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Original Research Article

Epidemiology of acute myocardial infarction in a tertiary hospital in Hadhramout Governorate, Yemen

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ABSTRACT

Background: There is a lack of comprehensive data on the epidemiological characteristics and risk factor profile of adult patients with acute myocardial infarction (AMI) in Yemen. This study aimed to determine the epidemiological characteristics of AMI among adult patients in Hadhramout governorate, Yemen.
Materials and Methods: A retrospective cross-sectional study was conducted from January 01, 2023, to June 30, 2024, in Hadhramout Modern Hospital, Mukalla, Republic of Yemen. All patients admitted to the hospital with AMI during the study period were included in this study.
Results: We recruited 109 patients with AMI, representing 1.3% of all hospital admissions. The mean age of the patients was 61.56±11.02(35-90 years). Male patients accounted for 56% of patients (n=61), and the most common risk factor was diabetes mellitus 89(81.7%). The common clinical presentation was typical chest pain 98(89.9), while 5 patients (4.6%) presented with cardiogenic shock. Two types of AMI were identified: non-ST-elevation MI 29 (26.6%) and ST-elevation MI 80 (73.4%). All patients were admitted to the intensive care unit, and the mean length of hospital stay was 7.84 ± 2.64 (1-13 days). All patients received dual antiplatelet therapy, while 46 patients (42.2%) received streptokinase as intravenous thrombolytics. The in-hospital mortality was 13 (11.9%).
Conclusion: AMI represents 1.3% of all hospital admissions in our hospital. It is more commonly seen in males as compared to females with diabetes mellitus being the most commonly associated risk factor. The in-hospital mortality was 13(11.9%) representing 4.2% of all mortality in the hospital during the study period. Our study highlights the challenge of prevention and management of AMI in our limited-resources governorate. People should be educated about the risk factors of AMI and a well-equipped cardiac center should be provided in Hadhramout Governorate.

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1. Introduction

Ischemic heart disease (IHD) is a disease spectrum of diverse etiology with the common factor being an imbalance between myocardial blood supply and demand. Because the fundamental pathophysiologic defect in the ischemic myocardium is inadequate perfusion, ischemia is associated not only with insufficient oxygen supply but also with reduced availability of nutrients and inadequate removal of metabolic endproducts.[1] Acute myocardial infarction (AMI) is a common and potentially fatal presentation of Ischemic heart disease. Its risk factors include age, gender, obesity, blood pressure, glycemic control, lipid profile, and smoking status.[2] AMI is one of the life-threatening coronary-associated pathologies characterized by sudden cardiac death. In the United States, an estimated 605 000 incident AMIs and 200 000 recurrent AMIs occur each year. In Saudi Arabia, each year, about 130,974 Saudis suffer an

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MI episode.[3,4]

In developed countries, AMI has been studied extensively, with a plan to reduce the burden of it has been settled for a long time. However, there is little data on the incidence and clinical course of acute myocardial infarction in the Middle East.

In Yemen, despite the importance of this topic, there is a lack of comprehensive data on the epidemiological characteristics and risk factor profile of adult patients with AMI. However, some previous studies have described the clinical profile of AMI in certain regions of Yemen.[5,6] Therefore, this study aimed to determine the epidemiological characteristics of AMI among adult patients in Hadhramout Governorate, Yemen, shedding light on its frequency, risk factors, clinical presentation, management strategies, and outcomes.

2. Materials and Methods

2.1. Study design, setting, and population

A retrospective cross-sectional study was conducted from January 01, 2023, to June 30, 2024, in Hadhramout Modern Hospital, Mukalla City, Yemen. All patients admitted to the hospital with acute myocardial infarction (AMI) during the study period were included in this study. Hadhramout Modern Hospital is a private referral center in Mukalla City, which was established on January 1^{st}, 2015 with a 90-bed capacity. It is an academic center where students of medical and health institutes receive their education and about 1,000,000 people receive medical care in various specialties. The hospital covers medicine, surgery, pediatrics, obstetrics/gynecology, and has an intensive care unit.

2.2. Inclusion and exclusion criteria

All patients suffering from AMI aged 18 years or older were included in this study; however, patients aged <18 or those with incomplete data were excluded.

2.3. Sample size and sampling technique

All consecutive patients diagnosed with AMI during the study period were included (complete enumeration) and a purposive sampling technique was followed.

2.4. Case definition and data Collection

The diagnosis of AMI in this study relied solely on the treating physician's notes. It was based on at least two of the following conditions: a) a history of ischemic-type chest discomfort, b) evolutionary changes in serially obtained ECG tracings, and c) a rise and fall in serum cardiac markers. Cases of AMI were identified in the medical records department. We then retrospectively reviewed the patient's medical records and obtained detailed data, including age, age groups, gender, clinical presentation, risk factors, length of hospital stay, admission location, treatment, and outcome.

2.5. Statistical analysis and ethical approval

All continuous values were reported as means and standard deviation (SD) and categorical variables as percentages. We obtained permission to conduct the study from the hospital's administrative office, as we don't have a research committee in the governorate.

Table 1: Sociodemographic characteristics of acute myocardial infarction patients involved in this study

Variable	**N(%)**
Age (Mean)	61.56±11.02(35-90) years
Sex	
Male	61(56)
Female	48(44)
Age group (Years)	
20-44	5(4.6)
45-54	17(15.6)
54-64	42(38.5)
65-74	34(31.2)
≥75	11(10.1)
Marital status	
Married	30(27.5)
Single	10(9.2)
Widow	69(63.3)
Urban	63(57.8)
Employees	38(34.9)
Literate	42(38.5)

3. Results

3.1. Sociodemographic characteristics

During the period from January 1, 2023, to June 30, 2024, we involved 109 patients with acute myocardial infarction (AMI), representing 1.3% of all hospital admissions. Male patients accounted for 56% of patients (n=61), and female patients accounted for 44% of cases (n=48). The mean age of the patients was 61.56±11.02(35-90 years). The patients in the age group between 54-64 years were more frequently affected than other groups. The sociodemographic characteristics of the patients involved in this study are described in table 1.

3.2. Risk factors and clinical characteristics

The most common risk factor was diabetes 89(81.7%), followed by uncontrolled hypertension 77(70.6%), Dyslipidemia 74(67.9%), and smoking 50(45.9), whereas 11(10.1%) patients had no risk factors. The most clinical

Table 2: Clinical characteristics, risk factors and outcomes of acute myocardial infarction in patients involved in this study

Variable	N (%)
Clinical presentation	
Typical chest pain	98(89.9)
Atypical chest pain	11(10.1)
Epigastric pain	20(18.3)
Shortness of breath	16(14.7)
Bradycardia	13(11.9)
Palpitation with collapse	10(9.2)
Palpitation	5(4.6)
Hypotension (cardiogenic shock)	5(4.6)
Risk factors	
Uncontrolled hypertension	77(70.6)
Diabetes mellitus	89(81.7)
Smoking cigarettes	50(45.9)
Previous myocardial infarction	18(16.5)
Dyslipidemia	74(67.9)
Obesity	30(27.5)
Qat chewing	25(22.9)
No risk factors	11(10.1)
Type of myocardial infarction	
Non-ST elevation MI	29(26.6)
ST elevation MI	80(73.4)
Location of myocardial infarction	
Anterior wall MI	45(41.3)
Inferior wall MI	25(22.9)
Anterolateral wall MI	22(20.2)
Posterior wall MI	4(3.7)
Not specified	13(11.9)
Hospitalization	7.84±2.64(1-13 days)
ICU admission	109(100)
Management	
Thrombolysis	46(42.2)
Dual antiplatelet therapy	109(100)
Outcome	
Alive	96(88.1)
Dead	13(11.9)

MI: myocardial infarction; ICU: intensive care unit

presentation included typical chest pain 98(89.9), while 5(4.6) patients presented with cardiogenic shock. Two types of AMI were identified: non-ST-elevation MI 29 (26.6%) and ST-elevation MI 80 (73.4%). In most patients 45 (41.3%) the AMI was localized at the anterior wall, followed by the inferior wall, while in 13 (11.9) patients the location of the AMI could not be identified.

3.3. Management and outcomes of AMI

All patients were admitted to the intensive care unit, and the mean length of hospital stay was 7.84 ± 2.64 (1-13 days). All patients received dual antiplatelet therapy, while 46 (42.2%) patients received streptokinase as intravenous thrombolytics. The in-hospital mortality was 13 (11.9%) representing 4.2% of all mortality in the hospital during the study period.

4. Discussion

Due to a lack of research, there is no comprehensive data on the characteristics and profiles of AMI patients in Yemen. In order to develop national health strategies to combat it, it is of great importance to have a detailed understanding of the risk factors associated with AMI in the Yemeni population. This study is the first to provide a detailed description of the little known about the epidemiological profile of AMI in Hadhramout Governorate, Yemen, and its impact on in-hospital outcomes.

In line with several studies worldwide,[6–11] this study showed male preponderance, which may be related to female gonadal hormones,[12] in addition, the prevalence of habits such as smoking is higher among men than women.[13] The mean age of AMI patients in the current study was 61.56 years, which is comparable to reports from Western Europe, North America, and Australia, where the mean age ranges from 63.5 to 67.4 years.[12,14–17] However, our result is six to eight years Higher than a previous report from Yemen[6] and most reports from Iraq, India, Pakistan, Africa, and the Arabian Peninsula countries[7–9,18,19], where the mean age ranges from 54 to 56 years. The prevalence of AMI among elderly patients might be attributed to advanced age-related changes such as atherosclerotic changes and increasing risk factors like obesity, hypertension, diabetes, and dyslipidemia.

Diabetes mellitus is a well-established risk factor for cardiovascular disease (CVD). People with type 2 diabetes mellitus have a higher cardiovascular morbidity and mortality and are disproportionately affected by CVD compared with non-diabetic subjects.[20] In the current study, we found that diabetes mellitus was the most common risk factor, in contrast to a previous report from Yemen[6], which showed Qat chewing as the most common risk factor for AMI. This finding also was in contrast with most reports from Iraq, India, Pakistan, Africa, and the Arabian Peninsula countries, which showed hypertension as the most common risk factor for AMI[7–9,18,19] Regarding Qat chewing, we found that only 25 patients (22.9%) had a history of Qat chewing in contrast to 88% found in a previous report from Sana'a[6] Some authors tend to convince the scientific media that Qat chewing is a risk factor for CVD, in particular, AMI, but there is no solid evidence to support this claim.[21] Similar to most studies in the literature, our study found the following risk factors among our patients: hypertension, dyslipidemia, obesity, smoking, and previous myocardial infarction, although with varying frequencies.

In the present study, the most commonly involved AMI site was the anterior wall. About 45 patients (41.3%) had anterior wall AMI, which is comparable with a previous

report from Yemen[6] and other studies from India and Pakistan.[7,22,23] In our study, the most common type of AMI was ST elevation MI 80(73.4), similar trends were reported by other researchers from Asian countries like India, Saudi Arabia, Iraq, Sri Lanka, and Malaysia.[7–10,22–25]

Medications are a crucial part of AMI management in our hospital, as elsewhere. Dual antiplatelets were given to all patients involved in this study. On the other hand, Percutaneous Coronary Intervention (PCI), including angioplasty and stent placement, was not performed in our hospital due to a lack of facilities. However, thrombolytic therapy, which involves the administration of clot-busting medications, was initiated in 46 patients (42.2%), as an alternative to the unavailable PCI. Unfortunately, there are no national guidelines for the prevention and treatment of AMI in Yemen, so each tertiary center formulates its practical protocols based on international guidelines but adapted to the local situation of each region of the country. Moreover, there are no cardiac rehabilitation programs available throughout the whole country to aid patients in their recovery and improve their heart health.

4.1. Limitations of the study

The main limitation of our study is its retrospective design with missing follow-up and long-term outcome data. In addition, since the study is based on a retrospective review of the patient's medical records, we did not include some important variables such as body mass index (BMI) and waist circumference, which were not recorded by the primary care physicians. Another limitation is the hospital-based setting, which limits the generalization of our results. In addition, our study had a smaller sample size, and no age- and sex-matched controls from the general population were available. Despite this, our study was one of the first studies conducted in Hadhramout Governorate, Yemen, that describe the epidemiological characteristics and risk factor profile of adult patients with AMI. It calls for more research on inclusive population-based studies or additional studies in other tertiary centers to provide multi-center results and hence generalize our conclusions.

5. Conclusion

AMI represents 1.3% of all hospital admissions in our hospital, and it is more commonly seen in males as compared to females. Diabetes mellitus is the most commonly associated risk factor. The in-hospital mortality was 13(11.9%) representing 4.2% of all mortality in the hospital during the study period. Our study highlights the challenge of AMI prevention in our resource-poor governorate. People should be educated about the risk factors of AMI, the role of smoking cessation, lowering cholesterol, blood pressure control, and diabetes control as possible measures for primary prevention of this disease. Furthermore, our study highlights the challenge of AMI management in a resource-poor setting in Yemen. Therefore, there is an urgent need for a well-equipped cardiac center in Hadhramout Governorate to provide efficient treatment for the population.

6. Authors' contribution

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, data analysis, and interpretation, or all these areas. All authors took part in drafting, revising, or critically reviewing the article; and gave final approval of the version to be published.

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None.

8. Conflict of Interest

None.

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