Risk Factors of ST-Elevation Myocardial Infarction among Young Patients in Erbil/Iraq

Nooreldien Bassim Essa[1*] *, Halgurd Fathulla Ahmed* [2] *,*
Soran Ahmed Khidr[3]

Author's Information
1.M.B.Ch.B. Emergency Medicine
2.M.B.Ch.B., F.I.B.M.S_ assistant professor in Internal Medicine Director of training Kurdistan Higher Council for Medical Specialties
3.M.B.Ch.B., FKBMS_Emergency Medicine Lecturer, Hawler Medical University College of Medicine

Corresponding author:
Nooreldien Bassim Essa
bassimessanooreldien@gmail.com

Funding information
Self-funded

Conflict of interest
None declared by author

ABSTRACT

Background: Acute myocardial infarction is a leading cause of death globally. The mortality rate has remained unchanged over the past decade. Acute myocardial infarction is less common in adults under the age of 45 than in the elderly. There's a gap in contemporary data among young adults with ST-elevation myocardial infarction in Iraq.

Objective: Therefore, we aim to assess characteristic and risk factors of young patients with ST- elevation myocardial infarction in Erbil province, Iraq.

Patients and mathods: A cross-sectional study was conducted. For the recruitment of young ST- elevation myocardial infarction patients' convenience sampling method was utilized. The study was carried out between November, 2021 - August 2022. Means and frequencies were used for numerical data. Chi-square was used to compare between men and women.

Results: A total of 112 patients were recruited for this study, the mean age of patients was 41.8 ± 4.89. In a total sample of 112 patients, smoking was the leading cause of death in 63/112 (56.3%) patients, followed by hypertension in 50/112 (44.6%), Family history of stroke in 47/112 (42%), Diabetes Mellitus in 32/112 (28.6%), Dyslipidemia in 27/112 (24.1%) and ischemic heart disease in 16/112 (14.3%) of patients.

Conclusion: More than half of all patients with acute myocardial infarction have arterial hypertension, a significant reduction in the prevalence of cardiovascular diseases can be achieved by implementing adequate preventive measures and treating patients, as risk factors for their development have long been identified. Smoking cessation is one of the most effective secondary prevention measures because it lowers the risk of re-infarction.

1. INTRODUCTION

Acute myocardial infarction (AMI) is a leading cause of death globally. Even though AMI is less common in adults under the age of 45 than in the elderly. AMI hospitalization rates for young people have not declined over the past decade. (1-5). However, there's a significant burden on society through the loss of productive life years (6,7). This burden has a great impact when a young person, who may be the main source of income in a family suffers from a ST segment elevation myocardial infarction (STEMI). Recently, because of the risk of early death and long-term disability, STEMI in young age group is gaining clinical attention (3). In individuals who are 45 years of age or younger, studies reveal a 2 to 10% risk of AMI (3, 8). Compared to older patients the reported incidence of myocardial infarction (MI) is 8 times lower in younger population. Autopsies of young adults under the age of 34 have revealed that 50% have intimal atherosclerosis (9), despite estimates from myocardial infarction (MI) registries indicating that only 2% to 6% of all infarctions involve people under the age of 45 (10). The protection offered by young age is slowly countered by increased prevalence of risk factors for coronary heart diseases (CHD) such as impaired glucose tolerance, and obesity, in adolescence (11). Different socioeconomic and environmental factors could put them at higher risk of developing coronary artery disease (CAD). Younger people are likely less inclined to seek medical help because of their lack of knowledge about CAD and their false sense of security. Early detection and risk factor reduction in this population are crucial. Recognizing that the mechanism and disease course of AMI differ in young patients from those in an older population may help to both prevent the disease and improve the prognosis (12). However, fewer studies have been conducted in younger people to investigate risk factor profiles and patterns of coronary artery involvement in ST-segment elevation myocardial infarction (STEMI). Early detection and risk factor modification are critical in this population subset. This study sought to identify the percentage frequency of traditional ischemic heart diseases (IHDs) risk factors in patients with ST segment elevation myocardial infarction (STEMI), taking gender into account (12). This data will aid physicians in identifying and targeting primary and secondary preventative therapies.

While, previous studies have described characteristics and outcomes of young patients with MI. However, there's a gap in contemporary data among young adults with STEMI in Iraq. We therefore, aim to assess characteristic and risk factors of young patients with STEMI in Erbil province, Iraq.

2. METHODOLOGY

This was a cross-sectional study conducted at multiple hospitals inside Erbil city, during the period from November, 2021 to August 2022. Verbal consent was obtained from the patients. Prevalence rates of the main risk factors hypertension, smoking, dyslipidemia, obesity, diabetes mellitus, and a Positive Family History were computed for gender.

Inclusion criteria:

All patients between 15-47 years of age, diagnosed as STEMI, which is determined by the characteristic rise and fall of cardiac markers of myocardial necrosis with at least one of the following: 1) Ischemic symptoms, 2) changes in the electrocardiogram that indicate new ischemia (less than 0.1 mV in two or more standard leads, less than 0.2 mV in two or more contiguous pre-cordial leads, or a new left bundle branch block), and 3) changes in the troponin level that are indicative of MI all must occur within 12 hours of the onset of symptoms (according to the normal local laboratory value).

Exclusion criteria:

• Patients diagnosed with congenital heart disease, cardiomyopathy, myocarditis, Takayasu's arteritis, vascular dysplasia, coronary artery embolism, AMI secondary to aortic dissection, severe aorta valve stenosis, myocardial hypertrophy, and history of AMI without evidence from angiography showing narrowing of the coronary arteries were excluded.

• Pediatric age group <15 years and Middle/old age group >47 years were excluded

• ECG changes showing T wave inversion or ST segment depression were also excluded

Data collection:

Data were collected by using a questionnaire during patient interviews and by looking through medical records, demographic and baseline data were gathered. The risk factor profiles for CAD in the patients' medical records were examined. Gender, age, a history of smoking or drinking, a family history of coronary artery disease (CAD), a medical history of

hypertension, type II diabetes mellitus, cranial vascular accidents, and the existence of other illnesses were among the baseline data.), troponin T (normal range 0.05-0.40 ng/mL) was performed. The questionnaire consisted of four parts; the first part gathered demographic data which included: patient's age, gender, marital status and residency. The second part focused on the patient's chief complaint at admission and past medical history along with family history of the patients. This included past history of hypertension, diabetes mellitus, dyslipidemia, ischemic heart disease as well as family history of these diseases. In the third part, we. collected social history; smoking habit and physical activity. The fourth section was utilized to record ECG findings and the test result of cardiac enzymes for each patient

Statistical analysis:

Data analysis was carried out using Statistical Package for Social Sciences (SPSS) 25.0 software (SPSS Inc., Chicago, IL, USA). Numerical data with a normal distribution such as age, are presented as means with standard deviation. Frequency presented percentages of risk factors were assessed. Chi-square was used to compare between men and women. Odds ratio of risk factors in male and female were calculated. P value less than 0.05 was considered statistically significant. Outcomes are illustrated with tables and figures.

3. RESULTS

A total of 112 patients were recruited in this study, the mean age of patients was 41.8 ± 4.89. Females contributed for (39.3%). The baseline characteristics of patients were as follows: Those from Urban areas were 82 (73.2%). All patients had an elevated ST-segment but only 26 (23.3%) had a positive Troponin T value (**Table 1**). Among the 112 patients, smoking was the leading risk factor; it was reported in 63/112 (56.3%) patients, followed by hypertension in 50/112 (44.6%), family history of stroke in 47/112 (42%), Diabetes Mellitus (DM) in 32/112 (28.6%), Dyslipidemia in 27/112 (24.1%) and ischemic heart disease in 16/112 (14.3%) of patients (Figure 2). Physical inactivity was found in 99/112 (99.3%) patients. Only 13/112 (11.6%) of our patients were physically active among which the majority (69.2%) were males. In this study, 21/112 (18.8%) of the patients had no previously known medical history (**Table 2**). The leading risk factor in men was smoking, in 57/68 (83.8%). positive family history was present in 27/68 (39.7%). followed by: Hypertension

23/112 (33.8%), dyslipidemia 22/68(32.4%), DM 17/68 (25%), IHD 10/68 (14/7%) (**Figure 2**). The leading risk factor in women was hypertension, in 27/44 (61.4%) (OR= 3.12). Positive family history was present in 20/44 (45.5%) (OR= 1.26). followed by: Diabetes Mellitus 15/44 (34.1%) (OR= 1.56), ischemic heart disease 6/44 (13.6%) (OR= 0.52), smoking 6/44 (13.6%) (OR= 0.03), dyslipidemia 5/44 (11.4%) (OR= 0.27) (**Figure 3**). In this study, men were more likely to be smokers, and have dyslipidemia or a history of ischemic heart disease. While, women were more likely to be hypertensive, diabetic, and have a family history of stroke. The frequencies of risk factors of men vs women and odds ratio is mentioned in (**Table 3**).

Table 1. Baseline Characteristics of patients

Variables		No.	%
Gender	Male	68	60.7
	Female	44	39.3
Age years	Minimum	28	
	Maximum	47	
Residency	Urban	82	73.2
	Rural	30	26.8
Marital status	Single	8	7.1
	Married	102	91.1
	Divorced	1	0.9
	Widowed	1	0.9

SD: Standard Deviation. Age mean ± SD is 41.8 ± 4.89.

Table 2. Frequency of risk factors among the study population

Risk factors	No.	%
Hypertension	50	44.6%
Ischemic heart disease	16	14.3%
Diabetes Mellitus	32	28.6%
Dyslipidemia	27	24.1%
Family history of ischemic heart disease	47	42%
Smoking	63	56.3%

Table 3. Frequencies and odds ratio of traditional risk factors of STEMI in men vs. women

Risk factors	Male		Female		OR (95% CI)		P. value
	No.	%	No.	%	Male	Female	
Hypertension	23	33.8	27	61.4	0.32	0.15-0.71	0.004
Ischemic heart disease	10	14.7	6	13.6	1.09	0.422-2.76	0.87
Diabetes Mellitus	17	25	15	34.1	0.64	0.281-1.48	0.29
Dyslipidemia	22	32.4	5	11.4	3.73	1.29-10.77	0.011
Family history of ischemic heart disease	27	39.7	20	45.5	0.79	0.367-1.701	0.504
Smoking	57	83.8	6	13.6	32.8	11.19-96.26	0.000

4. DISCUSSION

Young people have lifestyles characterized by overworking, work stress, smoking, and overeating. These factors likely cause disruptions in the internal environment leading to coronary atherosclerosis, in turn increasing the risk of acute MI (11). As mentioned in previous studies, one of the most invariably substantiated risk factors for coronary artery disease is male sex. The skewed distribution between males (60.7%) and females (39.3%) in this study is ascribed to the possible protective effects of estrogens in females in preventing atherosclerosis and the increased frequency of male smokers rather than female smokers. These findings are in accordance with Sinha et al.'s findings (12). The most important risk factor for IHD is considered to be hypertension. According to some studies, people with high blood pressure are three times more likely than normotensive people to develop CVD (8). Our study found hypertension in 44.6% of respondents, which is higher than the prevalence of hypertension in Sinha et al.'s study (12). These findings can be attributed to a higher proportion of respondents in our total sample being in the younger age group. In terms of gender, women had higher rates of hypertension than men (61.4 vs. 33.8%). In terms of frequency, smoking was the most common risk factor (56.3% of all respondents). Smoking was identified as a risk factor in 83.8% of male patients and 13.6% of female patients. The high ranking of smoking on the risk factors scale is in line with previous studies (9, 12) and this finding backs up other authors' claims that there is no safe level of cigarette smoking and that every cigarette is harmful (13).

On the risk factors scale, positive family history was present in 42% of all respondents and ranked the third among the other risk factors. This finding was slightly lower than Yunyun et al. and Sinha et al.'s results where positive family history of coronary artery disease was found in (54.65%, 46.8%, respectively) patients (9, 12). In terms of gender in our study, it was more common in women than in men (45.5% vs. 39.7%). Hyperlipidemia was found in 24.1% of all respondents, ranking fourth on the risk factor scale. This finding was also in line with previous studies Men were more likely than women to have hyperlipidemia (32.4% versus 11.4%, respectively). According to previous studies, diabetes mellitus patients are at a high risk for IHD, particularly acute myocardial infarction (14). Diabetes mellitus was found in 21% of all examined cases of acute myocardial infarction in Yunyun et al.'s study (9). IHD affects roughly half of all people with diabetes, with 20% developing a myocardial infarction (15). Treatment of metabolic parameters intensively may reduce the negative effects of hyperglycemia (16). Diabetes was found in 28.6% of the patients in our study. It was more or less equally prevalent in both men and women (25% and 34%, respectively). People who have multiple risk factors (arterial hypertension, smoking, and hyperglycemia) are more likely to develop a variety of complications. Some studies have found that women who use oral contraception, are hypertensive, and smokers are three times more likely to have an ischemic stroke (17). In this study, men with myocardial infarction were more likely to be smokers (83.8%) and hypertensives (33.8%) with a positive family history of IHD (39.7%), whereas women were more likely to be hypertensive (67%), diabetic (34.1%) with a positive family history of ischemic heart disease (39.7%). These findings imply that people with a positive family burden are at a much higher risk of having a myocardial infarction at a younger age. The most frequent clinical presentation in this study was chest pain accounting approximately 90% of cases. This finding is also in accordance with other researches (9). Troponin level was negative in 76.8% of our patients, this is attributed to the fact that most of our patients were interviewed in the super-acute stage of MI. Thus, Troponin was negative in the majority. The two most common management method in this study were (Aspirin 300mg+clopedogril 300mg+Statins 40mg+Clexane injection+ Referral for PCI) in 45.5% of patients and (Aspirin 300mg+clopedogril 300mg+ enoxaparin injection+ Referral for PCI) in 30.5% of patients. CVDs were responsible for 10% of global mortality in the early

twentieth century (18). They now account for half of all deaths in the developed world, thanks to the continuous implementation of public health improvement measures (vaccinations), which contributed to a significant increase in life expectancy but also a sudden increase in CVD prevalence (19). This disease kills about one in every five men and one in every six women (20).

Limitations:

To ensure a representative distribution of risk factors of STEMI among young adults, a larger sample size is required. Furthermore, we do not have data on all known risk factors for MI, in particular, we do not have data on obesity or BMI. Although, obesity has been shown to be a risk factor for MI, its effect is modest in comparison with smoking and other cardio-embolic risk factors like hypertension, diabetes mellitus, and dyslipidemia.

5. CONCLUSIONS

Almost half of our patients had hypertension and more than half were smokers. A significant decrease in the prevalence of cardiovascular diseases can be attained by implementing adequate preventive measures and treating patient, as the risk factors for their development have long been identified. In our opinion smoking cessation could be one of the most effective secondary prevention measures as well as good blood pressure control.

Ethical Approval:

All ethical issues were approved by the author. Data collection and patients enrollment were in accordance with Declaration of Helsinki of World Medical Association , 2013 for the ethical principles of researches involving human. Signed informed consent was obtained from each participant and data were kept confidentially.

6. BIBLIOGRAPHY

1. Gao H, Wang Y, Shen A, Chen H, Li H. Acute Myocardial Infarction in Young Men Under 50 Years of Age: Clinical Characteristics, Treatment, and Long-Term Prognosis. Int J Gen Med. 2021;14:9321-31. Epub 20211204. doi: 10.2147/ijgm.S334327.

2. Gupta A, Wang Y, Spertus JA, Geda M, Lorenze N, Nkonde-Price C, et al. Trends in acute myocardial infarction in young patients and differences by sex and race, 2001 to 2010. J Am Coll Cardiol. 2014;64(4):337-45. doi: 10.1016/j.jacc.2014.04.054.

3. *Gulati R, Behfar A, Narula J, Kanwar A, Lerman A, Cooper L, et al. Acute Myocardial Infarction in Young Individuals. Mayo Clinic Proceedings. 2020;95(1):136-56. doi: 10.1016/j.mayocp.2019.05.001.*

4. *Neumann FJ, Sousa-Uva M. 'Ten commandments' for the 2018 ESC/EACTS Guidelines on Myocardial Revascularization. Eur Heart J. 2019;40(2):79-80. doi: 10.1093/eurheartj/ehy855.*

5. *Puymirat E, Cayla G, Cottin Y, Elbaz M, Henry P, Gerbaud E, et al. Twenty-year trends in profile, management and outcomes of patients with ST-segment elevation myocardial infarction according to use of reperfusion therapy: Data from the FAST-MI program 1995-2015. Am Heart J. 2019;214:97-106. doi: 10.1016/j.ahj.2019.05.007.*

6. *Schofield D, Cunich M, Shrestha R, Passey M, Veerman L, Tanton R, et al. The indirect costs of ischemic heart disease through lost productive life years for Australia from 2015 to 2030: results from a microsimulation model. BMC Public Health. 2019;19(1):802. doi: 10.1186/s12889-019-7086-5.*

7. *Darba S, Safaei N, Mahboub-Ahari A, Nosratnejad S, Alizadeh G, Ameri H, et al. Direct and Indirect Costs Associated with Coronary Artery (Heart) Disease in Tabriz, Iran. Risk Manag Healthc Policy. 2020;13:969-78. Epub 20200731. doi: 10.2147/rmhp.S261612.*

8. *Jamil G, Jamil M, Alkhazraji H, Haque A, Chedid F, Balasubramanian M, et al. Risk factor assessment of young patients with acute myocardial infarction. Am J Cardiovasc Dis. 2013;3(3):170-4.*

9. *Yunyun W, Tong L, Yingwu L, Bojiang L, Yu W, Xiaomin H, et al. Analysis of risk factors of ST-segment elevation myocardial infarction in young patients. BMC Cardiovasc Disord. 2014;14:179. Epub 20141209. doi: 10.1186/1471-2261-14-179. PubMed Central PMCID: PMC4271480.*

10. *Strong JP, Malcom GT, McMahan CA, Tracy RE, Newman WP, 3rd, Herderick EE, et al. Prevalence and extent of atherosclerosis in adolescents and young adults: implications for prevention from the Pathobiological Determinants of Atherosclerosis in Youth Study. Jama. 1999;281(8):727-35. doi: 10.1001/jama.281.8.727.*

11. *Raj M. Obesity and cardiovascular risk in children and adolescents. Indian J Endocrinol Metab. 2012;16(1):13-9. doi: 10.4103/2230-8210.91176.*

12. *Sinha SK, Krishna V, Thakur R, Kumar A, Mishra V, Jha MJ, et al. Acute myocardial infarction in very young adults: A clinical presentation, risk factors, hospital outcome index, and their angiographic characteristics in North India-AMIYA Study. ARYA Atheroscler. 2017;13(2):79-87.*

13. *Roy A, Rawal I, Jabbour S, Prabhakaran D. Tobacco and Cardiovascular Disease: A Summary of Evidence. In: Prabhakaran D, Anand S, Gaziano TA, Mbanya JC, Wu Y, Nugent R, editors. Cardiovascular, Respiratory, and Related Disorders. Washington (DC): The International Bank for Reconstruction and Development / The World Bank© 2017 International Bank for Reconstruction and Development / The World Bank.; 2017.*

14. *Martín-Timón I, Sevillano-Collantes C, Segura-Galindo A, Del Cañizo-Gómez FJ. Type 2 diabetes and cardiovascular disease: Have all risk factors the same strength? World J Diabetes. 2014;5(4):444-70. doi: 10.4239/wjd.v5.i4.444.*

15. *Tung BW, Ng ZY, Kristanto W, Saw KW, Chan SP, Sia W, et al. Characteristics and outcomes of young patients with ST segment elevation myocardial infarction undergoing primary percutaneous coronary intervention: retrospective analysis in a multiethnic Asian population. Open Heart. 2021;8(1). doi: 10.1136/openhrt-2020-001437.*

16. *Deedwania P, Kosiborod M, Barrett E, Ceriello A, Isley W, Mazzone T, et al. Hyperglycemia and acute coronary syndrome: a scientific statement from the American Heart Association Diabetes Committee of the Council on Nutrition, Physical Activity, and Metabolism. Circulation. 2008;117(12):1610-9. Epub 20080225. doi: 10.1161/circulationaha.107.188629.*

17. *Mrsic D, Smajlovic J, Loncar D, Avdic S, Avdagic M, Smajic E, et al. Risk Factors in Patients with Non-ST Segment Elevation Myocardial Infarction. Mater Sociomed. 2020;32(3):224-6. doi: 10.5455/msm.2020.32.224-226.*

18. *Gaziano TA. Economic burden and the cost-effectiveness of treatment of cardiovascular diseases in Africa. Heart. 2008;94(2):140-4. doi: 10.1136/hrt.2007.128785.*

19. *Zaman MJ, Brunner E. Social inequalities and cardiovascular disease in South Asians. Heart. 2008;94(4):406-7. doi: 10.1136/hrt.2007.127480.*

20. *Delaney EK, Murchie P, Lee AJ, Ritchie LD, Campbell NC. Secondary prevention clinics for coronary heart disease: a 10-year follow-up of a randomised controlled trial in primary care. Heart. 2008;94(11):1419-23. Epub 20080115. doi: 10.1136/hrt.2007.126144.*