Journal of Vessels and Circulation
Qom University of Medical Sciences
Spring 2021. Volume 2. Number 2

Research Paper

Epidemiology and Risk Factorsof Patients with Acute Coronary Syndrome

Farbod Ebadi Fard Azar[1], ***Saeed Sheikh Gholami**[2], **Aziz Rezapour**[2]

1. Health Promotion Research Center, Iran University of Medical Sciences, Tehran, Iran.
2. Health Management and Economics Research Center, Iran University of Medical Sciences, Tehran, Iran.

Use your device to scan and read the article online

Please cite this article as Ebadi Fard Azar F, Sheikh Gholami S, Rezapour A. Epidemiology and Risk Factorsof Patients with Acute Coronary Syndrome. Journal of Vessels and Circulation. 2021; 2 (2):77-84. http://dx.doi.org/10.32598/JVC.2.2.85.1

http://dx.doi.org/10.32598/JVC.2.2.85.1

Article info:
Received: 30 Jun 2021
Accepted: 04 Sep 2021
Publish: 01 Apr 2021

Keywords:
Cardiovascular disease, Acute coronary syndrome, Non-ST elevation myocardial infarction, ST-elevation myocardial infarction, Angina, Unstable

ABSTRACT

Background and Aim: Cardiovascular disease (CVD) is the most important cause of death worldwide. The incidence and outcome of risk factors differ by type of acute coronary syndrome (ACS). The aim of the present study was to determine the epidemiology and risk factors of patients with ACS in Iran.

Materials and Methods: This is a cross-sectional descriptive study, which was conducted at the Heart Center Hospital, Iran on patients presenting with ACS for a period of one year. An interviewer collected data using an administered data collection form, and epidemiological patterns and risk factors were analyzed by SPSS. One-way analysis of variance (ANOVA) and Chi-square test were used to analyze the hypothesized patterns.

Results: The sample included 710 patients diagnosed with ACS, with Mean±SD age of 60.4±10.27 years, of whom 509 cases (71%) were men and 201 cases (29%) were women. Regarding the type of ACS, 51% of patients were diagnosed with unstable angina (UA), 22% with non-ST elevation myocardial infarction (NSTEMI), and 27% with ST-elevation myocardial infarction (STEMI). Nearly, 37% of cases with STEMI diagnosis, 22.6% with NSTEMI diagnosis, and 16.3% with UA diagnosis were smokers, which indicates a significant association between smoking and STEMI diagnosis (P=0.003). According to the body mass index, a large percentage of the patients were overweight (49%) and only 20.7% had normal body weight. Almost 60% of cases with UA diagnosis, 57% with NSTEMI diagnosis, and 50.5% with STEMI diagnosis had hypertension (HT) (P=0.455), indicating no significant association between hypertension and UA, NSTEMI, and STEMI. About 59% of patients with NSTEMI, 53.2% of patients with UA, and 52% of patients with STEMI had dyslipidemia (P=0.569), indicating no significant association between dyslipidemia and UA, NSTEMI, and STEMI. About 40% of cases with NSTEMI, 37% with STEMI, and 33% with UA diagnosis had diabetes mellitus (P=0.508), indicating no significant association between diabetes mellitus and UA, NSTEMI, and STEMI.

Conclusion: Regarding the occurrence and effect of risk factors, there are three types of ACS. It is necessary to plan to enhance the health level of these patients. Therefore, patients with ACS need special attention in order to be identified and treated as soon as possible.

*** Corresponding Author:**
Saeed Sheikh Gholami, PhD.
Address: *Health Management and Economics Research Center, Iran University of Medical Sciences, Tehran, Iran.*
Phone: *+98 (21) 77881811*
E-mail: *saeedgholami1970@gmail.com*

Journal of Vessels and Circulation
Qom University of Medical Sciences

1. Introduction

Cardiovascular disease (CVD), especially acute coronary syndrome (ACS), is the most important cause of death worldwide [1-3]. About 70% of CVD deaths happen in low- and middle-income countries. One reason is that people living in these countries are more exposed to risk factors, such as smoking and alcohol. At the same time, they often do not have the knowledge of prevention programs compared to people in high-income countries. In addition, they have less availability to equitable well-being care services that meet their needs. As a result, many people in countries die from CVDs and other non-communicable diseases, diseases at young ages, often in their productive years [4, 5].

About 25 million people died due to CVD in 2020 [6]. In the USA, about five million patients go to the emergency to check for chest pain and other relevant symptoms every year [7]. Also, 10% of patients have myocardial infarction and 50% have unstable angina (UA) [8]. CVD is the most common cause of mortality and accounts for about 46% of deaths [9]. In Iran, CVD prevalence is increasing [10]. CVDs pose a high burden on the health systems worldwide and these diseases are one of the most preventable human non-communicable diseases [11]. ACSs affect different physical, social, and economic aspects of patients' life [12]. Several studies have shown that South Asians experience higher mortality rates [13, 14].

ACS is a spectrum of clinical signs and symptoms of coronary heart failure, including non-ST elevation myocardial infarction (NSTEMI), ST-elevation myocardial infarction (STEMI), and UA [15, 16].

ACS is a term used to describe a range of conditions associated with sudden, reduced blood flow to the heart. Such a condition is a heart attack (myocardial infarction) — when cell death results in damaged or destroyed heart tissue. Factors, such as the family history of heart disease and advanced age have been identified as non-modifiable risk factors, and factors, such as smoking, hypertension, diabetes, and obesity have been identified as modifiable risk factors [17].

Awareness about ACS leads to understanding rational prioritization and more suitable planning by the health system [18, 19]. The aim of the present study was to determine the epidemiology and risk factors of patients with ACS in Iran.

2. Materials and Methods

Study type

A cross-sectional descriptive study was performed among patients diagnosed with ACS presenting to the medical ward, Heart Center Hospital, in 2019.

Study population, inclusion, and exclusion criteria

The study population consisted of a total of 710 patients (aged between 40 and 90 years), who received inpatient with ACS during 2019. This disease was diagnosed and classified according to the American College of Cardiology American Heart Association and was categorized into three types of NSTEMI, STEMI, and UA [20, 21].

Data analysis

The data were coded and entered into an excel datasheet and analyzed using SPSS software v. 20.2. A univariate analysis was conducted initially and for selected variables, a bivariate analysis was conducted subsequently. The X2 test for nominal scale data was used to identify statistical significance. One-way analysis of variance (ANOVA) was used to compare differences in age between three ACS groups. As the P-value was non-significant, no post hoc tests were used. A probability of less than 0.05 was used to ascertain statistical significance.

3. Results

The total sample consisted of 710 patients presenting with ACS, with Mean±SD age of 60.4±10.27 years. Of the total of 710 patients diagnosed with ACS, 363 cases (51%) had UA, 155 cases (22%) had NSTEMI, and 192 cases (27%) had STEMI. In NSTEMI patients, 102 cases (66%) were men whereas 142 cases (74%) of the STEMI patients were men and 265 cases (73%) of UA patients were men. Thus, the male sex showed a higher association with three types of ACS (Figute 1 and Table 1).

One-way analysis, bChi-square test

The highest percentage of UA (39.3%) and NSTEMI (37.8%) patients belonged to the 60–69 age group. Also, the highest percentage of STEMI patients (44.3%) aged between 50 and 59 years (Figure 2). The higher Mean±SD age was 62±10.3 years in NSTEMI patients, 61±9.4 years in UA patients, and 56.8±10.7 years in STEMI patients with a significant statistical difference (P=0.002) (Table 1).

Table 1. Patient baseline characteristics by type of ACS

Characteristics		Mean±SD/No.(%)			
		UA	NSTEMI	STEMI	P
Number of patients		363(51%)	155(22%)	192(27%)	-
Gender	Men	265(73%)	102(66%)	142(74%)	-
	Women	98(27%)	53(34%)	50(26%)	-
Age (y)		61±9.4	62±10.3	56.8±10.7	0.002a
Current smoker		59(16.3%)	35(22.6%)	71(37%)	0.003b
BMI (kg/m^2)	Normal weight	83(22.9%)	31(20%)	37(19.2%)	0.174b
	Overweight	173(47.6%)	77(49.7%)	95(49.5%)	0.296b
	Obese	107(29.5%)	47(30.3%)	60(31.3%)	0.459b
Comorbidity history	Hypertension	218(60%)	88(56.8%)	97(50.5%)	0.455b
	Dyslipidemia	193(53.2%)	91(58.7%)	100(52%)	0.569b
	Diabetes mellitus	119(32.8%)	62(40%)	71(37%)	0.508b

BMI: body mass index; UA: unstable angina; NSTEMI: non-ST elevation myocardial infarction; STEMI: STelevation myocardial infarction.

Out of 710 patients, 165 were regular smokers. Moreover, 37% of STEMI, 22.6% of NSTEMI, and 16.3% of UA patients were smokers, which indicates that smoking is a risk factor for STEMI compared to NSTEMI and UA (P=0.003) (Figure 3).

According to body mass index, 79.3% of ACS patients weighed more than normal limits; with 49% being overweight (49.7% of NSTEMI, 49.5% of STEMI, and 47.6% of UA patients, P=0.296) and 30.3% being obese (31.3% of STEMI, 30.3% of NSTEMI, and 29.5% of UA patients, P=0.459). Only 20.7% of patients were considered to be of normal weight (22.9% of UA, 20% of NSTEMI, and 19.2% of STEMI patients, P=0.174).

Among 710 patients, 403 cases (56%) had HT, 384 cases (55%) had dyslipidemia, and 252 cases (36.5%) had DM. Also, 60% of UA patients, 56.8% of NSTEMI patients, and 50.5% of STEMI patients had HT (P=0.455); there was no significant association between HT in the three types of diagnosis. About 53% of patients with UA, 58.4% with NSTEMI, and 52% with STEMI had dyslipidemia (P=0.569) without any significant association between dyslipidemia and three types of diagnosis. Around 33% of UA, 40% of NSTEMI, and 37% of STEMI patients had DM (P=0.508); indicating no significant association between DM with UA, NSTEMI, and STEMI (Table 1).

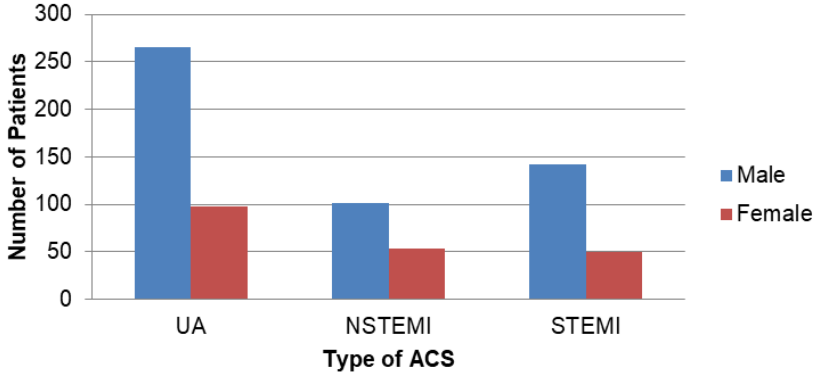

Figure 1. Gender distribution by type of diagnosed Acute Coronary Syndrome

Journal of Vessels and Circulation
Qom University of Medical Sciences

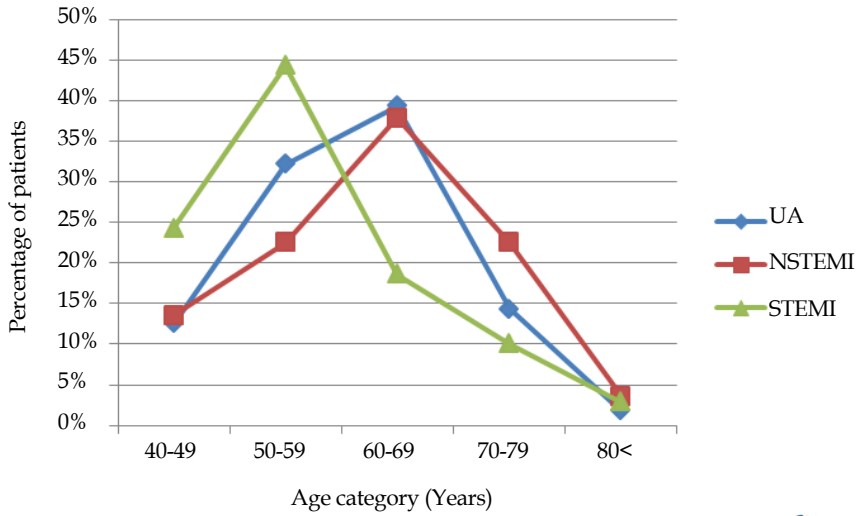

Figure 2. Age distribution of the study population by the type of diagnosed Acute Coronary Syndrome

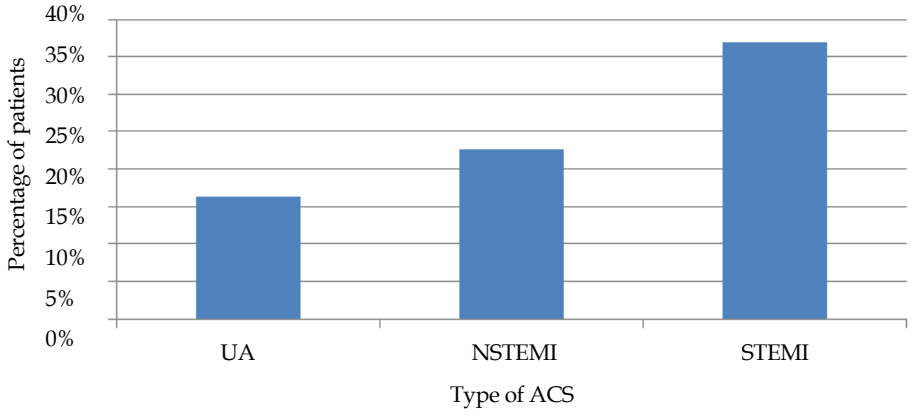

Figure 3. Association of smoking with the type of Acute Coronary Syndrome

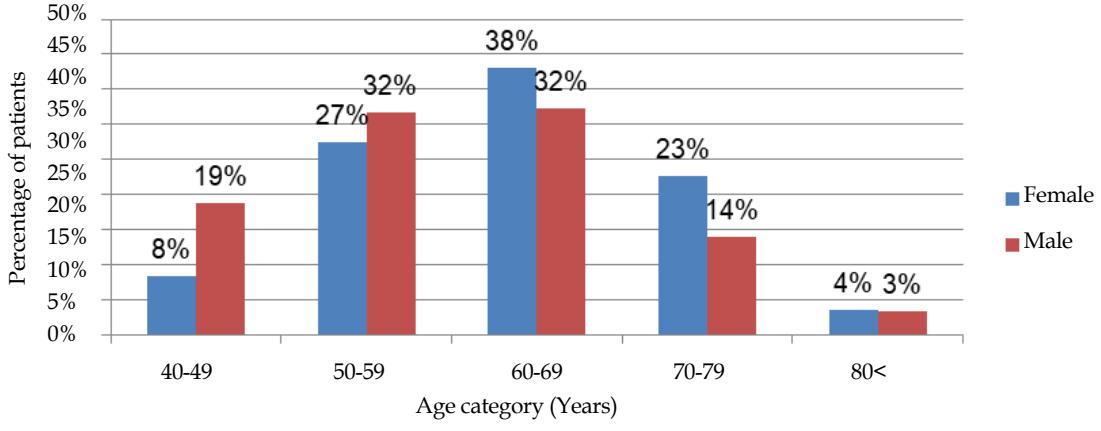

Figure 4. Distributionof Patients with Acute Coronary syndrome by age and sex

The distribution of the patients by age and sex is shown in Figure 4. The highest percentage of men presenting with an ACS was in the 50-59 and 60-69 age groups, while the highest percentage of women was in the 60-69 age group. A total of 82.7% of patients with STEMI in this study underwent reperfusion therapy (medical reperfusion and mechanical reperfusion). Medical reperfusion was used to treat 29.5% of patients with STEMI, while only 53.2% of STEMI patients were treated with mechanical reperfusion and17.3% of STEMI patients were treated with CABG.

Coronary angiography was performed in 71.6% of ACS patients during their hospitalization (72% of men and 71.2% of women). Furthermore, coronary angiography was performed in 59% of men and 52% of women with UA, in 68.5% of men and 78.9% of women with NSTEMI, and in 89% of men and 82.8% of women with STEMI.

The mean duration of hospitalization for ACS patients was 7.5 days. The mean hospital stays for UA and NSTEMI patients were 9.6 days and 8.1 days, respectively, while patients with STEMI were hospitalized for a significantly shorter duration, with a mean duration of 5.6 days. No deaths were recorded among patients younger than 59 years. The mortality rate of STEMI and NSTEMI was 2% and 1.6%, respectively. The death rate for UA patients was 1.5%.

Aspirin was prescribed to 86% of patients, statins to 84.2%, pantoprazole to 69.8%, clopidogrel to 61.5%, angiotensin-converting enzyme (ACE) inhibitors to 59.3%, β-blockers to 51.7%, and diuretics to 29% of patients.

4. Discussion

The present study analyzed the epidemiological and clinical characteristics, as well as the in-hospital course and therapeutic approach of inpatients with ACS in Iran, during a one-year period. Epidemiological and risk factor studies in Asian countries have led to important conclusions regarding the type of presentation and the treatment of ACS [13, 14, 22-27].

The ACCESS group showed that 46% of ACS cases in developing countries are STEMI and 54% are NSTEMI/UA [28]. Ralapanawa et al. in 2014 showed that 25.7% of ACS cases were STEMI, 36.7% were NSTEMI, and 37.7% were UA [24], while our study in 2019 showed that 27% of ACS cases were STEMI, 22% were NSTEMI, and 51% was UA.

Sharma et al. pointed out a higher Mean±SD age of 60.07±10.47 years among cases with NSTEMI compared to 57.76±11.44 years for STEMI cases with no statistically significant difference (P=0.103) [29]. Our study showed a slightly higher Mean±SD age for NSTEMI (62±10.3 years) and UA (61±9.4 years) compared to STEMI (56.8±10.7 years) but with a statistically significant difference (P=0.002).

In the present study, nearly 71% of patients with ACS were men, and the male gender was strongly associated with all three types of ACS compared to the female gender. Also, a study in Nepal showed a strong association between ACS and male gender (75.7%) [30]. This male preponderance was seen in an Interheart study (76%) and was also observed in the South Asian cohort (85%) [31].

In our study, the highest proportion of patients with NSTEMI (37.8%) and UA (39.3%) aged 60-69 years, and the highest percentage of STEMI patients (44.3%) aged 50-59 years. Medagama et al. reported no significant difference in the age distribution of patients, with the majority being between 51 and 70 years [23].

Smoking is a risk factor for heart disease and about 30% of all deaths from inpatients were found to be attributed to smoking [32]. In our study, out of 710 patients, 165 cases (25%) were regular smokers. Our study further showed smoking (P=0.003) to be more significantly associated with STEMI than NSTEMI and UA. Similarly, Medagama et al., Sharmaet al., and Ralapanawa et al. also showed that smoking is more common in STEMI patients [23, 24, 29]. Multivariate analysis showed that current smoking and increased apolipoprotein B100/apolipoprotein A-I ratio, followed by a history of DM, HT, and psychosocial factors were the two strongest risk factors. Rare novel risk factors were high inflammatory markers and homocysteine levels [33].

According to the body mass index, a large percentage of the patients were overweight or obese (79.3%) and only 20.7% had normal body weight. The prevalence of these risk factors among the ACS population in the study was similar to the Cyprus population with ACS [34].

Hypertension was a risk factor with 403 (56%) patients being hypertensive. In a study, the prevalence of hypertension in the South Asian cohort was 31.1%, which is much lower than our study. Also, a study in India [22] reported 48.8% of cases with HT and another study reported 44.7% of cases with HT [24]. The results of our study were approximately similar to the findings of both studies, which showed ACS to be hypertensive.

Journal of Vessels and Circulation
Qom University of Medical Sciences

Diabetes was found in 36.5% of the study population compared to a study in India reported 35.5% and another study in Sri Lanka reported 29% of diabetes prevalence among the population [22, 24]. Diabetes did not show a significant association with the type of ACS in our study in contrast to Sharma et al.'s study, which showed DM to be significantly associated with NSTEMI. Similar to Ralapanawa et al.'s study, our study showed no significant association between diabetes with the type of ACS [24, 29].

Our study showed that 55% of ACS patients had dyslipidemia, whereas an Indian study showed that almost 38% of ACS patients had dyslipidemia. In addition, a study in Sri Lanka showed 18% of ACS patients with dyslipidemia [24].

A total of approximately 83% of patients with STEMI in this study underwent reperfusion therapy. Specifically, 29.5% of STEMI patients were treated with medical reperfusion, and 53.2% with mechanical reperfusion. A study on the reperfusion treatment of STEMI in 30 European countries showed that overall reperfusion therapy (thrombolysis or primary angioplasty) was utilized for 37% to 92% of patients [35].

Coronary angiography was performed on 71.6% of ACS patients during their hospitalization (72% of men and 71.2% of women). Antoniades et al. also showed that coronary angiography was utilized for 69.1% of ACS patients with 72.8% of them being men and 44.2% being women [34].

The percentage of patients receiving aspirin and statins at discharge showed a similar percentage to that in the HELIOS study (86% vs. 88% and 84.2% vs.82%, respectively). While the β-blockers were prescribed for a lower percentage of patients in our study than in the HELIOS study (51.7% vs. 69.8%) [36]. In our study, the mortality rate was 1.7%, and the mean hospital stay was 7.5 days. Ralapanawa et al. in 2014 reported two deaths (0.7%) and the average hospital stay to be 4.2±1.3 days [24].

5. Conclusion

The incidence and outcome of risk factors differ by type of ACS. Smoking is significantly associated with STEMI. A large percentage of the patients were overweight and obese. Patients with UA and NSTEMI had higher rates of hypertension. Patients with NSTEMI suffered more from dyslipidemia and diabetes mellitus in comparison to the patients with STEMI or UA. More studies are required to understand the epidemiology and risk factors of ACS, particularly at regional levels as they can differ from one region to another.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics committee of the Iran University of Medical Sciences (Code: 97-02-136-33863).

Funding

This study was part of a PhD thesis supported by Iran University of Medical Sciences.

Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

Acknowledgments

This study was part of a PhD thesis supported by the Iran University of Medical Sciences (Grant No.: IUMS/SHMIS-97-02-136-33863). The authors would like to thank the Iran University of Medical Sciences.

References

[1] Dehghani M, Eshraghi A, Shakeri M, Fallah Rastgar A, Hoshmand G. [Influence of various factors on response to streptokinase therapy for acute myocardial infarction (Persian)]. Medical Journal Of Mashhad University Of Medical Sciences. 2011; 54 (2):113-9. [DOI:10.22038/mjms.2011.5354]

[2] Adavi A, Fathi Marghmalaki R, Madmoli Y, Fathi Marghmalaki R, Madmoli M. [the effect of stress management on anxiety of females with hypertension (Persian)]. IJNR. 2016; 11 (5):7-12. [DOI:10.21859/ijnr-11052]

[3] Madmoli M, Eilami O, Rezaie K, Aliabad MA, Moslemirad M. [Diabetes and the risk of suffering cardiovascular diseases: A two-year retrospective study (Persian)]. IJEES. 2018; 8 (3):649-56v. [DOI:10.31407/ijees]

[4] WHO. Noncommunicable diseases: Mortality [Internet]. World Health Organisation. 2016. https://www.who.int/data/gho/data/themes/topics/topic-details/GHO/ncd-mortality

[5] Gholami SS, Azar FEF, Rezapour A, Tajdini M. [Cost-effectiveness of coronary artery bypass graft and percutaneous coronary intervention compared to medical therapy in patients with coronary artery disease: A systematic review

(Persian)]. Heart Fail Rev. 2019; 24 (6):967-75. [DOI:10.1007/s10741-019-09811-3][PMID].

[6] Majidi S, Moghadam nia M, Sharifi M. [Comparison of signs and symptoms associated with acute coronary syndrome in male and female patients (Persian)]. Jour of gums. 2012; 20 (80):60-6. http://journal.gums.ac.ir/article-1-120-en.html

[7] McCaig LF, Burt CW. National hospital ambulatory medical care survey: 2001 emergency department summary. Adv Data. 2003; (335):1-29. [PMID]

[8] Hamm CW, Bertrand M, Braunwald E. Acute coronary syndrome without ST elevation: Implementation of new guidelines. Lancet. 2001; 358 (9292):1533-8. [DOI:10.1016/S0140-6736 (01)06585-0][PMID]

[9] Sharifirad G, Mohebbi S, Matlabi M. [The relationship of physical activity in middle age and cardiovascular problems in old age in retired people in Isfahan, 2006 (Persian)]. Horizon Med Sci. 2007; 13 (2):57-63. http://hms.gmu.ac.ir/article-1-167-en.html

[10] Talaei M, Sarrafzadegan N, Sadeghi M, Oveisgharan S, Marshall T, Thomas GN, et al. [Incidence of cardiovascular diseases in an Iranian population: The Isfahan cohort study (Persian)]. Arch Iran Med. 2013; 16 (3):138-44. [PMID]

[11] Ikeda A, Iso H, Toyoshima H, Fujino Y, Mizoue T, Yoshimura T, et al. Marital status and mortality among Japanese men and women: The Japan collaborative cohort study. BMC Public Health. 2007; 7:73. [DOI:10.1186/1471-2458-7-73] [PMID][PMCID]

[12] Panthee B, Kritpracha C. Review: Anxiety and quality of life in patients with myocardial infarction. Nurse Media Journal of Nursing. 2011; 1 (1):105-15. [DOI:10.14710/nmjn.v1i1.750] https://ejournal.undip.ac.id/index.php/medianers/article/view/750

[13] Hughes LO, Raval U, Raftery EB. First myocardial infarctions in Asian and white men. BMJ. 1989; 298 (6684):1345-50. [DOI:10.1136/bmj.298.6684.1345][PMID] [PMCID]

[14] Ghaffar A, Reddy KS, Singhi M. Burden of non-communicable diseases in South Asia. BMJ. 2004; 328 (7443):807-10. [DOI:10.1136/bmj.328.7443.807][PMID] [PMCID]

[15] Bozkurt B, Hershberger RE, Butler J, Grady KL, Heidenreich PA, Isler ML, et al. 2021 ACC/AHA key data elements and definitions for heart failure: A report of the American college of cardiology/American heart association task force on clinical data standards (writing committee to develop clinical data standards for heart failure). J Am Coll Cardiol. 2021; 77 (16):2053-150. [DOI:10.1016/j.jacc.2020.11.012] [PMID]

[16] Thygesen K, Alpert JS, Jaffe AS, Chaitman BR, Bax JJ, Morrow DA, et al. Fourth universal definition of myocardial infarction (2018). European Heart Journal. 2019; 40 (3):237–69. [DOI:10.1093/eurheartj/ehy462] https://academic.oup.com/eurheartj/article/40/3/237/5079081#

[17] Longmore M, Wilkinson I, Baldwin A, Wallin E. Oxford handbook of clinical medicine-mini edition. OUP Oxford; 2014. https://books.google.com/books/about/Oxford_Handbook_of_Clinical_Medicine.html?id=-tDQAgAAQBAJ

[18] Ahmadi A, Soori H, Sajjadi H. [Modeling of in hospital mortality determinants in myocardial infarction patients, with and without type 2 diabetes, undergoing pharmacoinvasive strategy: The first national report using two approaches in Iran (Persian)]. Diabetes Res Clin Pract. 2015; 108 (2):216-22. [DOI:10.1016/j.diabres.2015.02.018][PMID]

[19] Pedigo A, Aldrich T, Odoi A. Neighborhood disparities in stroke and myocardial infarction mortality: A gis and spatial scan statistics approach. BMC Public Health. 2011; 11:644. [DOI:10.1186/1471-2458-11-644][PMID] [PMCID]

[20] Anderson JL, Adams CD, Antman EM, Bridges CR, Califf RM, Casey DE Jr, et al. 2011 writing group members; ACCF/AHA task force members. 2011 ACCF/AHA focused update incorporated into the ACC/AHA 2007 guidelines for the management of patients with unstable angina/non-st-elevation myocardial infarction: A report of the American college of cardiology foundation/American heart association task force on practice guidelines. Circulation. 2011; 123 (18):e426-579. [DOI:10.1161/CIR.0b013e318212bb8b][PMID]

[21] Amsterdam EA, Wenger NK, Brindis RG, Casey DE Jr, Ganiats TG, Holmes DR Jr, et al. 2014 AHA/ACC guideline for the management of patients with non-st-elevation acute coronary syndromes: A report of the American college of cardiology/american heart association task force on practice guidelines. J Am Coll Cardiol. 2014; 64 (24):e139-e228. [DOI:10.1016/j.jacc.2014.09.017][PMID]

[22] Mohanan PP, Mathew R, Harikrishnan S, Krishnan MN, Zachariah G, Joseph J, et al. Kerala ACS Registry Investigators. Presentation, management, and outcomes of 25 748 acute coronary syndrome admissions in Kerala, India: Results from the Kerala acs registry. Eur Heart J. 2013; 34 (2):121-9. [DOI:10.1093/eurheartj/ehs219][PMID] [PMCID]

[23] Medagama A, Bandara R, De Silva C, Galgomuwa MP. Management of acute coronary syndromes in a developing country; Time for a paradigm shift? an observational study. BMC Cardiovasc Disord. 2015; 15:133. [DOI:10.1186/s12872-015-0125-y][PMID] [PMCID]

[24] Ralapanawa U, Kumarasiri PVR, Jayawickreme KP, Kumarihamy P, Wijeratne Y, Ekanayake M, et al. Epidemiology and risk factors of patients with types of acute coronary syndrome presenting to a tertiary care hospital in Sri Lanka. BMC Cardiovasc Disord. 2019; 19 (1):229. [DOI:10.1186/s12872-019-1217-x][PMID] [PMCID]

[25] Mashali H, Toleideh F, Rahmani R, Darabiyan P, Madmoli M. [The predictive role of hyperlipidemia in the incidence of ACS in patients referring to Shahidzadeh hospital in Behbahan in 2016-2017 (Persian)]. Medical Science. 2018; 22 (94):566-70. http://discoveryjournals.org/medicalscience/current_issue/v22/n94/index.htm

[26] Azar FEF, Solhi M, Chabaksvar F. [Investigation of the quality of life of patients with hypertension in health centers (Persian)]. J Educ Health Promot. 2020; 9:185. [DOI:10.4103/jehp.jehp_741_19][PMID] [PMCID]

[27] Gholami SS, Azar FEF, Rezapour A, Tajdini M. [Cost-effectiveness of coronary artery bypass graft and percutaneous coronary intervention compared to medical therapy in patients with coronary artery disease: A systematic review (Persian)]. Heart Fail Rev. 2019; 24 (6):967-75. [DOI:10.1007/s10741-019-09811-3] [PMID]

[28] ACCESS Investigators. Management of acute coronary syndromes in developing countries: Acute coronary events-a multinational survey of current management strategies. Am Heart J. 2011; 162 (5):852-59.e22. [DOI:10.1016/j.ahj.2011.07.029][PMID]

Journal of Vessels and Circulation
Qom University of Medical Sciences

[29] Sharma R, Bhairappa S, Prasad SR, Manjunath CN. Clinical characteristics, angiographic profile and in hospital mortality in acute coronary syndrome patients in south Indian population. Heart India. 2014; 2 (3):65-9. [DOI:10.4103/2321-449x.140228]

[30] Shakya A, Jha SC, Gajurel RM, Poudel CM, Sahi R, Shrestha H, et al. Clinical characteristics, risk factors and angiographic profile of acute coronary syndrome patients in a tertiary care center of Nepal. Nepalese Heart Journal. 2019; 16 (1):27-32. [DOI:10.3126/njh.v16i1.23895]

[31] Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, et al. Interheart study investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the interheart study): Case-control study. Lancet. 2004; 364(9438):937-52. [DOI:10.1016/S0140-6736 (04)17018-9][PMID]

[32] General US. The health benefits of smoking cessation. Washington: Department of Health and Human Services; 1990.11-7. https://books.google.com/books?id=9bkJtXVCkdMC&printsec=frontcover#v=onepage&q&f=false

[33] O'Donnell MJ, Chin SL, Rangarajan S, Xavier D, Liu L, Zhang H, et al. Interstroke investigators. Global and regional effects of potentially modifiable risk factors associated with acute stroke in 32 countries (interstroke): A case-control study. Lancet. 2016; 388 (10046):761-75. [DOI:10.1016/S0140-6736 (16)30506-2] [PMID]

[34] Antoniades L, Christodoulides T, Georgiou P, Hadjilouca C, Christodoulou E, Papasavas E, et al. Epidemiology of acute coronary syndromes in the Mediterranean Island of Cyprus (CYPACS study, Cyprus study of acute coronary syndromes). Hellenic J Cardiol. 2014; 55 (2):139-49. [PMID]

[35] Widimsky P, Wijns W, Fajadet J, de Belder M, Knot J, Aaberge L, et al. European association for percutaneous cardiovascular interventions. Reperfusion therapy for ST elevation acute myocardial infarction in Europe: Description of the current situation in 30 countries. Eur Heart J. 2010; 31 (8):943-57. [DOI:10.1093/eurheartj/ehp492][PMID] [PMCID]

[36] Pipilis A, Andrikopoulos G, Lekakis J, Kalantzi K, Kitsiou A, Toli K, et al. HELIOS group. Outcome of patients with acute myocardial infarction admitted in hospitals with or without catheterization laboratory: Results from the HELIOS registry. Eur J Cardiovasc Prev Rehabil. 2009; 16 (1):85-90. [DOI:10.1097/HJR.0b013e32831e954e][PMID]