether recorded information makes sense to ensure the quality of data collected. Besides this, the principal investigators carefully entered and thoroughly clean the data before the commencement of the analysis.

4.11 Data Processing and Analysis

After data collection, each form was coded separately, cleaned and entered in to the computer software SPSS 25.0 statistical packages for editing by a principal investigator. Coding of different variables was also carried out before analysis. The analysis results of participants' socio-demographic characteristics and baseline outcome variable was summarized using descriptive summary measures. Binary logistic regression was used to assess the association of dependent and independent variables. Both bi-variable and multi-variable analysis was

conducted. Independent variables with a p-value of less than 0.25 in the bi-variable analysis were considered in the multivariable analysis. Adjusted odds ratios (AORs) with 95% confidence intervals were used to show association between independent variables and a dependent variable. Those independent variables with P-value < 0.05 was considered statistically significant factors associated with outcome variable.

4.12 Ethical Consideration

Ethical clearance for the proposed research was obtained from research committee. Letters of support was also received from the hospitals. After explanation about the whole purpose of the study, further permission letter was obtained from the heads of emergency.

Confidentiality of the information was respected throughout the data collection process. As the study was conducted through review of medical records the data was not disclosed to any person other than principal investigator and data collectors. All information collected from patients' cards was kept strictly confidential.

4.13 Result Dissemination

The final results will be given to Tibebe Ghion specialized Hospital and Felege Hiwot Comprehenve Specialized Referral Hospital, internal medicine department and for other responsible bodies and information will be further presented to annual conferences and will be published in reputable research journal.

5. RESULTS

5.1. Data exploratory

In this study, a total of 303 myocardial infraction patients were involved of these, 186 (61.4%) were early comers (less than 6 hours as of onset of symptoms) while 117 (38.6%) late comers (6 hours and above as of onset of symptoms) (Figure 2).

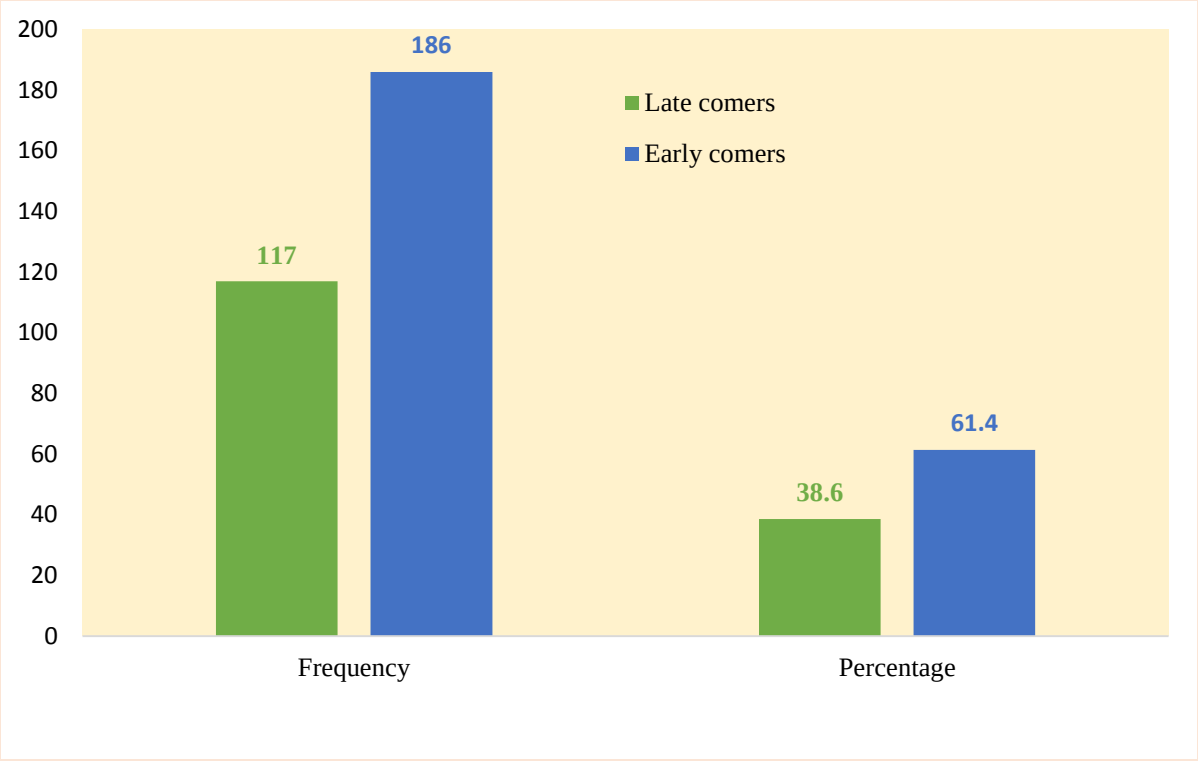


Figure 2: Prevalence of time from onset of symptoms to admission in *hours*

The results of descriptive statistics of this study are presented in Table 1. It shows the sociodemographic characteristics for predictors that considered as factors that affect time from onset of symptoms to admission in hours for myocardial infraction patients. The percentage distributions of myocardial infraction were differ by gender, marital status, level of education, residence, family history of heart disease, previous history of MI, diabetes history, hypercholesterolemia, history of heart failure or angina symptoms, initial symptoms perceived, behavior after onset of symptoms and mode of transport.

The majority of myocardial infraction patients were male (187; 61.72%) of which, about 80 (42.7%) were came after 6 hours that symptoms onset; married (222; 72.94%) amongst 84 (37.8%) also came after 6 hours that MI onset. In addition, majority of MI patients 195(64.36%) were urban residents and among those 75 (38.4%) were late comers (6 hours and above as of onset of symptoms). Among MI patients, 250 (82.51%), never smoke cigarette of those 89 (35.6%) were late comers for admission.

Besides, the majority of myocardial infraction patients were initially have had chest pain (183; 60.4%), have had history of hypertension (157; 51.9%); and have had no history of diabetes

(178; 58.8%), and hypercholesterolemia (217; 71.6%) respectively compared to their counter groups. Overall, three out of ten myocardial infraction patients were waiting until symptoms become worse after onset of symptoms and four out of ten were used their private car to visit the treatment center (Table 1).

Average time from onset of symptoms to initiation of treatment also shown in Table 1. The mean ages of myocardial infraction patients were 60.58 with minimum and maximum of 30 and 85 years and Inter-quartile range (IQR) of 12 years while the mean age of late comers was 60.7 hours with 8.9 hours of standard deviation. Similarly, the mean BMI of myocardial infraction patients was 25.02 with minimum and maximum of 19 and 35 and standard deviation 2.94 but the mean BMI of late comers was 24.5 with standard deviation of 2.9.

Table 1. Socio-demographic characteristics of myocardial infraction patients treated at Tibebe Ghion Specialized hospital and Felege Hiwot Comprehenve Specialized Referral Hospital.

Variables	**Category**	**n(%)**	**Time from onset of symptoms to admission in hours**	
			<6 H, n(%)	**≥ 6 H, n(%)**
Age in years	Mean ± SD	60.58 ± 9.36	60.5±9.7	60.7±8.9
Gender	Female	116 (38.28)	79 (68.1)	37 (31.9)
	Male	187 (61.72)	107 (57.2)	80 (42.7)
Marital status	Not married	81(26.73)	48 (59.2)	33 (40.8)
	Married	222 (72.94)	138 (62.1)	84 (37.8)
Educational level	None	100 (33.00)	51 (51.0)	49 (49.0)
	Primary	60 (19.80)	38 (63.0)	22 (37.0)
	Secondary	60 (19.80)	39 (65.0)	21 (35.0)
	Diploma & above	83 (27.3)	56 (67.4)	25 (32.6)
Place of residence	Urban	195 (64.35)	120 (61.5)	75 (38.4)
	Rural	108 (35.75)	62 (57.4)	42 (38.8)
Body mass index	Mean ± SD	25.03 ±2.94	25.3±2.9	24.5±2.9
Smoking status	Never smoke	250 (82.5)	161 (64.4)	89 (35.6)
	Smoker	35 (11.5)	10 (28.5)	25 (71.6)
	Stopped	18 (5.9)	12 (66.6)	6 (33.4)
Family history of heart disease	No	220 (72.6)	140 (63.6)	80 (36.4)
	Yes	83 (27.3)	45 (54.2)	38 (45.8)
Previous history of MI	No	240 (79.3)	146 (60.8)	94 (39.1)
	Yes	63(20.7)	38 (60.3)	25 (39.7)

Diabetes history	No	178 (58.8)	104 (58.4)	74 (41.5)
	Yes	125 (41.2)	82 (65.6)	43 (34.4)
History of hypertension	No	146 (48.1)	67 (45.8)	79 (54.2)
	Yes	157 (51.9)	103 (65.5)	54 (34.5)
Hypercholesterolemia	No	217 (71.6)	125 (57.6)	92 (42.4)
	Yes	86 (28.4)	59 (68.6)	27 (31.5)
History of heart failure or angina symptoms	No	254 (83.8)	147 (57.8)	105 (41.2)
	Yes	49 (16.2)	37 (75.5)	12 (24.5)
Initial symptoms perceived	Non chest pain	120 (39.6)	67 (55.8)	53 (44.2)
	Chest pain	183 (60.4)	119 (65.5)	64 (34.4)
Behavior after onset of symptoms	wait until symptoms worse	104 (34.32)	59 (32.2)	45 (38.8)
	Went to hospital	97 (30.69)	95 (97.0)	2 (3.0)
	Visit local pharmacy	15 (4.95)	2 (12.3)	13 (87.7)
	Consider non-senses	87 (28.71)	31 (35.6)	56 (64.4)
Mode of transport	Private car	126 (41.58)	81 (64.2)	45 (35.8)
	Public transport	87 (28.71)	41 (47.1)	46 (52.9)
	Ambulance	83 (27.39)	60 (72.2)	23 (27.8)
	Rent car	7 (2.0)	5 (71.4)	2 (28.6)

On top of these, the mean time ECG done after arrival of myocardial infraction patients was 125.14 minutes with a standard deviation of 97.58 minutes. This indicates that the mean of patient presentation-to-ECG time for patients with chest pain was beyond the recommended timeframe (the first ECG for a patient presenting with chest pain should be done within a 10-minute period of the patient arrival). The mean time of troponin of myocardial infraction patients was 18.33 hours with a standard deviation of 18.22 hours which indicates the variation of troponin in the patient is approximately zero. This is because troponin levels typically start to elevate in the circulation within 2 to 3 hours of the onset of chest pain and the levels will continue to rise at that time until a peak is reached, generally between 12 and 48 hours and then the troponin level will then begin to fall over the next 4 to 10 days down to a normal level. Similarly the mean time management started in hours was 4.8 hours with a standard

deviation of 2.9 hours. Finally, the mean time of myocardial infraction patients from onset of symptoms to admission in days was 5.83days.

5.2 Multi-variable analysis for predicting myocardial infection

One problem of single covariate approach is that it ignores the possibility that a collection of variables**,** each of which is weakly associated with the outcome, can become an important predictor of the outcome when taken together. It is therefore important to reduce the possibility of excluding variables at the univariable analysis stage. It is for this reason that a univariable test of chi-square with p-value of 0.25 or less was used for selection of variables for the multi variable analysis from single covariate findings. Based on this gender, educational level, BMI, smoking status, family history of heart disease, history of hypertension, hypercholesterolemia, history of heart failure or angina symptoms, behavior after onset of symptoms, mode of transport, were selected with 0.25 and below significant value for binary logistic regression method.

Table 2: Logistic regression analysis of factors associated with myocardial infection

Variables	**Time from onset of symptoms to admission in hours**		**COR (95% CI)**	**AOR (95% CI)**	**P-value**
	Early comers	**Late comers**			
Educational level					
None	51	49	1	1	
Primary	38	22	0.6 (0.31-1.16)	0.63(0.33-1.18)	0.001*
Secondary	39	21	0.56 (0.29-1.08)	0.30(0.14-0.66)	0.003*
Diploma & above	56	25	0.47 (0.25-0.86)	0.22(0.08-0.58)	0.002*
Smoking status					
Never smoke	161	89	1	1	
Smoker	10	25	4.52 (2.08-9.84)	2.04(1.04-3.99)	0.037*
Stopped	12	6	0.45 (0.12-1.65)	0.31(0.10-0.96)	.042*
History of hypertension					
No	67	79	1	1	
Yes	103	54	0.43 (0.26-0.71)	0.59(0.39-0.92)	0.002*

Hypercholesterolemia					
No	125	92	1	1	
Yes	59	27	0.58 (0.34-0.99)	0.29 (0.21-0.39)	0.006*
History of heart failure or angina symptoms					
No	147	105	1	1	
Yes	37	12	0.45 (0.23-0.91)	0.18(0.04-0.79)	0.004*
Behavior after onset of symptoms					
wait until symptoms worse	59	45	1	1	
Went to hospital	95	2	0.03 (0.01-0.12)	0.15 (0.21–0.45)	0.000*
Visit local pharmacy	2	13	8.52 (1.83-39.69)	4.05(3.54-5.99)	0.037*
Consider non-senses	31	56	2.37 (1.32-4.25)	1.73(1.10-2.78)	0.020*
Mode of transport					
Private car	81	45	1	1	
Public transport	41	46	2.02 (1.16-3.52)	2.05(1.35-3.11)	0.001*
Ambulance	60	23	0.69 (0.38-1.26)	0.63(0.33-1.18)	0.147
Rent car	5	2	0.9 (0.16-5.11)	0.66(0.37-1.18)	0.108

Table 2 reveals that the results of binary logistic regression analysis of factors associated with myocardial infection of patients treated at Tibebe Ghion Specialized Hospital from December 2020 to July 2022. After adjusting other covariates, a patient who attended primary, secondary and diploma & above education was about 37% (AOR= 0.63, 95% CI: 0.33-1.18), 70% (AOR = 0.30, 95% CI: 0.14-0.66) and 78% (AOR = 0.22, 95% CI: 0.08-0.58) less likely to late for admission after the onset of the MI symptoms than those of having no education respectively. A patient who smokes cigarette was 2.04 times more likely to late for admission after the onset of the MI symptoms than those patients who was never smoke cigarette (AOR= 2.04, 95% CI: 1.04-3.99) while a patient who stopped smoking cigarette was 69% less likely to be late for admission after the onset of the MI symptoms than those patients who was never smoke cigarette (AOR= 0.31, 95% CI: 0.10-0.96).

A patient having history of hypertension were about 41% less likely to late for admission after the onset of the MI symptoms as compared to patient having not history of hypertension

(AOR=0.59, 95% CI: 0.39-0.92). Likewise, a patient having hypercholesterolemia were about 71% less likely to late for admission after the onset of the MI symptoms as compared to patient not having hypercholesterolemia (AOR=0.29, 95% CI: 0.21-0.39). Moreover, a patient having history of angina symptoms were about 82% less likely to late for admission after the onset of the MI symptoms as compared to patient not having history of angina symptoms (AOR=0.18, 95% CI: 0.04-0.79). A patient who went to hospital were about 85% less likely to be late for admission after the onset of the MI symptoms as compared to patient who waits until symptoms worse (AOR=0.15, 95% CI: 0.21–0.45) while a patient who visit local pharmacy and consider non-senses were 4.05 (AOR=4.05, 95% CI: 3.54-5.99) and 1.73 (AOR=1.73, 95% CI: 1.10-2.78) times more likely to late for admission after the onset of the MI symptoms as compared to patient who waits until symptoms worse respectively. Likewise, a patient who used public transport was 2.05 times more likely to late for admission after the onset of the MI symptoms as compared to patient who used private car (AOR=2.05, 95% CI: 1.35-3.11).

6. DISCUSSION

In this study, the mean time of myocardial infraction patients from onset of symptoms to admission in days was 5.83days. This means that, the MI patients were unacceptably delayed since this delay leads increased morbidity and mortality. This is much different than most of other studies which the delay is less than 6hours. It is much higher in studies done in Korea with mean onset of symptoms to arrival was 255±285 (median: 150) min(21), San Francisco and East Bayareas with median delay was 4.25 hours(27) and at Bangladesh which their median pre-hospital delay was 9.0 hours (24).

This discrepancy might be due to the difference in study population, different geographic regions as well as different context in different countries.

In Addition, based on this study, patients who attended secondary and diploma & above education was less likely to be late for admission after the onset of the MI symptoms than those of having no education respectively. This is similar to the study done in Indonesia from which pre-hospital delay was correlated with education level (29). This might be due to higher awareness acquired during learning process.

Also this study shows that, patients having history of hypertension were about 41% less likely to late for admission after the onset of the MI symptoms as compared to patient having not history of hypertension. This is similar to study done in china which asses the Prehospital delays to care and associated factors in patients with STEMI who had history of hypertension were less likely to have Prehospital delay (22). This can be explained by the fact that many patients who are hypertensive are more likely to have counseling regarding their health status by health care personals. Additionally such patients have a regular follow up at the hospital and are more conscious about their health.

Also based on this study, patient having hypercholesterolemia were about 71% less likely to late for admission after the onset of the MI symptoms as compared to patient not having hypercholesterolemia. This again can be explained by the fact that these patients may visit hospital earlier and may have follow up at the hospital which make them more oriented in their health which makes them to contact the hospital early. A study done in Indonesia from a total of 292 participant prior health seeking behaviour were associated with less delay ($p \leq 0.0001$; sr=0.679) (29).

Also, based on this study, patient having history of angina symptoms or prior history of MI were about 82% less likely to late for admission after the onset of the MI symptoms as compared to patient not having history of angina symptoms.. Knowledge of the symptoms of MI and it is association is hospital delay has been studied in other studies. Study assessing Prehospital delay, and contributing aspects and responses to symptoms among Norwegian women and men, patients attributing the symptoms as cardiac origin had less delay (13). These patients have an experience of their symptoms and this may make them to go the hospital early.

On the other hand, this study revealed that, three out of ten myocardial infraction patients were waiting until symptoms become worse after onset of symptoms, this make them to delay more. While 4.9 percent visit local pharmacy. This is consistent with the finding of the study which was done in northern Swedish population which shows among patient with primary care as the first medical contact had more delay than those who refer themselves (25). In another study done in tertiary care hospital of northern Bangladesh delay was common in patients considering symptoms as non-significant (aOR 17.81, 95% CI 5.92–53.48) (28). Similarly, study done in Sanglah Hospital during the period December 2017 to May 2018, delay was longer among patients who wait till symptoms worsen or took antipain for their chest pan(29).

This study also shows that patients who used public transport was 2.05 times more likely to late for admission after the onset of the MI symptoms as compared to patient who used private car (AOR=2.05, 95% CI: 1.35-3.11). The delay was also more on patients who use ambulance.

It has a similar finiding in study less delay in using personal car as mode of transport to reach the hospital (OR=5.25, 95% CI 2.94-9.35, p<0.001) in comparison to using ambulance was observed This may explain that patients get more critical and more likely need ambulance to arrive the hospital.But it has a different finding in some other studies which shows that the private car usage is associated with delay. Study done in Korea assessing Factors Related to Prehospital Time Delay, use of private transport were more prevalent in long delay group(21).

In another study conducted in Sanglah General Hospital, Bali, Indonesia assessing hospital delay of MI patients shows less delay in patients who use ambulance as a transportation (OR 95% CI: 0.01 [0.01–0.01], p<0.0001) (29).

Also, patient who smokes cigarette was 2.04 times more likely to late for admission after the onset of the MI symptoms than those patients who was never smoke cigarette (AOR= 2.04, 95% CI: 1.04-3.99) while a patient who stopped smoking cigarette was 69% less likely to late for admission after the onset of the MI symptoms than those patients who was never smoke cigarette (AOR= 0.31, 95% CI: 0.10-0.96). This is consistent with study done in Bangladesh, which many patients had history of smoking (61%), among them, 41 patients (83.7%) had pre-hospital delay of longer than 6 h (28). The finding can be explained by the fact that these patients stopped smoking related to their health, and are more health oriented.

Also patients having Diabetes based on this study, has no statistically significant association with hospital delay. In contrary to other studies which show patients with diabetes came late to the hospital. Study done in San Francisco and East Bayareas, diabetes patients were delayed longer than other patients (27). In another study done in Korea assessing Factors Related to Prehospital Time Delay in Acute ST-Segment Elevation Myocardial Infraction, clinical variables like diabetes was associated with delay(21).

.

7. LIMITATION OF THE STUDY

- First, it was cross-sectional study design based on secondary data so, incomplete documentation of the patient's initial arrival time at the emergency may affect the study.
- Poor patient recall on their initial symptom also may affect it. This may create recall bias on the study.

8. CONCLUSION AND RECOMMENDATIONS

8.1. Conclusion

According to the findings of this study, the mean time of myocardial infraction patients from onset of symptoms to admission in days was 5.83days.

The delay occurred more likely in low educational status patient and smokers. The delay were also more frequent in patients who consider their symptoms as non-serious and wait untill symptoms worsen and those who visit local pharmacy at initial symptom onset.

There were less delay in hypertensive patients, and those who had history of hypercholesterolemia. Also the delay was less in patients who use private car as mode of transport to reach to the hospital.

8.2. Recommendation

Based on the findings of the study, we propose a few recommendations.

To Ministry of health and regional health bureau

- ✓ Patients who have no comorbidity were likely to be delayed. So there is need for mass commination especially patients who are not having hospital follow up or no contact with health care professionals to teach the people about the danger of MI and it is symptoms so that patients may recognize and may seek early treatment.
- ✓ Educational status of the people should be enhanced
- ✓ Community based health education should be held to teach the people to visit directly to hospital when they feel symptoms consistent with MI, and to stop smoking if any.
- ✓ Patients who use public transport were more likely to be delayed. So this may help to teach the people the kind of transport to use to come early to the hospital.

To Health institution

- ✓ The mean time for which ECG is done at emergency was 125.14 minutes, which should be done with in 10min. This is much longer than recommended time, so further study assessing the cause of delay is required so early management can be instituted.

REFERRAL

1. Kumar A, Cannon CP. Acute coronary syndromes : diagnosis and management , part I. 2009;10–1.
2. WHO. The top 10 causes of death - Factsheet. WHO reports [Internet]. 2020;(December 2020):1–9. Available from: https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death
3. Iqbal F, Barkataki JC. Spectrum of acute coronary syndrome in North Eastern India - A study from a major center. Indian Heart J. 2016;68(2):128–31.
4. Van De Werf F, Bax J, Betriu A, Blomstrom-Lundqvist C, Crea F, Falk V, et al. Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation. Eur Heart J. 2008;29(23):2909–45.
5. Wierzbicka M, Kośmider M, Bielecka-Dąbrowa A, Goch JH. The meaning of early percutaneous coronary intervention in acute coronary syndrome with preserved ST elevation. Cent Eur J Med. 2009;4(3):265–71.
6. Wang X, Hsu LL. Treatment-seeking delays in patients with acute myocardial infarction and use of the emergency medical service. 2013;21–2.

7. Keeley EC, Boura JA, Grines CL. Primary angioplasty versus intravenous thrombolytic therapy for acute myocardial infarction : a quantitative review of 23 randomised trials. 2003;15:21–4.
8. Mensah GA, Sampson UKA, Roth GA, Forouzanfar MH. Mortality from cardiovascular diseases in sub-Saharan Africa , 1990 – 2013 : a systematic analysis of data from the Global Burden of Disease Study 2013. 2015;26:1–9.
9. De Luca G, Suryapranata H, Ottervanger JP, Antman EM. Time Delay to Treatment and Mortality in Primary Angioplasty for Acute Myocardial Infarction: Every Minute of Delay Counts. Circulation. 2004;109(10):1223–5.
10. Luca G De, Suryapranata H, Ottervanger JP, Antman EM. Time delay to treatment and mortality in primary angioplasty for acute myocardial infarction : every minute of delay counts. 2004;(Cdc):21–2.
11. time on arrival.
12. You F, In S, Text PF, Distribution A, Factors A, Pain C, et al. No Title. :21–2.
13. Schei B, Hole T. Prehospital delay , contributing aspects and responses to symptoms among Norwegian women and men with first time acute myocardial infarction. 2007;(Cdc):21–2.
14. In S. J E N T AS H A P IR J O UR N A L O F C E L L UL A R actors Related to Delay in Seeking Medical Care mong Patients with Acute Myocardial Infarction in haka. :1–20.
15. Murray CJ, Lopez AD. Alternative projections of mortality and disability by cause 1990-2020 : Global Burden of Disease Study. 2020;(Cdc):21–3.
16. Yeh RW, Sidney S, Chandra M, Sorel M, Selby J V, Go AS. Population trends in the incidence and outcomes of acute myocardial infarction. 2010;(Cdc):21–2.
17. Eagle KA, Goodman SG, Avezum A, Budaj A, Sullivan CM, López-sendón J, et al. Practice variation and missed opportunities for reperfusion in ST-segment-elevation myocardial infarction : findings from the Global Registry of Acute Coronary Events (GRACE). 2002;(Cdc):21–2.
18. Care R, Sleep PR. Complex PCI means complex patients Contrast reduction for patients undergoing. :1–13.
19. Nguyen HL, Phan DT, Ha DA, Nguyen QN, Goldberg RJ. Pre-hospital delay in Vietnamese patients hospitalized with a first acute myocardial infarction: A short report.

F1000Research. 2018;4:1–16.

20. Momeni M, Salari A, Shafighnia S, Ghanbari A, Mirbolouk F. Factors influencing pre-hospital delay among patients with acute myocardial infarction in Iran. Chin Med J (Engl). 2012;125(19):3404–9.
21. Park YH, Kang GH, Song BG, Chun WJ, Lee JH, Hwang SY, et al. Factors Related to Prehospital Time Delay in Acute ST-Segment Elevation Myocardial Infarction. 2012;864–9.
22. Feng L, Li M, Xie W, Zhang A, Lei L, Li X, et al. Prehospital and in-hospital delays to care and associated factors in patients with STEMI: An observational study in 101 non-PCI hospitals in China. BMJ Open. 2019;9(11):1–8.
23. Venkatachelam Associate Professor RC, Associate Professor AB, Manohar RT, Rao TM, Professor AS, Venkatachelam RC. Factors affecting time to arrival in hospital among patients with acute myocardial infarction (MI). J Sci Innov Res JSIR [Internet]. 2015;4(42):109–14. Available from: http://www.jsirjournal.com/Vol4_Issue2_12.pdf
24. Rafi A, Sayeed Z, Sultana P, Aik S. Pre-hospital delay in patients with myocardial infarction : an observational study in a tertiary care hospital of northern Bangladesh. 2020;1–38.
25. Nilsson G, Mooe T, Söderström L, Samuelsson E. Pre-hospital delay in patients with first time myocardial infarction : an observational study in a northern Swedish population. BMC Cardiovasc Disord [Internet]. 2016;1–10. Available from: http://dx.doi.org/10.1186/s12872-016-0271-x
26. Factors influencing treatment delay for patients with acute myocardial infarction. 2010;(Cdc):21035027.
27. Banks AD, Dracup K. Factors Associated with Prolonged Prehospital Delay of African Americans with Acute Myocardial Infarction. 2006;15(2).
28. Rafi A, Sayeed Z, Sultana P, Aik S, Hossain G. Pre-hospital delay in patients with myocardial infarction : an observational study in a tertiary care hospital of northern Bangladesh. 2020;1–12.
29. Ni Y, Yusniawati P, Yueniwati Y, Ningsih DK, Rohman MS. Pre-hospital delay and its associated factors in patients with acute coronary syndrome. 2020;(February).
30. Hertz JT. Acute Myocardial Infarction in Sub-Saharan Africa : The Need for Data.

2014;9(5).
31. Angaw DA, Ali R, Tadele A, Shumet S. The prevalence of cardiovascular disease in Ethiopia : a systematic review and meta-analysis of institutional and community-based studies. 2021;21–2.
32. Fanta K, Daba FB, Tegene E, Melaku T, Fekadu G, Chelkeba L. Management quality indicators and in- hospital mortality among acute coronary syndrome patients admitted to tertiary hospitals in Ethiopia : prospective observational study. 2021;1–9.
33. Desta DM, Nedi T, Hailu A, Atey TM, Tsadik G, Asgedom SW, et al. Treatment outcome of acute coronary syndrome patients admitted to Ayder Comprehensive Specialized Hospital , Mekelle , Ethiopia ; A retrospective cross-sectional study. 2020;1–17.
34. Wang X, Hsu LL. Treatment-seeking delays in patients with acute myocardial infarction and use of the emergency medical service. 2013;

ANNEX

ANNEXES 1: Data collection Checklist

1	Chart number	_____
2	Admission date/arrival time	
3	Age	_____
4	Gender	_____

5	Marital Status	Married_____	Unmarried_____	
6	Level of education	below bachelor_____	Bachelor or above____	
7	Living area	Urban_____	Rural_____	
8	BMI	Normal _____	Overweight_____	
9	Smoking status	Non-smoker	Smoker	#years If stopped how many years
10	Family history of heart disease	No	Y es	
11	**1.** Acute MI symptoms	No chestpain_	Chest pain with others	
12	Behavior after onset of symptoms	Misinterpreting symptoms___	Considered non serious____ Suspected MI____	
13	Time from the onset of symptoms to addmision	less than 1hour _____ less than 6 hours	Less than 12hours more than 24 hours	
14	Admission by	Ambulance	personal car Others____	
15	Previous myocardial infraction	No_____	One time_____ More than one_____	

16	History of Hypertension	No____	Yes_____
17	Hypercholesterolemia	No__	Yes___
18	History of . Heart disease (angina, AMI, heart failure)	No____	Yes_____
19	Diabetes mellitus type I / II	No___	Yes___
20	Time ECG done		
21	Time troponin send		
22	Time which management started		

DECLARATION

I, the under signed, declared that this is my original work, has never been presented in this or any other University, and that all the resources and materials used for the research, have been fully acknowledged.

Principal investigator

Name: Dr. Yahya Hassen Ahmed

Signature: _____

Date: 19/3/15

Advisors

1. Name: Dr Wubet Mengesha

   Signature: _____

   Date: 20/3/15

2. Name: Ergoye Mohamed

   Signature: _____

   Date: 19/3/15