Risk factors Assessment of Adults Suffering from Myocardial Infarction

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Abstract

Background: Myocardial infraction (MI) is defined as the necrosis in the myocardium due to the lack of the oxygen supply of heart which cannot be supplied by the coronary artery. The most prominent risk factors for myocardial infarction are older age, actively smoking, high blood pressure, diabetes mellitus, and total cholesterol and high-density lipoprotein levels. **Aim of the Study**: assess risk factors of myocardial infarction among adults. **Design:** A descriptive analytical design was used. **Subjects and Methods: Setting:** The study was conducted in cardiovascular hospital / Ain Shams University Hospitals. **Size:** the sample composed of 350 myocardial patients according to inclusion criteria. **Tools: Tool 1:** A Structured Interviewing Questionnaire Sheet that contain four parts; **Part I** Socio - demographic data of studied patients, past and present medical history of the studied patients, **Part III:** patient's knowledge about myocardial infarction and **Part II:** patient's reported practices regarding myocardial infarction and **Tool 2:** Risk factors assessment sheet. **Results:** Near to one third of the studied sample had satisfactory knowledge about myocardial infarction and around three quarter of the studied sample have inadequate level of total reported practices regarding myocardial infarction. Around two third of the studied sample have unmodifiable risk factors for myocardial infarction as sex and family history and about one quarter of them reported early menopause as a risk factors for myocardial infarction respectively. **Conclusion:** There was highly significant positive correlation between participants` knowledge and their practices regarding myocardial infarction. Also, there is statistically significant relation between sample' reported practices regarding myocardial infarction and all MI risk factors. **Recommendation**: Conducting health education program for patients with myocardial infarction to improve their knowledge and practice regarding their disease through establishment of a web site.

Keywords: Myocardial infarction, Risk factors.

Introduction:

Cardiovascular Disease (CVD) is a global health problem having high mortality and morbidity rate. As per World Health Organization reports there were 17,700,000 deaths due to CVD in 2015. Myocardial infraction (MI) is defined as the necrosis in the myocardium due to the lack of the oxygen supply of heart which cannot be supplied by the coronary artery ***(Mansilla-Chacón et al., 2021).***

It is also known as a heart attack that is sudden block in blood flow in the coronary arteries. If the block is severe, the heart can stop beating. It is characterized by chest pains or discomfort which may travel into the shoulder, arm, back, neck or jaw. This type of pain always starts from the center or left side of the chest where heart is present and remains for few minutes ***(Sagris et al., 2022).***

The most common cause of myocardial infarction is coronary thrombosis which usually is secondary to arteriosclerosis and atherosclerotic changes. Other causes include spasms of the coronary arteries and blockage of the coronary arteries by an embolism. Complications of myocardial infarction include dysrhythmias, cardiogenic shock, ventricular rupture, ventricular aneurysm, arterial embolism, venous thrombosis, pulmonary embolism, pericarditis and mitral insufficiency ***(Saleh & Ambrose, 2018).***

The most prominent risk factors for myocardial infarction are older age, actively smoking, high blood pressure, diabetes mellitus, and total cholesterol and high-density lipoprotein levels. Many risk factors of myocardial infarction are shared with coronary

artery disease, the primary cause of myocardial infarction, with other risk factors including male sex, low levels of physical activity, a past family history, obesity, and alcohol use ***(Lei & Bin, 2019).***

Therefore, hospital discharge is a critical and challenging time for patients after MI. Coping with a change and readjustment of lifestyle and adherence to new treatments requires support from professionals through continuity of care. These patients are particularly vulnerable to additional cardiac events, and secondary prevention is a priority. This prevention is based on patient education regarding any suspicion of associated symptoms and control of risk ***(Grässler et al., 2021)***

Nurses play a vital role in management of an acute myocardial infarction MI. They must respond rapidly and efficiently to patients who are experiencing symptoms of acute MI. Nurses must quickly work to assess their patient; administer sublingual nitroglycerin and aspirin, if indicated; obtain a 12-lead EKG; and notify the physician. The essential role of nurse to help patient continually promote and improve their compliance regarding medical instructions is necessary to change self-image, revise daily living routines and to cope with the effects of health deviations based on patient education ***(Gleason et al., 2019).***

As regard MI risk factors there is little controversy over the benefits to cardiovascular health of not smoking, eating a well-balanced diet, maintaining mental well-being, taking regular exercise and keeping active ***(Mortensen & Nordestgaard, 2020).***

Interventions by community health nurse using personal or family counseling and education, with or without drug treatment, were more effective in modifying risk factors and reducing mortality in people at high risk because of raised blood pressure. These results argue in favor of multiple risk factor interventions for prevention of cardiovascular disease in multifactorial high-risk groups. For the general low-risk population, policy measures that create a conducive environment which facilitates behavioral change may have a greater impact at lower cost than individual counseling and therapeutic approaches ***(Brainin et al., 2018).***

Significance of the study

As regard to the incidence in Egypt, the average age of myocardial infraction is 43% of men aged less than 55 years and 67% of women under 65 years. In Egypt in year 2019 data were collected from 3224 patients with Acute coronary syndrome (ACS) in 30 coronary care centers, covering 11 governorates across Egypt ***(Tamis-Holland et al., 2019).***

In worldwide, heart attack cases nearly doubled from 271 million in 1990 to 523 million in 2019 which the number of heart diseases death rose from 12.1 million to 18.6 million ***(WHO, 2021).***

Myocardial infarction constitutes a major health problem in the world and it is considered a life threatening. Annually, approximately every 40 minutes, an American will have a myocardial infarction. The average age of first myocardial infarction is 65.6 years old for men and 72.0 years old of women. In the United States in 2019, coronary events area expected to occur in about 1.055.000 individuals, including 720.000 new and 335.000 recurrent coronary events ***(Wadie et al., 2020).***

The world is affected by a global rise in the prevalence of cardiovascular risk factors. Etiology of myocardial infarction is complex and still not completely elucidated ***(Dyrbuś et al., 2021).*** Therefore, it`s important to assess risk factors of myocardial infarction among adults.

Aim of the study

This study aims to assess risk factors of myocardial infarction among adults

Research Questions:

1. What are risk factors for clients with myocardial infarction?
2. Are there relations between clients' socio-demographic characteristics and their knowledge about myocardial infarction?
3. Is there a relation between clients' knowledge with myocardial infarction and their risk factors?

4. Is there a relation between clients' reported practices with myocardial infarction and their risk factors?
5. Is there a relation between clients' knowledge with myocardial infarction and their reported practices?

Subjects and Methods

Subjects and methods of this study were portrayed under four main topics as follows:

I. Technical design
II. Operational design
III. Administrative design
IV. Statistical design

I. Technical Design

The technical design for this study Include research design, setting, subjects and tools of data collection.

1) Research Design:

A Descriptive analytical research design was utilized in this study.

2) Research Setting:

This study was conducted at outpatient clinic of the cardiovascular hospital affiliated to Ain Shams University hospitals.

3) Subjects of the study:

The subject of this study include 3500 myocardial infarction adult patients in the years 2019 – 2020 admitted to cardiovascular hospital according to inclusion criteria: Adults from both sexes diagnosed with acute myocardial infarction, conscious, and with stable condition after 3 days of myocardial infarction attack

Sample type: purposive sample was used.

Sample Size: the sample include 10% of the total clients admitted to the previous mentioned setting which are 350 adult patients.

$$n = \frac{N \times p(1-p)}{\{N-1 \times (d2 \div Z2)\} + P(1-P)}$$

4) Tools of data collection:

Data of this study were collected through the following tools:

I- A Structured Interviewing Questionnaire Sheet:

An Arabic questionnaire was developed by the researcher to elicit data and consisting of four parts:

Part 1: Socio - demographic data of studied patients, such as age, gender, marital status, occupation, educational level, residence, family size, crowding index and monthly income.

Part 2: Past and present medical history of the studied patients, such as history of chronic disease, family history of chronic disease, smoking and medical diagnosis.

Part III: Patient's knowledge about myocardial infarction: It was designed by the researcher based on ***(Zafari et al., 2019)*** aimed to assess patient's knowledge about myocardial infarction as (anatomy and physiology of the heart, meaning, clinical manifestation, investigations, treatment, follow-up regimens…. etc.).

❖ **Scoring system:**

The questionnaire contains 20 closed ended questions in form of multiple choice question (MCQ), the total scores of the questionnaire ranged from (0- 20) points. The right answer was scored as 1 point and the wrong one was scored as a zero. These scores were summed and were converted to percent score and classified into 2 categories:

- Satisfactory level of knowledge ≥ 60% = ≥ 12 correct item.
- Unsatisfactory level of knowledge <60% = < 12 correct item.

Part IV: Patient's reported practices regarding myocardial infarction: It was designed by the researcher based on ***(Baghernezhad et al., 2020)*** to assess patient's reported practices regarding myocardial infarction as (exercise training, checking cholesterol level, blood pressure, blood sugar, smoking cessation controlling diet.. etc).

❖ **Scoring system:**

The questionnaire contains 21 closed ended questions in form of multiple choice question (MCQ), the total scores of the questionnaire ranged from (0- 21) points. The positive practice was scored as 1 point and the negative one was scored as a zero. These scores were summed and were converted to percent score and classified into 2 categories:

- Adequate level of practice ≥ 60% = ≥ 13 done item.

- Inadequate level of practice 60% = <13 done item.

II- Risk factors assessment sheet:

It was designed by the researcher based on Wilcox et al. (2021) aimed at assessing patient's risk factors regarding myocardial infarction. The scale was consisted of 15 items divided into 2 categories; unmodifiable risk factors (4 items) and modifiable risk factors (11 items).

II. Operational design:

The operational design for this study contains three phases namely: the preparatory phase,validity and reliability, pilot study, and fieldwork.

1-The Preparatory phase:

This phase started from September 2021 till November 2021, the researcher reviewed using articles, the internet, scientific journals, the material in textbooks, the national and international related literature were used in the study to be acquainted with study subjects. During this phase, the researcher also visited the selected places to get acquainted with the personnel and the study settings.

2-Validity and reliability of tool

To achieve the criteria of trustworthiness of the tools of data collection in this study, the tools were tested and evaluated for their face and content validity, and reliability by jury group consisting of (5) experts 5 in community health nursing field and some modifications done in rephrasing of some sentences in study tools. To ascertain relevance, clarity, and completeness of the tool's experts elicited responses were either agree or disagree for the face validity and for content reliability, important, not important, and comments.

The required corrections and modifications were done and the researcher revised each tool and modifies some statement under supervision of the researcher supervisors.

Reliability for tools was applied by the researcher for testing the internal consistency of the tools by administrating of the same tool to the same subjects under similar condition. Internal consistency reliability of all items of the tools was assessed using Cronbach's alpha coefficient, proved to be high as indicated in the following table:

Reliability Statistics

Tool	Cronbach's Alpha	Internal consistency
Patient's knowledge about myocardial infarction	**.850**	**Strong**
Patient's reported practices regarding myocardial infarction	**.847**	**Strong**
Risk factors assessment sheet	**.801**	**Strong**

The sample size was calculated at 95% level of confidence and 80% study power. Using open-Epi software package for a correlation sample size was 350 after accounting for anon-response rate of approximately 5% and for 10% of the total sample for pilot study which excluded from the total number of sample size. To evaluate the applicability and reliability of the constructed tools.

3-Pilot study:

The pilot study was carried out in November 2021 before data collection. A pilot study was conducted on 10% (35) patients of the total study sample to evaluate the applicability and reliability of the constructed tools. The pilot has also served to estimate the time needed for each subject to fill in the questions and to identify the problems that may be encountered during the study. All participants in the pilot study were excluded from the studied sample. Minor modifications were done in the form of rephrasing, organization and omission.

4-Field work:

The actual fieldwork for the process of the data collection has consumed three-months started on beginning of December 2021 and was completed by the end of February 2022, through collecting the data from the study subjects at 3 days (Sunday, Tuesday and Thursday) / week at morning shift (8a.m-8p.m). The researcher met with a number of patients ranging from 8-10 patients in each meeting. Confidentiality of any obtained information was assured, and the subjects were informed about their right to participate or

not in the study. The participants were also assured about anonymity, and that data will only be used for the purpose of the study.

The researcher introduced himself to subjects then explain the aim of the study to each one of them. Oral consent was obtained from every participant who fulfilled the inclusion criteria. An individual interview was conducted for every patient to collect the necessary data using the tools for data collection, the average time needed to assess patient's knowledge about myocardial infarction was around 10-20 minutes, patient's reported practices regarding myocardial infarction was around 15-20 minutes and about10-15 minutes for risk factors assessment sheet.

5-Ethical considerations:

An ethical approval was obtained from the the Scientific Research and the council members of ethical committee, and the Dean of the faculty of the Nursing at Ain Shams University. And verbal consent was obtained from the patients before distributing the questionnaires and after explanation of the purpose of the study; anonymity was assured and maintained; no burden or risk was imposed on patients; no coercion or pressure was applied.

Prior to the actual work of research study, ethical approval was obtained from the Scientific Research Ethical Committee of the Faculty of Nursing at Ain Shams University. The subjects were informed about their right to withdraw at any time without giving any reason and the collected data kept confidential and used for scientific work only. Informal consent was obtained from each participant in the study.

III. Administrative design

After securing the official permission from the dean of Ain-sham faculty of nursing to the director of the cardiovascular hospital affiliated to Ain Shams University hospitals, the researcher met the director of the cardiovascular hospital before applying of the study to determine the suitable time to meet the study participants and explain the aim and objectives of the study.

IV. Statistical design:

Data collected from the studied sample was revised, coded and entered using Personal Computer (PC). Computerized data entry and Statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 25 (SPSS Inc., Chicago, IL, USA). Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the arithmetic mean and standard deviation (SD) for quantitative data. Chi-square test (X^2) was used for comparisons between qualitative variables. Spearman correlation test was used to measure the strength and direction of association between two ranked variables. Degrees of significance of results were considered as follows:

- Highly statistically significant at p-value <0.001.
- Statistically significant was considered at p-value <0.05.
- Non- statistically significant at p-value>0.05

Results:

Table (1): shows that, 50.3% of the studied sample age ranged between 50-<60 years, the Mean SD of age is 55.28 ± 10.9 years. As regard to marital status, 75.4% of them are married. Also, 60% of the studied sample are working, 55.5% of them working in administrative work. Moreover, 55.7% of them reside in urban areas. In addition, 66.8% and 52.9% of the studied sample have 3-5 family members and 3-5 rooms, respectively. Furthermore, 57.7% of the studied sample had a crowding index of 1-<2. Moreover, 66.9% of the studied sample do not have sufficient monthly income

Figure (1): illustrate that, 72% of the studied sample have unsatisfactory level of total knowledge about myocardial infarction. While, 28% of them have satisfactory level.

Figure (2): show's that, 74.3% of the studied sample have inadequate level of total reported practices regarding myocardial infarction. While, 25.7% of them have adequate level.

Table (2): emphasizes that, 70.9% and 62.3% of the studied sample have unmodifiable risk factors for myocardial infarction as sex and family history and only 27.1 of them reported early menopause as a risk factors for myocardial infarction respectively. Also, they had modifiable risk factor diabetes mellitus 54.3 %, dyslipidemia 72%, hypertension 70% and obesity 68.6%. Moreover, the studied sample has smoking risk factor 58.9%, gout 3%,

physical inactivity and lack of exercise 72.9%, psychological stress 86.3%, socioeconomic status 66.9% and Unhealthy diet 84.3% and no one reported alcoholism, respectively.

Table (3): show's that, , there is highly statistically significant relation between sample' reported practices regarding myocardial infarction and all unmodifiable risk factors as, aging, sex, family history and early menopause at (P= < 0.01). furthermore, there is highly statistically significant relation between sample' reported practices regarding myocardial infarction and their modifiable risk factors as, diabetes mellitus, dyslipidemia, hypertension, obesity, physical inactivity and lack of exercise, psychological stress, socioeconomic status, and unhealthy diet at (P= < 0.01). Also, there is statistically significant relation with smoking status and having gout at (P= < 0.05).

Table (4): clarifies that, there was highly significant positive correlation between sample' knowledge and their reported practices regarding myocardial infarction among the studied sample at (P= < 0.01).

Table (1): Distribution of the studied sample according to their socio-demographic data (n=350).

Socio-demographic data	No.	%
Age (year)		
20-<30	10	2.9
30-<40	28	8
40-<50	66	18.9
50-<60	**176**	**50.3**
≥ 60	70	20
Mean SD **55.28 ± 10.9**		
Marital status		
Single	36	10.3
Married	**264**	**75.4**
Divorced	15	4.3
Widowed	35	10
Occupation		
Working	**220**	**60**
Not working	130	40
If yes, what is the work nature? (n=220)		
Administrative work	**122**	**55.5**
Muscular effort	98	44.5
Residence		
Urban	**195**	**55.7**
Rural	155	44.3
Number of family members		
<3	16	4.6
3-5	**234**	**66.8**
≥5	100	28.6
Number of rooms		
<3	116	33.1
3-5	**185**	**52.9**
≥5	49	14
Crowding index		
<1	52	14.9
1-<2	**202**	**57.7**
≥ 2	96	27.4
Monthly Income		
Enough	116	33.1
Not enough	234	66.9

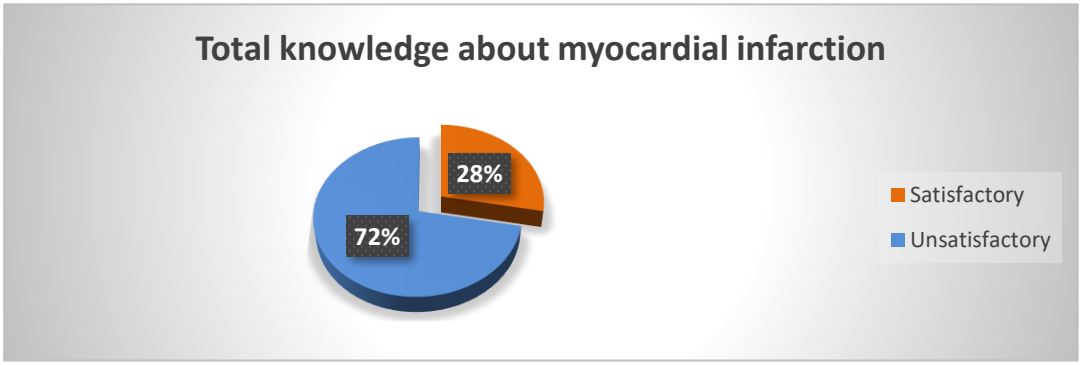

Figure (1): Distribution of the studied sample according to their total knowledge about myocardial infarction.

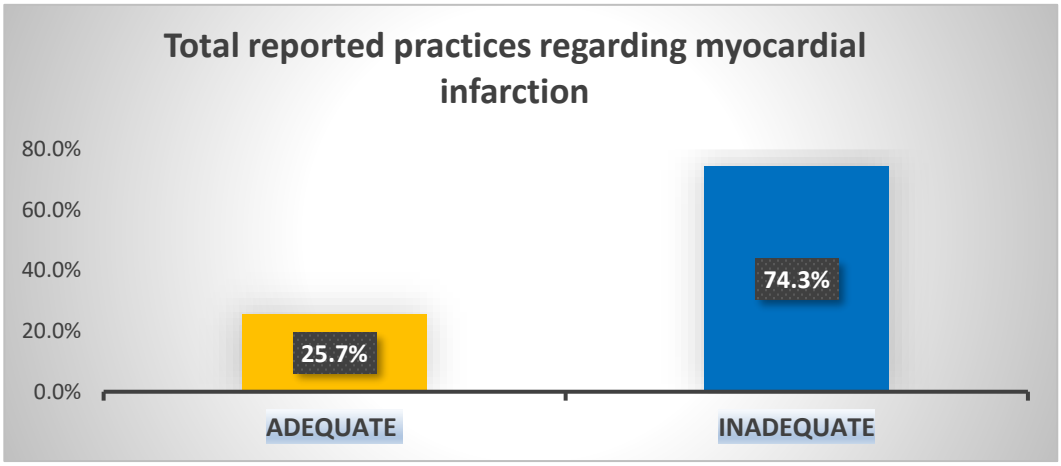

Figure (2): Distribution of the studied sample according to their total reported practices regarding myocardial infarction.

Table (2): Distribution of the studied sample according to myocardial risk factors (n=350).

Items	Yes		No	
	No.	%	No.	%
Unmodifiable risk factors				
Aging (65years old or more)	70	20	280	80
Sex	248	70.9	102	29.1
Family history	218	62.3	132	37.7
Early menopause	95	27.1	255	72.9
Modifiable risk factors				
Diabetes mellitus	190	54.3	160	45.7
Dyslipidemia	252	72	98	28
Hypertension	245	70	105	30
Obesity	240	68.6	110	31.4
Smoking	206	58.9	144	41.1
Gout	9	3	341	97
Alcoholism	0	0.0	350	100
Physical inactivity and lack of exercise	255	72.9	95	27.1
Psychological stress	302	86.3	48	13.7
Socioeconomic status	234	66.9	116	33.1
Unhealthy diet	295	84.3	55	15.7

Table (3): Relation between myocardial risk factors and total reported practices regarding myocardial infarction among the studied sample **(n=350).**

Items		Total reported practices regarding myocardial infarction				X2	P-Value
		Adequate (n=90)		Inadequate (n=260)			
		N	%	N	%		
Aging	Yes	8	8.9	62	23.8	14.20	.000**
	No	82	91.1	198	76.2		
Family history	Yes	75	83.3	143	55	13.81	.005**
	No	15	16.7	117	45		
sex	Yes	8	8.9	62	23.8	13.35	.000**
	No	82	91.1	198	76.2		
Early menopause	Yes	20	22.2	75	28.8	12.41	.009**
	No	70	77.8	185	71.2		
Diabetes mellitus	Yes	17	18.9	173	66.5	14.00	.001**
	No	73	81.1	87	33.5		
Dyslipidemia	Yes	12	13.3	240	92.3	14.25	.001**
	No	78	86.7	20	7.7		
Hypertension	Yes	15	16.7	230	88.5	14.71	.000**
	No	75	83.3	30	11.5		
Obesity	Yes	8	8.9	232	89.2	15.09	.000**
	No	82	91.1	28	10.8		
Smoking	Yes	24	26.7	182	70	8.922	0.043*
	No	66	73.3	78	30		
Gout	Yes	20	22.2	155	59.6	11.93	0.045*
	No	70	77.8	105	40.4		
Physical inactivity and lack of exercise	Yes	7	7.8	245	94.2	15.91	.000**
	No	83	92.2	15	5.8		
Psychological stress	Yes	45	50	257	98.8	15.22	.000**
	No	45	50	3	1.2		
Socioeconomic status	Yes	10	11.1	224	86.2	15.01	.000**
	No	80	88.9	36	13.8		
Unhealthy diet	Yes	40	44.4	255	98.1	15.77	.000**
	No	50	55.6	5	1.9		

Table (4): Correlation between sample' knowledge, reported practices regarding myocardial infarction among the studied sample (n=350).

Items	Total knowledge
Total reported practices	r = .299
	P = .005**

Discussion:

Myocardial infarction is a clinical diagnosis based on the presence of symptoms or signs of myocardial ischemia in conjunction with acute myocardial injury, as indicated by a rise or fall in cardiac biomarker concentrations. The fourth universal definition recognizes that myocardial infarction can result from a number of different pathophysiologic myocardial infarction occurs in those with atherosclerotic plaque rupture and thrombosis ***(White, 2021).***

The risk factors for myocardial infarction have been well characterized in a number of large such as hypertension, diabetes mellitus, and hyperlipidemia have been shown to increase future atherothrombotic risk. Risk factors that predict myocardial infarction are likely to be more complex, with an acute illness responsible for supply or demand imbalance

and myocardial infarction in a population of susceptible patients ***(Taggart et al., 2021).***

The aim of this study was to assess risk factors of myocardial infarction among adults, assessing clients' knowledge and reported practices toward myocardial infarction.

Concerning the socio-demographic characteristics of studied patients, the present study findings show that, approximately half of our studied patients were aged from fifty to less than sixty years, this study result was congruent with ***(Trajković et al., 2021)*** who conducted the study entitled "Exercise-Based Interventions in Middle-Aged and Older Adults after Myocardial Infarction" who mentioned that the majority of study sample were 50<70 years old.

As regard to marital status, our study results revealed that about three quarters of our study were married this result was in the same line with the study conducted in Russia and reassured named "High-sensitivity cardiac troponin and the universal definition of myocardial infarction." by ***(Chapman et al., 2020)*** who mentioned that majority of study patient were married.

Lastly as regard to studied patients` gender, the results of the present study revealed that more than two third of the studied patients were males. While, near to one third of the studied patients were female. This results shows similarity with the study entitled "Sex-Specific Risk Factors Associated with First Acute Myocardial Infarction in Young Adults." Conducted by ***(Lu et al., 2022)*** who mentioned that the majority of study sample were males

In relation to patients` level of total knowledge about myocardial infarction, our study illustrated that near to one third of the studied sample had satisfactory knowledge about myocardial infarction. This result confirmed with study of ***(Jalal & Noorbhai, 2021)*** named "Knowledge of cardiovascular disease risk and exercise duration among asymptomatic sedentary male individuals participating in Islamic prayer (Salaah)" that illustrated that quarter of study sample had satisfactory knowledge about myocardial infarction.

As regard total reported practices regarding myocardial infarction of the study participants, the results show that, around three quarter of the studied sample have Inadequate level of total reported practices regarding myocardial infarction.

This result showed disharmony with ***(Konstanty-Kalandyk et al., 2018)*** who conduct study in USA named "Is right coronary artery chronic total vessel occlusion impacting the surgical revascularization results of patients with multivessel disease? A retrospective study." that stated, the majority of study sample had adequate level of total reported practices regarding myocardial infarction.

As regard risk factors of myocardial infarction among our study subjects, our study results displays that around two third of the studied sample have unmodifiable risk factors for myocardial infarction as sex and family history and about one quarter of them reported early menopause as a risk factors for myocardial infarction respectively.

Similarly, this study conducted in Nigeria about" Risk factors profile of young and older patients with myocardial infarction" by ***(Mane, 2018)*** found that, the majority of the studied patients had unmodifiable risk factors for myocardial infarction as sex and age and family history .

Moreover, the study results shows that, more than half of the studied sample had diabetes mellitus as modifiable risk factor. In the same line, study named "Acute myocardial infarction risk factors and correlation of its markers with serum lipids." by ***(Azab & Elsayed, 2017)*** stated that the most prevalent risk factor in male and female patients is diabetes, 70.9% and 72.7 for males and females respectively. In the same line, ***(Bahall et al., 2018)*** conducted study titled "Risk factors for first-time acute myocardial infarction patients in Trinidad." demonstrated diabetes was the most predominant risk factor among male and female

patients, 70.9% for males and 72.7% for females were diabetic.

Furthermore, around three quarter of our studied participants had other modifiable risk factors for myocardial infarction as dyslipidemia, hypertension and obesity. In the same line, study conducted by ***(Shlomo et al., 2022)*** named "Active Lifestyle Post First Myocardial Infarction: A Comparison between Participants and Non-Participants of a Structured Cardiac Rehabilitation Program." stated that the most common risk factor was hyperlipidemia, observed in 68% of the participants; hypertension was reported in 58%, and 50% of participants were smokers.

In congruent ***(Azab & Elsayed, 2017)*** mentioned that percentages of hypertriglyceridemia were 33.9% and 40% for males and females respectively. Prevalence of hypertension among male patients was more than in female, the percentages were 41.2% for males and 30.3% for female, this means that the second the third risk factor in males was hypertension. Hypertriglyceridemia was the fourth risk factor among males and females patients with 21.3% and 30.7% respectively.

Also, the study results demonstrate smoking as a risk factor between more than half of the studied patients and few of them reported gout as a risk factor. Study conducted by ***(Azab & Elsayed, 2017)*** showed similarity as mentioned smoking is the second risk factor in males (51.2%), but all of female patients were nonsmoking, on the other hand, hypertriglyceridemia was the second risk factor among female patients. By chi square test we found a highly significant difference between males and females in smoking.

Moreover, ***(Bahall et al., 2018)*** revealed that Smoking was the second risk factor among male patient (51.2%), but all the female patients sample were not smoker, this because, the smoking is not an habit among females in most of Arabian and Islamic countries. Smoking appeared to be the second most common risk of AMI. Smoking was significantly (p=0.00) more common in male patients (52.2%) than females (0%).

Regarding other modifiable risk factors, the majority of the studied patients reported psychological stress and unhealthy diet. In congruent with our finding ***(Bortkiewicz et al., 2019)*** used logistic regression to test whether the participants' dietary habits affected the MI risk in a study named "Dietary habits and myocardial infarction in occupationally active men." It was found that the MI risk was significantly increased by the reduction of the frequency of consumption of fish, fruit, salads and cooked vegetables. In addition, the MI risk was significantly higher in those people who preferred fatty and/or salty foods. It was shown that, after adjusting the daily consumption of fish, salads and cooked vegetables, as well as fruit and vegetable oils significantly reduced the risk of myocardial infarction. At the same time, the increase in the MI risk was associated with obesity and preference for fatty foods.

Moreover, ***(Bortkiewicz et al., 2019)*** also provided interesting information about the importance of other dietary behaviors as risk factors for MI. the study showed that the average number of main meals among the patients with myocardial infarction was significantly higher than in the control group. In the authors' opinion, more plentiful main meals per day give more opportunities to eat too much, which could have been the cause of the more frequent obesity observed in the patients with myocardial infarction

Also, about three quarter of the studied sample reported Physical inactivity and lack of exercise and two third reported socioeconomic status. In harmony with our results the study named 'Association between type of physical activity and risk factors for cardiovascular disease, Islamic Republic of Iran." By ***(Aminian et al., 2021)*** showed that Logistic regression analysis stated leisure-time physical activity has a strong negative relationship with all CVD risk factors after adjustment for age and smoking and ***(Kumma et al., 2022)*** who conducted study named "Modifiable cardiovascular disease risk factors among adults in southern Ethiopia: a community-based cross-sectional study." demonstrated the weighted prevalence of physical inactivity of the adult

people under the study was 44.1% (95% CI 33.6% to 55.3%).

On the whole, the study named "Epidemiological Study of Risk Factors in Myocardial Infarction Patients." conducted by ***(Sushritha et al., 2020)*** mainly focuses on evaluation of few easily measured, preventable risk factors like smoking, alcohol, obesity where higher proportion of risk factors in myocardial infarction patients has been observed in Coronary Artery Disease (31%), Hypertension (20.9%), followed by Diabetes Mellitus (15.01%), Smoking (12.5%), Alcohol consumption (12.3%), Obesity (3.09%) and Any co-existing diseases (4.75%).

Concerning correlation between sample' knowledge and reported practices regarding myocardial infarction. Our study results revealed that there was high relation between participants` knowledge and their practices regarding myocardial infarction

These findings were in accordance with the study conducted " Patients' knowledge about symptoms and adequate behavior during acute myocardial infarction and its impact on delay time "by ***(Pietrzykowski et al., 2022)*** who stated that there was high relation between participant's knowledge and their practices regarding myocardial infarction

Moreover, ***(Mannoh et al., 2021)*** revealed that in the study titled" disparities in Awareness of Myocardial Infarction and Stroke Symptoms and Response Among United States" and accentuated that, there was high relation between participants knowledge and their practices regarding myocardial infarction

Our study may be attributable to higher burdens of AMI risk factors such as hypertension, diabetes mellitus, obesity, risky behaviors such as unhealthy dietary patterns, cigarette smoking and alcohol consumption and lower prevalence of protective healthy behaviors such as fruit/vegetable consumption nonsmoking and regular exercise in counties with low education levels

Lastly, health literacy has been shown to mediate the association between education level and health behaviors. In fact, low education attainment may confer a cardiovascular risk that is equivalent to traditional risk factors. Accordingly, counties with low education levels may have low health literacy levels, resulting in a large proportion of their population having limited ability to obtain, process, and understand basic health-related information needed to communicate, navigate health systems, and make decisions regarding lifestyle and personal health behaviors. Low education and insufficient income leads to a lack of follow-up and a lack of awareness of the risks and complications of this disease.

Conclusion:

In the light of the present study findings, it can be concluded that:

- Around three quarter of the studied sample had unsatisfactory total knowledge and total practices about myocardial infarction level.
- More than two third of the studied sample had sex and family history as unmodifiable risk factors for MI and the majority of studied sample had psychological stress and unhealthy diet and more than two third of them reported dyslipidemia, hypertension, obesity, physical inactivity and lack of exercise and socioeconomic status as modifiable risk factors for MI.
- There was statistically significant relation between sample' reported practices regarding myocardial infarction and their modifiable risk factors.
- There was highly significant positive correlation between sample' knowledge and their reported practices regarding myocardial infarction among the studied sample.

Recommendations:

In the light of the current study findings it is recommended that:

- Health education program is needed for patients with myocardial infarction to improve their knowledge and practice regarding their disease.
- Give booklet as handout for patients containing basic and important instructions for MI patients when leaving hospital.

- It is essential to adopt international recognized protocols for primary, secondary and tertiary prevention, diagnosis, treatment and follow up for myocardial infarction patients.
- As diet is one of the major risk factors of myocardial infarction, it is essential to find the most effective diet protocol and supply it to myocardial infarction patients.
- Providing a follow up centers for chronic diseases prevention and health promotion to decrease the incidence of many chronic diseases especially ischemic heart diseases, this can be achieved through Decision makers.
- Establishment of a web site, including all information about myocardial infarction and all aspects of health education such as different educational materials, medias, and audio- visual aids.
- Policy makers for each healthcare facility should provide accessible resources like brochures and pamphlets, in addition to non-traditional methods, to disseminate awareness among patients regarding myocardial infarction.
- Replication of the study on a large probability sample selected from different geographical areas to obtain generalized data. Also, integration of qualitative research to explore perceived risk may generate new knowledge and increase depth of understanding.

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