ORIGINAL ARTICLE

Distribution of cardiovascular risk factors in patients with acute myocardial infarction according to age

Luis Mariano de la Torre Fonseca[1,2]*, Lin Wang[3], Ahmed Martínez Pazos[4], Lila Alicia Echevarría Sifontes[1,2], Kendry Janero Moliner[2,5]

[1]"Comandante Manuel Fajardo" University Clinical Surgical Hospital, Havana, Cuba
[2]University of Medical Sciences of Havana, Havana, Cuba
[3]San Carlos Clinical Hospital, Madrid, Spain
[4]Arzobispo Loayza National Hospital, Lima, Peru
[5]National Institute of Angiology and Vascular Surgery, Havana, Cuba

***Luis Mariano de la Torre Fonseca.** marianotorre@infomed.sld.cu

Received: 05/29/2022 - Approved: 10/27/2022

ABSTRACT

Introduction: coronary diseases cause 20% of all deaths in Europe; One of its most serious presentations is acute myocardial infarction. The presence of certain modifiable risk factors or not, play a primary role in the initial diagnosis, behavior and prognosis of this disease. Thus, a history of hypertension, diabetes mellitus, dyslipidemia, obesity, and smoking have a direct influence on the incidence and future course of acute myocardial infarction.
Objective: to determine the distribution of the different personal histories, sex according to age groups, creatinine value and left ventricular ejection fraction.
Methods: observational, retrospective, cross-sectional study of all patients admitted with acute myocardial infarction in the Intensive Coronary Care Unit of the "Manuel Fajardo" Clinical-Surgical University Hospital in Havana, between January 2016 and december 2020.
Results: the history of ischemic heart disease, arterial hypertension and diabetes mellitus were significantly associated with patients older than 65 years ($p<0.05$) as well as the presence of complications.
Conclusions: in patients diagnosed with AMI, the incidence of female sex is higher among patients 65 years of age or older, as well as a history of ischemic heart disease, hypertension and diabetes mellitus. As shown in the studies analyzed and the result of this investigation, the presence of cardiovascular complications and decreased LVEF are associated with older age.
Key words: myocardial infarction; acute coronary syndrome; cardiovascular risk factors

RESUMEN

Introducción: las enfermedades coronarias causan el 20% de todas las muertes en Europa; una de sus presentaciones más graves es el infarto agudo de miocardio. La presencia de determinados factores de riesgo modificables o no juegan un papel primordial en el diagnóstico inicial, la conducta y el pronóstico de esta enfermedad.

Los antecedentes de hipertensión arterial, diabetes mellitus, dislipidemia y obesidad y el tabaquismo influyen de manera directa en la incidencia y la futura evolución del infarto agudo de miocardio.
Objetivo: determinar la distribución de los diferentes antecedentes personales, el sexo según los grupos de edades, el valor de la creatinina y la fracción de eyección del ventrículo izquierdo.
Métodos: estudio observacional, retrospectivo, de corte transversal de todos los pacientes ingresados con infarto agudo de miocardio en la Unidad de Cuidados Coronarios Intensivos del Hospital "Manuel Fajardo" de La Habana entre enero de 2016 y diciembre de 2020.
Resultados: los antecedentes de cardiopatía isquémica, hipertensión arterial y diabetes mellitus y las complicaciones se asociaron de manera significativa con los pacientes de mayores de 65 años (p<0,05).
Conclusiones: en los pacientes con diagnóstico de infarto agudo de miocardio la incidencia del sexo femenino es mayor entre los de 65 años o más, lo mismo que los antecedentes de cardiopatía isquémica, hipertensión arterial y diabetes mellitus. Tal como se ha mostrado en los estudios analizados y el resultado de la presente investigación la presencia de complicaciones cardiovasculares y la disminución de la fracción de eyección del ventrículo izquierdo se asociaron con una mayor edad.
Palabras clave: infarto agudo del miocardio; síndrome coronario agudo; factores de riesgo cardiovasculares

INTRODUCTION

Coronary heart disease causes 20% of all deaths in Europe, with a distribution that varies according to the country;[1] one of its most serious presentations is acute myocardial infarction (AMI). It is estimated that approximately 600 000 people are diagnosed each year in the United States with AMI and 27 out of every 100 000 inhabitants die from this cause.[2] In Cuba the rate of cardiac infarction in 2019 was 64.6 per 100 000 inhabitants.[3]
Alterations in myocardial necrosis markers, accompanied by clinical manifestations and electrocardiographic changes, are essential elements for the diagnosis of AMI. The latest consensus on the fourth universal definition of myocardial infarction defines this disease as the presence of acute myocardial damage determined by the elevation of cardiac biomarkers, in the context of acute myocardial ischemia.[4] Depending on its electrocardiographic presentation, it could be with or without ST-segment elevation.
The presence of certain modifiable or non-modifiable risk factors plays a primordial role in the initial diagnosis, behavior and prognosis of this disease. Thus, a history of arterial hypertension (AHT), diabetes mellitus, dyslipidemia, obesity and smoking have a direct influence on the incidence and future course of AMI;[5] however, the distribution of these risk factors does not behave in the same way in all age groups.
Despite the high incidence of this disease in Cuba and the significant impact on patients' quality of life, the demographic characteristics of AMI and the relationship of its different risk factors with age in patients admitted with this diagnosis in this center are unknown. The present investigation was carried out with the objective of determining the distribution of the different personal histories, sex according to age groups, creatinine value and left ventricular ejection fraction (LVEF).

METHODS

Observational, retrospective, cross-sectional study of all patients admitted with AMI to the Coronary Intensive Care Unit of the Hospital Universitario Clínico-Quirúrgico "Manuel Fajardo" of Havana between January 2016 and December 2020.
The sample consisted of 259 patients consecutively admitted to the Coronary Intensive Care Unit with a diagnosis of AMI who met the inclusion and exclusion criteria.
Inclusion criteria:
1- Patients with a diagnosis of AMI.
2- Patients discharged alive from the Coronary Intensive Care Unit.
Exclusion criteria:
1- Patients in whom all the data evaluated in this study do not appear in the Coronary Intensive Care Unit database. No sampling technique was used.
Two groups were formed for the study:
Group 1: patients with a diagnosis of AMI and age less than 65 years.
Group 2: patients with the same diagnosis and age over 65 years.
AMI was defined in all patients who presented an acute coronary event and in the electrocardiogram J-point elevation, new horizontal or descending ST depression ≥ 0.5 mm in two contiguous leads or T-wave inversion > 1 mm in two contiguous leads with R wave compatible with the diagnosis of AMI according to the diagnostic criteria of the fourth universal definition of AMI,[6] elevation of markers of myocardial necrosis: troponin T or CKMB when they were performed at least three hours after symptom onset. In cases where laboratory tests (cardiac enzymes) were not available or the onset of symptoms was very early, in addition to the electrocardiographic pattern described above and the evolution of the electrical pattern of AMI, new alterations in the thickening of the heart walls on echocardiography were taken into account for the diagnosis.

Statistical analysis

The data were obtained from a database corresponding to patients admitted to the Coronary Intensive Care Unit and were entered into the IBM SPSS Statistics 25 statistical package for statistical analysis. Continuous variables were expressed as mean with its standard deviation (SD) or median (interquartile range) according to the normal or non-normal distribution of data that was evaluated by the Kolmogorov-Smirnov test. Categorical variables are presented as numbers and in hundreds.
The X^2 method was used to evaluate the statistical association between categorical variables and Fisher's exact test when less than 80% of the cells in the contingency table had expected values greater than five. In the case of continuous variables, the Student's t-test for independent samples was applied when the distribution was normal and the U-Mann Whitney test when it was not. In all cases, the confidence level was 95% and a critical or rejection zone (alpha) of 0.05 associated with the probability value p. That is, if $p<0.05$ there was statistical significance, while if $p<0.01$ it was concluded to be statistically highly significant.

Study variables

Demographic and clinical variables: age, sex, personal pathological history (ischemic heart disease, arterial hypertension, diabetes mellitus, dyslipidemia, obesity and smoking), infarct topography (anterior, inferior, lateral and posterior) and the presence of in-hospital non-lethal hemodynamic (acute heart failure, acute pulmonary edema and cardiogenic shock), electrical (atrioventricular block, supraventricular tachycardia and ventricular tachycardia) and clinical (reinfarction and post-AMI angina) complications.
Laboratory and echocardiographic variables: serum creatinine (measured in µmol/l) and left ventricular ejection fraction (LVEF).

Ethical and legal aspects

The investigators participating in this study followed the applicable ethical and legal rules, specifically the Declaration of Helsinki. Informed consent was obtained from the patients to participate in the study and approval was obtained from the hospital Ethics Committee. The research did not require significant financial or material resources.

RESULTS

All patients who were admitted with a diagnosis of AMI during the period from 2016 to 2020 were studied. Surface electrocardiograms were performed at the time of admission and in an evolving manner, control echocardiograms and laboratory tests that included cardiac biomarkers (CKMB or troponins) in the first 48 hours. Two groups were formed, group 1 with 134 patients diagnosed with AMI and age less than or equal to 65 years and group 2 with 125 patients with the same diagnosis and age over 65 years. The male sex prevailed in group 1, while in the group of patients older than 65 years there were no significant differences with respect to gender (Figure 1).

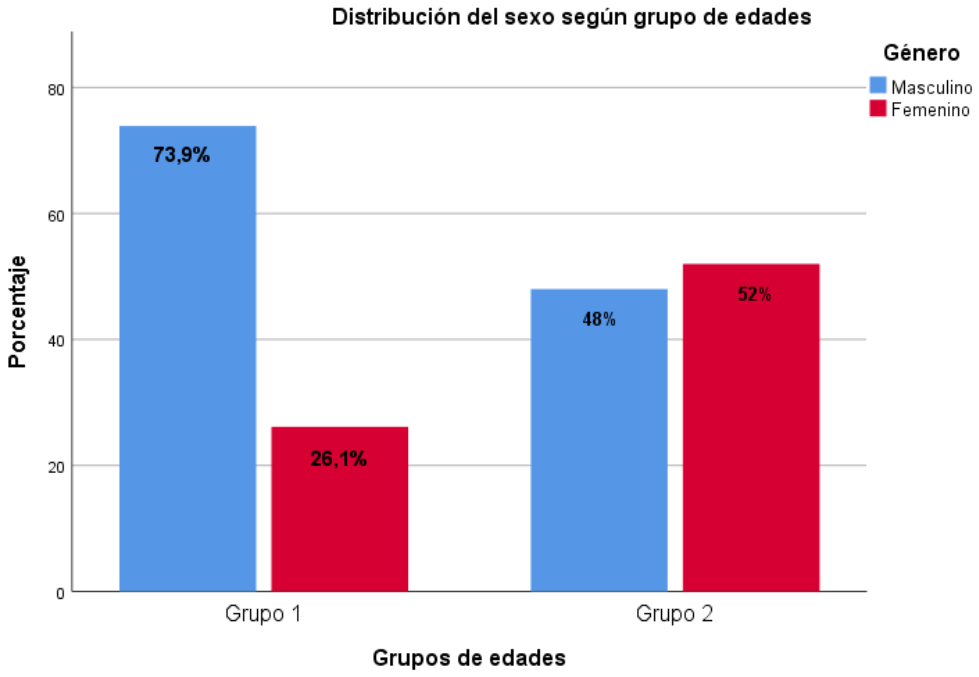

Figure 1. Gender distribution by age group

The most frequent personal pathologic antecedents included AHT (61.2% in group 1 and 79.2% in group 2), diabetes mellitus (16.4% and 32.8%) and smoking (82.1% and 46.4%). The most common topographical infarctions were anterior and inferior in both groups. Regarding non-lethal complications, hemodynamic and electrical complications prevailed: 15.2% and 12% in group 2, respectively (Table 1).

Table 1. General characteristics of the population

Variables		**Group 1 No.=134**	**Group 2 No.=125**
Age, median (IQR)		56 (51-60)	76 (70-80)
Sex	Male	99 (73.9%)	60 (48%)
	Female	35 (26.1%)	65 (52%)
Personal background	Ischemic heart disease	20 (14.9%)	45 (36%)
	AHT	82 (61.2%)	99 (79.2%)
	Diabetes mellitus	22 (16.4%)	41 (32.8%)
	Dyslipidemia	4 (3%)	5 (4%)
	Obesity	26 (19.4%)	16 (12.8%)
Toxic habits	Smoking	110 (82.1%)	58 (46.4%)
Topography	Previous	58 (43.3%)	64 (51.2%)
	Inferior	75 (56.6%)	53 (42.4%)
	Lateral	1 (0.7%)	7 (5.6%)
	Posterior	0 (0%)	1 (0.8%)
Complications	Hemodynamic	3 (2.2%)	19 (15.2%
	Electrical	13 (9.7%)	15 (12%)
	Mechanical	0 (0%)	2 (1.6%)
	Clinical	6 (4.5%)	3 (2.4%)
Creatinine value, median (IQR)		87 (74.75-98)	92 (77-110.5)
LVEF, median (IQR), mean±SD		56 (51-60)	50.26±11.294

IQR: interquartile range; SD: standard deviation

In the analysis of the possible associations between sex and cardiovascular risk factors and the different age groups, female sex was significantly more frequent among patients over 65 years of age. A history of ischemic heart disease, HT and diabetes mellitus were significantly associated with group 2; however, smoking was higher in the group of patients younger than 65 years (Table 2). The presence of nonlethal cardiovascular complications of any type was significantly associated with the group of patients older than 65 years.

Table 2. Relationship between gender, cardiovascular risk factors, and the presence of complications with age

Variables		**Group 1 <65 years**	**Group 2 >65 years**	**p**
Gender	Female	35 (26.1%)	65 (52%)	<0.001
	Male	99 (73.9%)	60 (48%)	
Personal background	Ischemic heart disease	20 (14.9%)	45 (36%)	<0.001
	AHT	82 (61.2%)	99 (79,2%)	0.002
	Diabetes mellitus	22 (16.4%)	41 (32,8%)	0.002
	Dyslipidemia	4 (3%)	5 (4%)	0.742
	Obesity	26 (19.4%)	16 (12,8%)	0.150
Toxic habits	Smoking	110 (82.1%)	58	<0.001
Presence of complications		22 (16.4%)	39 (31,2%)	0.005
LVEF, median		56	50	<0.001
Creatinine, median		122. 36	138. 19	0.089

Patients older than 65 years had a lower LVEF than those in group 1, with a significance of p<0.001 (Figure 2).

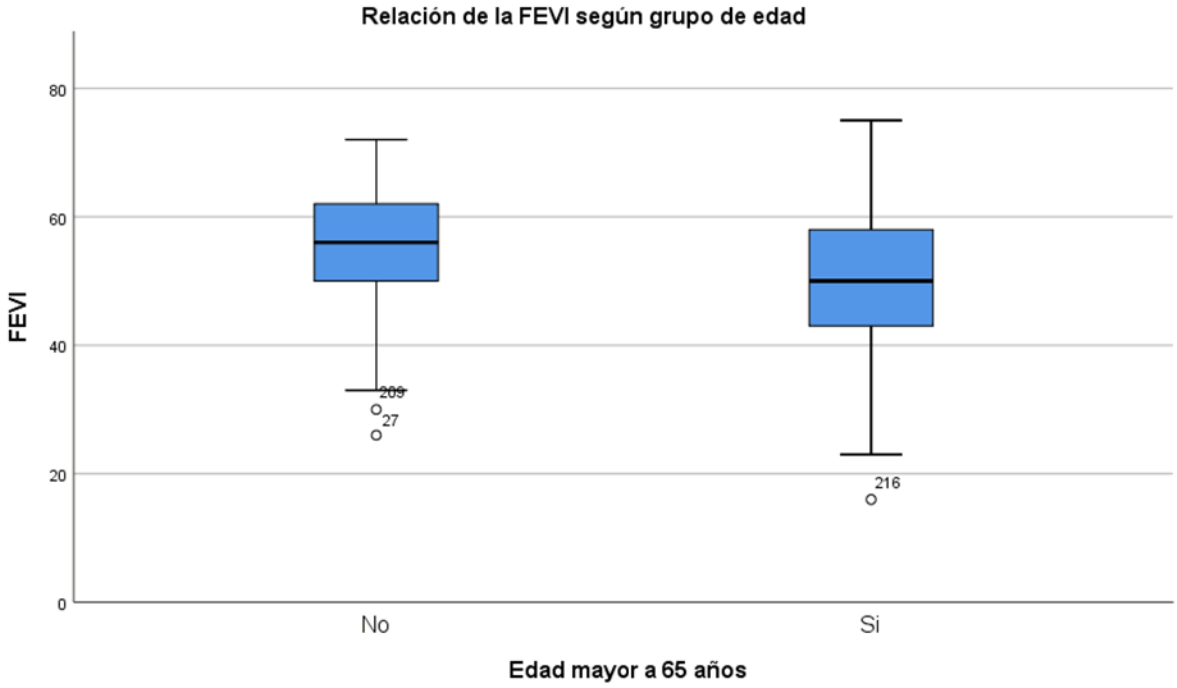

Figure 2. Relationship between LVEF and age

Table 3. Cardiovascular complications and their relationship with risk factors in the group of patients over 65 years of age

Variables		**Presence of complications**		**p**
		Yes (39)	No (86)	
Gender	Female	22 (56.4%)	43 (50%)	0.506
	Male	17 (43.6%)	43 (50%)	
Personal background	Ischemic heart disease	14 (35.9%)	32 (37.2%)	0.888
	AHT	32 (82.1%)	67 (77.9%)	0.597
	Diabetes mellitus	29 (33.7%)	12 (30.8%)	0.745
	Dyslipidemia	2 (5.1%)	3 (3.5%)	0.665
	Obesity	6 (15.4%)	10 (11.6%)	0.560
Toxic habits	Tabaquismo	19 (48.7%)	39 (45.3%)	0.726
LVEF, median		47.36	51.57	0.376
Creatinine, median (range)		65.60	61.82	0.589

Tabla 4. Cardiovascular complications and their relationship with risk factors in the group of patients under 65 years of age

Variables		**Presence of complications**		**p**
		Si (22)	No (112)	
Sexo	Female	3 (13.6%)	32 (28.6%)	0.145
	Male	19 (86.4%)	80 (71.4%)	
Personal background	Ischemic heart disease	2 (9.1%)	18 (16.1%)	0.401
	AHT	13 (59.1%)	69 (61.6%)	0.825
	Diabetes mellitus	6 (27.3%)	16 (14.3%)	0.133
	Dyslipidemia	1 (4.5%)	3 (2.7%)	0.638
	Obesity	6 (27.3%)	20 (17.9%)	0.307
Toxic habits	Tabaquismo	18 (81.8%)	92 (82.1%)	0.971
LVEF, median (range)		73.48	66.33	0.429
Creatinine, median (range)		79.20	65.20	0.122

In the analysis of the relationship of the main risk factors with the occurrence of cardiac complications, separated into two groups (older and younger than 65 years), no significant statistical associations were found (Tables 3 and 4). Cardiovascular complications had similar behavior in both groups.

DISCUSSION

Despite the increase in the incidence of AMI with age, this serious disease currently appears with some frequency at younger ages.[7,8] In series consulted, the age groups most represented correspond to those in the sixth decade of life, with heterogeneous behavior in different latitudes.[9,10] Population aging and the consequent increase in life expectancy in developed and developing countries have contributed to making this disease a real health problem at the global level.

The influence of risk factors such as AHT, diabetes mellitus and smoking on populations and their impact on the vascular endothelium and their association with atherosclerosis make them three of the main cardiovascular risk factors[11] As in the present study, other studies[12,13] have highlighted the incidence of HT, diabetes mellitus and smoking in patients diagnosed with AMI.

Although it is true that women delay the risk of suffering an infarction by approximately 10 years, they do not avoid it; factors associated with estrogen protection could justify this behavior[14,15] The results of the present study highlight the higher incidence in men before the age of 65 years, with a significant increase in women after this age. Other studies[16] in patients undergoing coronary intervention after AMI highlight the lower age of men compared to women. The results of a recent Arab registry conclude that ST-segment elevation acute coronary syndrome was more frequent among men under 65 years of age and not so among those over 65 years of age, with a significant increase among women.[17] Other studies[18,19] show that men with AMI had a lower mean age than women.

The impact of cardiovascular risk factors on cardiac muscle and their incidence is greater in older groups. Current studies underline the relationship of AHT, diabetes mellitus and smoking with age.[20] The results of the present study coincide in the incidence of these risk factors and the history of ischemic heart disease in patients over 65 years of age. In the results of other studies[21,22] the behavior of a history of infarction, HT and diabetes mellitus was significantly higher in older patients. A similar relationship appears in the "China STEMI Care Project Phase 2 (CSCAP-2)" of patients diagnosed with ST-segment elevation acute coronary syndrome.[23]

The effect of chronic diseases such as hypertension, diabetes mellitus, and smoking on the vascular endothelium, and the decrease in coronary reserve, contribute to the increase in cardiovascular complications of any type in geriatric patients.[24] Two studies[25,26] highlighted that mortality and in-hospital complications increased exponentially with age.

The LVEF, despite numerous questions, represents a rapid and simple predictor of in-hospital and out-of-hospital prognosis in patients with AMI. Its relationship with the extent and severity of infarction has been demonstrated in numerous investigations;[27] in addition, the effect of risk factors and age in this group of patients, as highlighted in the present investigation, have an

impact on ventricular function. A study that evaluated predictors of systolic dysfunction in patients with ST-segment elevation AMI showed that age older than 65 years was associated with LVEF less than 55%.[28] Other studies[29,30] found that left ventricular systolic dysfunction was more frequent in older patients with AMI.

The distribution of cardiovascular risk factors, as well as their evolution in the face of an acute coronary event varies according to age, depending on the numerous transformations that occur in the human body, as reflected in the present study, which, being a cross-sectional study, has, as its main limitation, the difficulty of establishing a causal relationship between the statistically associated risk factors.

CONCLUSIONS

In patients diagnosed with AMI, the incidence of female sex is higher among patients aged 65 years or older, as well as a history of ischemic heart disease, HT, and diabetes mellitus. As shown in the studies analyzed and the result of the present investigation, the presence of cardiovascular complications and decreased LVEF were associated with older age.

BIBLIOGRAPHIC REFERENCES

1. Mega JL, Braunwald E, Wiviott SD, Bassand JP, Bhatt DL, Bode C, et al. Rivaroxaban in patients with a recent acute coronary syndrome. N Engl J Med [Internet]. 2012 [cited 05/02/2022];366(1):9-19. Available at: https://pubmed.ncbi.nlm.nih.gov/22077192/. https://doi.org/10.1056/nejmoa1112277
2. Benjamin EJ, Virani SS, Callaway CW, Chamberlain AM, Chang AR, Cheng S, et al. Heart disease and stroke statistics-2018 update: a report from the American Heart Association. Circulation [Internet]. 2018 [cited 07/02/2022];137(12):e67-e492. Available at: https://pubmed.ncbi.nlm.nih.gov/29386200/. https://doi.org/10.1161/CIR.0000000000000558
3. Ministerio de Salud Pública. Dirección de Registros Médicos y Estadísticas de Salud. Anuario Estadístico de Salud 2020 [Internet]. La Habana: MINSAP; 2021 [cited 05/02/2022]. Available at: https://files.sld.cu/bvscuba/files/2021/08/Anuario-Estadistico-Espa%c3%b1ol-2020-Definitivo.pdf
4. Thygesen K, Alpert JS, Jaffe AS, Chaitman BR, Bax JJ, Morrow DA, et al. Fourth Universal Definition of Myocardial Infarction (2018). Circulation [Internet]. 2018 [cited 05/02/2022];138(20):e618-e651. Available at: https://pubmed.ncbi.nlm.nih.gov/30571511/. https://doi.org/10.1161/CIR.0000000000000617
5. Virani SS, Alonso A, Aparicio HJ, Benjamin EJ, Bittencourt MS, Callaway CW, et al. Heart Disease and Stroke Statistics-2021 Update: A Report From the American Heart Association. Circulation [Internet]. 2021 [cited 02/05/2022];143(8):e254-e743. Available at: https://pubmed.ncbi.nlm.nih.gov/33501848/. https://doi.org/10.1161/CIR.0000000000000950
6. Thygesen K, Alpert JS, Jaffe AS, Chaitman BR, Bax JJ, Morrow DA, et al. Consenso ESC 2018 sobre la cuarta definición universal del infarto de miocardio. Rev Esp Cardiol [Internet]. 2019 [cited 05/02/2022];72(1):72.e1-72.e27. Available at:

https://www.revespcardiol.org/es-consenso-esc-2018-sobre-cuarta-articulo-S0300893218306365. https://doi.org/10.1016/j.recesp.2018.11.011
7. 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 [Internet]. 2017 [cited 05/02/2022];13(2):79-87. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5628855/
8. Yandrapalli S, Nabors C, Goyal A, Aronow WS, Frishman WH. Modifiable Risk factors in young adults with first myocardial infarction. J Am Coll Cardiol [Internet]. 2019 [cited 05/02/2022];73(5):573-584. Available at: https://pubmed.ncbi.nlm.nih.gov/30732711/. https://doi.org/10.1016/j.jacc.2018.10.084
9. Kim JH, Chae SC, Oh DJ, Kim HS, Kim YJ, Ahn Y, et al. Multicenter Cohort study of acute myocardial infarction in Korea- interim analysis of the Korea Acute Myocardial Infarction Registry–National Institutes of Health Registry. Circ J [Internet]. 2016 [cited 05/02/2022];80(6):1427-1436. Available at: https://pubmed.ncbi.nlm.nih.gov/27118621/. https://doi.org/10.1253/circj.CJ-16-0061
10. Johansson S, Rosengren A, Young K, Jennings E. Mortality and morbidity trends after the first year in survivors of acute myocardial infarction: a systematic review. BMC Cardiovasc Disord [Internet]. 2017 [cited 05/02/2022];17(1):53. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5297173/. https://doi.org/10.1186/s12872-017-0482-9
11. Konukoglu D, Uzun H. Endothelial Dysfunction and Hypertension. Adv Exp Med Biol [Internet]. 2017 [cited 05/02/2022];956:511-540. Available at: https://pubmed.ncbi.nlm.nih.gov/28035582/. https://doi.org/10.1007/5584_2016_90
12. Khan AA, Chung MJ, Novak E, Brown DL. Increased hazard of myocardial infarction with insulin-provision therapy in actively smoking patients with diabetes mellitus and stable ischemic heart disease: The BARI 2D (bypass angioplasty revascularization investigation 2 diabetes) trial. J Am Heart Assoc [Internet]. 2017 [cited 05/02/2022];6(9):e005946. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5634262/. https://doi.org/10.1161/JAHA.117.005946
13. Nordlund D, Engblom H, Bonnet JL, Hansen HS, Atar D, Erlinge D, et al. Gender but not diabetes, hypertension or smoking affects infarct evolution in ST-elevation myocardial infarction patients - data from the CHILL-MI, MITOCARE and SOCCER trials. BMC Cardiovasc Disord [Internet]. 2019 [cited 05/02/2022];19(1):161. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6610840/. https://doi.org/10.1186/s12872-019-1139-7
14. Iorga A, Cunningham CM, Moazeni S, Ruffenach G, Umar S, Eghbali M. The protective role of estrogen and estrogen receptors in cardiovascular disease and the controversial use of estrogen therapy. Biol Sex Differ [Internet]. 2017 [cited 05/02/2022];8(1):33. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5655818/. https://doi.org/10.1186/s13293-017-0152-8
15. Franco Y, Mendoza-Fernández V, Lemini C. Mecanismos de acción de los efectos protectores de los estrógenos sobre el sistema cardiovascular. Rev Fac Med UNAM [Internet]. 2003 [cited 05/02/2022];46(3):101-108. Available at: https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=6049
16. Fransoo RR, Martens PJ, Prior HJ, Burland E, Château D, Katz A. Age difference explains gender difference in cardiac intervention rates after acute myocardial infarction. Healthc Policy [Internet]. 2010 [cited 05/02/2022];6(1):88-103. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2929899/

17. Shehab A, Bhagavathula AS, Alhabib KF, Ullah A, Suwaidi JA, Almahmeed W, et al. Age-Related sex differences in clinical presentation, management, and outcomes in ST-segment-elevation myocardial infarction: pooled analysis of 15 532 Patients From 7 Arabian Gulf Registries. J Am Heart Assoc [Internet]. 2020 [cited 05/02/2022];9(4):e013880. Available at: https://www.ahajournals.org/doi/full/10.1161/JAHA.119.013880. https://doi.org/10.1161/JAHA.119.013880
18. Tomassini F, Cerrato E, Rolfo C, Bianco M, Lo Savio L, Quirós A, et al. Diferencias relacionadas con el sexo en pacientes con IAMCEST: análisis por puntuación de propensión. REC Interv Cardiol [Internet]. 2020 [cited 05/02/2022];2(1):15-21. Available at: https://dialnet.unirioja.es/servlet/articulo?codigo=7877415. https://doi.org/10.24875/RECIC.M19000072
19. Lee CY, Liu KT, Lu HT, Mohd Ali R, Fong AYY, Wan Ahmad WA. Sex and gender differences in presentation, treatment and outcomes in acute coronary syndrome, a 10 year study from a multi-ethnic Asian population: The Malaysian National Cardiovascular Disease Database-Acute Coronary Syndrome (NCVD-ACS) registry. PLoS One [Internet]. 2021 [cited 05/02/2022];16(2):e0246474. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7869989/. https://doi.org/10.1371/journal.pone.0246474
20. Anh DT, Minh HV, Binh HA, Bao TQ, Hai NTT, Nam LX, et al. Age Related differences in acute coronary syndrome: an observation at a Central Hospital in Vietnam. J Transl Int Med [Internet]. 2021 [cited 05/02/2022];9(1):32-37. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8016352/. https://doi.org/10.2478/jtim-2021-0012
21. Bush N, Sharma YP, Prasad K, Kumar P, Mehrotra S. Comparison of demographic profile, risk factors, and in-hospital outcome in young and old patients with acute coronary syndrome: A single-center experience. J Family Med Prim Care [Internet]. 2021 [cited 05/02/2022];10(2):871-876. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8138388/. https://doi.org/10.4103/jfmpc.jfmpc_1975_20
22. Claussen PA, Abdelnoor M, Kvakkestad KM, Eritsland J, Halvorsen S. Prevalence of risk factors at presentation and early mortality in patients aged 80 years or older with ST-segment elevation myocardial infarction. Vasc Health Risk Manag [Internet]. 2014 [cited 05/02/2022];10:683-9. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4266339/. https://doi.org/10.2147/VHRM.S72764
23. Chen S, Che Q, Zheng Q, Zhang Y, Jia J, Wu Y, et al. Relationship between different risk factor patterns and follow-up outcomes in patients with ST-segment elevation myocardial infarction. Front Cardiovasc Med [Internet]. 2021 [cited 05/02/2022];8:633992. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8185218/. https://doi.org/10.3389/fcvm.2021.633992
24. Oliveros E, Patel H, Kyung S, Fugar S, Goldberg A, Madan N, et al. Hypertension in older adults: Assessment, management, and challenges. Clin Cardiol [Internet]. 2020 [cited 05/02/2022];43(2):99-107. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7021657/. https://doi.org/10.1002/clc.23303
25. Gharacholou SM, Lopes RD, Alexander KP, Mehta RH, Stebbins AL, Pieper KS, et al. Age and outcomes in ST-segment elevation myocardial infarction treated with primary percutaneous coronary intervention: findings from the APEX-AMI trial. Arch Intern Med [Internet]. 2011 [cited 05/02/2022];171(6):559-67. Available at: https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/226948. https://doi.org/10.1001/archinternmed.2011.36

26. Vázquez-Oliva G, Zamora A, Ramos R, Marti R, Subirana I, Grau M, et al. Acute myocardial infarction population incidence and mortality rates, and 28-day case-fatality in older adults. The REGICOR Study. Rev Esp Cardiol (Engl Ed) [Internet]. 2018 [cited 05/02/2022];71(9):718-725. Available at: https://pubmed.ncbi.nlm.nih.gov/29174866/. https://doi.org/10.1016/j.rec.2017.10.019
27. Maury S, Jordán A, Torres L, Martínez M, Slart R, Juárez L, et al. Fracción de eyección del ventrículo izquierdo: Correlación con el tamaño del infarto y la reserva de perfusión miocárdica posinfarto agudo de miocardio. Arch Cardiol Méx [Internet]. 2013 [cited 05/02/2022];83(supl 3):28. Available at: https://www.elsevier.es/es-revista-archivos-cardiologia-mexico-293-pdf-X1405994013548294
28. Chen ZW, Yu ZQ, Yang HB, Chen YH, Qian JY, Shu XH, et al. Rapid predictors for the occurrence of reduced left ventricular ejection fraction between LAD and non-LAD related ST-elevation myocardial infarction. BMC Cardiovasc Disord [Internet]. 2016 [cited 05/02/2022];16:3. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4700617/. https://doi.org/10.1186/s12872-015-0178-y
29. Bortnick AE, Shahid M, Shitole SG, Park M, Broder A, Rodriguez CJ, et al. Outcomes of ST-elevation myocardial infarction by age and sex in a low-income urban community: The Montefiore STEMI Registry. Clin Cardiol [Internet]. 2020 [cited 05/02/2022];43(10):1100-1109. Available at: https://onlinelibrary.wiley.com/doi/10.1002/clc.23412. https://doi.org/10.1002/clc.23412
30. Siddiqui AJ, Holzmann MJ. Association between reduced left ventricular ejection fraction following non-ST-segment elevation myocardial infarction and long-term mortality in patients of advanced age. Int J Cardiol [Internet]. 2019 [cited 05/02/2022];296:15-20. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0167527319325306. https://doi.org/10.1016/j.ijcard.2019.07.019

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

CONTRIBUTION OF THE AUTHORS

LMTF: conceptualization, methodology, validation, writing (revising and editing).
LAES: data curation, writing the original draft.
LW: formal analysis, supervision.
AMP: methodology, writing (reviewing and editing).
KJM: research, writing the original draft.