

Epidemiological and Clinical Investigation of the ST Elevated Myocardial Infarction in an Emergency Department in Turkey

Senay Akpınar¹, Fatih Büyükcamlı¹, Jale Sen¹, Mustafa Calık¹, Yılmaz Zengin¹, Feruza Turan Sönmez¹, Muhammed Evvah

Karakilic¹

¹ Diskapi Yildirim Beyazit Education and Research Hospital, Ankara, Turkey

Abstract

Objectives: In this study, epidemiologic investigation of clinical features and risk factors of the patients diagnosed as acute ST elevation myocardial infarction (STEMI).

Methods: The study designed as retrospective, descriptive, cross-sectional. 229 patients admitted to the training and research hospital emergency department with a yearly admission of 252677 in 2010, were included the study.

Results: A total of 77.7% of the patients was male. Patient admission was the most in February (11.8%), and the least in August (5.2%). The most effected part of the heart was anterior (48.5%). 55.4% of the patients had smoking and 2.8% had alcohol usage history; 23.3% had hypertension, 20.0% hyperlipidemia, 18.3% diabetes mellitus, 11.7% family history of coronary artery disease.

Conclusions: By the prevention from the modifiable risk factors for acute coronary diseases can reduce the frequency of coronary artery diseases.

Keywords: Emergency Service, STEMI, Epidemiology

Received: 12.10.2013 Accepted: 14.12.2013

Introduction

Acute Coronary Syndromes include (ACS) unstable angina pectoris (UAP), non-ST segment elevated acute myocardial infarction (NSTEMI) and ST segment elevated myocardial infarction (STEMI). Acute myocardial infarction (AMI) is a disease that causes with significant morbidity and mortality, which is primarily based on atherosclerosis. The main cause of mortality and poor prognosis following AMI is the extent of myocardial necrosis (1). In the course of AMI, the imbalance between the need and demand of oxygen leads to ischemia (2,3). In the most of the cases, ischemia is caused by an acute thrombotic occlusion which reduces the oxygen presentation (4).

Several studies in recent years have been demonstrated that the risk factors have decreased and atherosclerosis has regressed in patients with myocardial infarction with the combination of medical treatment and changes in life-style; also the rate of new onset of infarction and mortality have decreased (5,6). Secondary prevention called as risk-decreasing treatment has gained importance with the increase of scientific evidences (7). Nowadays, secondary prevention is a treatment strategy for the treatment of atherosclerotic vascular disease (8). Secondary prevention includes giving up smoking, improving healthy eating habits and increasing physical activity. Risk factors, related with life style and should be

controlled include: hypertension, hypercholesterolemia, obesity and blood glucose.

In this study, our objective was to evaluate the distribution of the risk factors and to determine the most common and modifiable risk factors in patients who had presented to the emergency department and diagnosed as STEMI; and also we investigated the most frequently affected part of hearth.

Materials and Methods

This study was planned as a retrospective, descriptive, cross-sectional study. 229 patients, who had presented to the emergency department of an education and research hospital with an annual admission of 252677 patients in 2010 and diagnosed as acute STEMI and had undergone percutaneous coronary intervention, were included in the study. The patients who had been evaluated as ACS in the emergency department, but who had not undergone percutaneous coronary angiography were excluded from the study. The patients' files were investigated retrospectively from hospital records. The patients' age, gender, the complaints leading to presentation to the emergency department, the time of admission, the site of involvement of myocardial infarction; the modifiable risk factors like cigarette smoking, hyperlipidemia, alcohol usage, and hypertension; the non-modifiable risk factors like age, gender, family

history of coronary artery disease (CAD), and history of diabetes mellitus (DM), were investigated.

The descriptive statistics were demonstrated as mean \pm standard deviation for continuous variables, and the nominal variables were demonstrated as number of cases and percentages (%).

Results

A total of 178 (77.7%) of the patients were male. The mean age of females was 62.0 ± 14.4 (range 29-84); males' was 56.5 ± 12.0 (range 27-86). The highest percentage of referral was in February (11.8%); a lower percentage of referral was in August (5.2%); others were January, 8.7%; March, 7.4%; April, 11.4%; May, 7.7%; June, 6.1%; July, 5.3%; September, 5.3%; October, 9.6%; November, 10.9 %, and December, 9.6%. The most common risk factor was smoking with a rate of 55.5%; the other risk factors have been demonstrated in Figure 1.

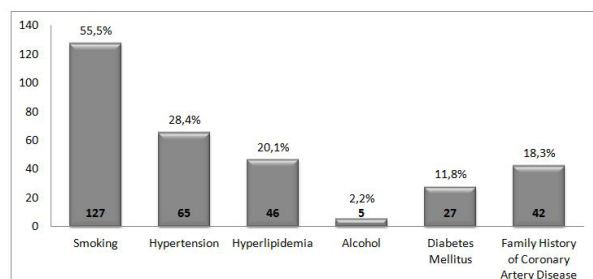


Figure 1. Risk factors of the study group.

The most common complaint on presentation was chest pain (193 patients, 84.3%), others are shown on Table 1. The laboratory results are given in Table 2 briefly. As we see, the laboratory results associated with ACS are generally in normal range in acute phase of the STEMI.

Table 1. Complaints of the study patients on admission.

Complaints	n	%
Chest pain	193	84,3
Back pain	9	3,9
Dyspnea	7	3,1
Nausea and Vomitting	7	3,1
Vertigo	5	2,2
Syncope	4	1,7
Unconsciousness	3	1,3
Weakness	3	1,3
Palpitation	2	0,9
Abdominal pain	2	0,9

Table 2. Some of the laboratory results of the study patients on admission.

Variables	Normal Range	Level	n	%
Troponin-I	0 - 0.06 ng/mL	<0.006	4	1.9
		0.006-1.000	175	81.8
		>1.000	35	16.4
CK-MB	0 – 25 U/L	0-25	133	62.7
		>25	79	37.3
CK	32 – 294 U/L	≤294	175	82.5
		>294	37	17.5
LDL	<130 mg/dL	<130	148	72.2
		130-159	36	17.6
		>160	21	10.2
HDL	40-60 mg/dL	<40	78	38.2
		40-60	117	57.4
		>60	9	4.4
MPV	7.4 – 10.4 fL	<7.4	58	26.4
		7.4-10.4	158	71.8
		>10.4	4	1.8

On evaluation of the type of presentation of the patients to the hospital, 107 patients (46.7%) were found to have been brought to the hospital by ambulance, 122 patients (53.3%) had presented as outpatient by their own facilities (outpatient, taxi, private car, etc.). The most commonly affected part of heart was determined to be the anterior region of the heart (111 patients, 48.5%); the frequencies of the other affected regions have been demonstrated in Figure 2. The in-hospital mortality rate was 13.5% (31 patients).

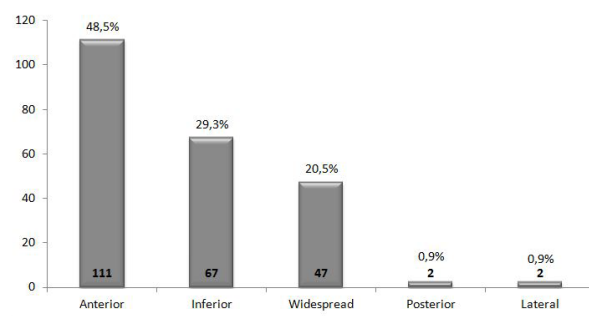


Figure 2. The effected part of the heart of the patients.

Discussion

Recent studies, investigated in the last twenty five years, suggest that changing the life style in concomitantly to medical treatments decrease the risk factors of myocardial infarction and also provide the

regression of atherosclerosis, decrease the risk of new infarction and mortality (5,6,9,10). By the increase of scientific evidences, secondary protecting strategies became important (7,8).

Some of the risk factors lead to the development of atherosclerosis. These major risk factors are responsible for 90% of the risk increase in the population (11). In our study, we evaluated the constant risk factors like age, gender, and family history, and the modifiable risk factors like smoking, HT, HL, DM and alcohol use.

According to the European Society of Cardiology 2007 Hypertension Guide, the risk of coronary artery disease increases at the age of 55 years and above in males and at the age of 65 years and above in females (12). In our study, consistent with the literature, the range of age in females was 29-84 years and the mean age was 62.0 ± 14.4 years, and the range of age in males was 27-86 years and the mean age was 56.5 ± 12.0 years.

Sönmez et al. (13) reported that the mean age of males to be younger than that of females in coronary artery disease patients. CAD begins 10 years later in women than in men. In middle-aged women, the mortality rate of CAD is lower due to the decreasing effects of alpha and beta lipoproteins of estrogen. In our study, 77.7% of the patients who had undergone PCI due to STEMI were males and this was consistent with the information in former studies.

According to the study conducted by Anderson and Kessenich in 2001, a history of CAD in the family members increases the risk of CAD risk by 3.5 fold in males and by 2.8 fold in women (14). In our study, 11,79% of the patients had a family history of CAD.

Smoking increases the risk of myocardial infarction and sudden death by 2.7-fold in men and 4.7-fold in women (15). The TEKHARF study (16) revealed that smoking was the most common risk factor in Turkey. While the smoking habit has decreased in men in Turkey, on the contrary, the habit has strongly increased in women. The coronary artery disease mortality among Turkish women is at the highest level among European countries. Cessation of smoking rapidly decreases the risk of coronary artery disease. In the state of quitting smoking, the relative risk decreases to the levels of a non-smoker in one year or less than one year (17). In our study, the most common risk factor was smoking (55.4%).

Hypertension is the most important known risk factor for coronary artery disease. Despite the fact that systemic arterial hypertension is an accelerator of

atherosclerosis pathogenically dependent on cholesterol, it is also an independent risk factor for ischemic heart disease (18). Hypertension is responsible for 35% of all atherosclerotic cardiovascular events. Coronary heart disease is 2-3 folds higher in hypertensive individuals than normotensive individuals (19). In hypertensive individuals who have acute myocardial infarction, the incidences of post-infarction angina pectoris, silent myocardial ischemia, atrial fibrillation, ventricular tachycardia, ventricular fibrillation and cardiogenic shock are higher than that in normotensive individuals. The 5-year mortality rate is higher in hypertensive patients who have coronary artery disease or who have undergone coronary artery by-pass operation than in normotensive individuals (20). In our study, HT was the second most common risk, with a rate of 23.3%.

It has been known since the 1950s that high triglyceride levels contribute to the development of atherosclerosis. However, it is controversial whether or not triglyceride is an independent predictor for the development of CAD (21,22). Normally, triglycerides do not accumulate in the vascular wall; however, as the triglyceride levels increase, lipoproteins that are mainly atherogenic and the content of triglyceride-rich lipoproteins increase in blood. As their densities are high and their sizes are very small, they easily permeate through the vascular wall and play a role in the formation of atheroma plaques (21,22). In our study, among the risk factors, HL was determined to be in the third place, with a rate of 20.0%.

The incidence of cardiovascular disease was high in male and female patients of all ages diagnosed with DM (23). The rate of chronic heart failure was 4-fold higher in diabetic males under 65 years of age and 8-fold higher in diabetic women under 65 years of age (24). In our study, 18.3% of the patients had DM.

When the MI symptoms were considered, chest pain was in the first place in both genders (25). In our study, when we classified the patients who had presented to the emergency department and included in our study according to the complaint on presentation, the most common complaint was chest pain, which was present in 84.3% of the patients.

Conclusion

In coronary artery disease, the modifiable risk factors have been presented as a common problem in most of the patients. Patient education and guidance in eliminating the modifiable risk factors will decrease the incidence of coronary artery disease, and also STEMI.

References

1. Taylor GJ, Humphries JO, Mellits ED, Pitt B, Schulze RA, Griffith LS, Achuff SC. Predictors of clinical course, coronary anatomy and left ventricular function after recovery from acute myocardial infarction. *Circulation*. Nov 1980;62(5):960-970.
2. Alpert JS, Thygesen K, Antman E, Bassand JP. Myocardial infarction redefined--a consensus document of The Joint European Society of Cardiology/American College of Cardiology Committee for the redefinition of myocardial infarction. *Journal of the American College of Cardiology*. Sep 2000;36(3):959-969.
3. Boersma E, Mercado N, Poldermans D, Gardien M, Vos J, Simoons ML. Acute myocardial infarction. *Lancet*. Mar 8 2003;361(9360):847-858.
4. Picard MH, Wilkins GT, Gillam LD, Thomas JD, Weyman AE. Immediate regional endocardial surface expansion following coronary occlusion in the canine left ventricle: disproportionate effects of anterior versus inferior ischemia. *American heart journal*. Mar 1991;121(3 Pt 1):753-762.
5. Grundy SM. Cholesterol management in the era of managed care. *The American journal of cardiology*. Feb 10 2000;85(3A):3A-9A.
6. Mukamal KJ, Maclure M, Muller JE, Sherwood JB, Mittleman MA. Prior alcohol consumption and mortality following acute myocardial infarction. *JAMA : the journal of the American Medical Association*. Apr 18 2001;285(15):1965-1970.
7. Ades PA. Cardiac rehabilitation and secondary prevention of coronary heart disease. *The New England journal of medicine*. Sep 20 2001;345(12):892-902.
8. Meyers DG. Relative survival benefits of risk factor modifications. *The American journal of cardiology*. Feb 1 1996;77(4):298-299.
9. Chorzempa A, Tabloski P. Post myocardial infarction treatment in the older adult. *The Nurse practitioner*. Mar 2001;26(3):36, 39-42, 45-36 passim; quiz 50-31.
10. Allison TG, Squires RW, Johnson BD, Gau GT. Achieving National Cholesterol Education Program goals for low-density lipoprotein cholesterol in cardiac patients: importance of diet, exercise, weight control, and drug therapy. *Mayo Clinic proceedings Mayo Clinic*. May 1999;74(5):466-473.
11. Jamrozik K. Epidemiology of Atherosclerotic Disease. In: Crawford MH, DiMarco JP, eds. *Cardiology*. 1st ed. England: Mosby International Ltd.; 2003.
12. Mancia G, De Backer G, Dominiczak A, Cifkova R, Fagard R, Germano g, et al. The task force for the management of arterial hypertension of the European Society of C. 2007 Guidelines for the management of arterial hypertension: The Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). *European heart journal*. Jun 2007;28(12):1462-1536.
13. Sonmez K, Pala S, Mutlu B, Izgi A, Bakal RB, Incedere O, Ozden K, Dogan Y, Turan F. Distribution of risk factors according to socioeconomic status in male and female cases with coronary artery disease. *Anatolian journal of cardiology*. Dec 2004;4(4):301-305.
14. Anderson J, Kessenich CR. Women And Coronary Heart Disease The Nurse Practitioner. *The American Journal Of Primary Health Care*. 2001;26(8):12-21.
15. Castelli WP, Garrison RJ, Dawber TR, McNamara PM, Feinleib M, Kannel WB. The filter cigarette and coronary heart disease: the Framingham study. *Lancet*. Jul 18 1981;2(8238):109-113.
16. TEKHARF; Oniki Yıllık İzleme Deneyimine Göre Türk Eriskinlerinde Kalp Sağlığı. İstanbul: Argos İletişim Hizmetleri Reklamcılık ve Ticaret AS; 2003.
17. Gordon T, Kannel WB, McGee D, Dawber TR. Death and coronary attacks in men after giving up cigarette smoking. A report from the Framingham study. *Lancet*. Dec 7 1974;2(7893):1345-1348.
18. Roberts WC. Preventing and arresting coronary atherosclerosis. *American heart journal*. Sep 1995;130(3 Pt 1):580-600.
19. Hambrecht R, Wolf A, Gielen S, Linke A, Hofer J, Erbs S, Schoene N, Schuler G. Effect of exercise on coronary endothelial function in patients with coronary artery disease. *The New England journal of medicine*. Feb 17 2000;342(7):454-460.
20. Franklin SS, Khan SA, Wong ND, Larson MG, Levy D. Is pulse pressure useful in predicting risk for coronary heart Disease? The Framingham heart study. *Circulation*. Jul 27 1999;100(4):354-360.
21. Gotto AM, Jr. Triglyceride as a risk factor for coronary artery disease. *The American journal of cardiology*. Nov 5 1998;82(9A):22Q-25Q.
22. Ravi GR, Pradeepa R, Mohan V. Hypertriglyceridemia and coronary artery disease--an update. *Indian heart journal*. Jan-Feb 2004;56(1):21-26.
23. Winters S, Jernigan V. Vascular disease risk markers in diabetes: monitoring & intervention. *The Nurse practitioner*. Jun 2000;25(6 Pt 1):40, 43-46, 49 passim; quiz 65-47.
24. Cüngürlü A, Tüfekci I. Obezite Ve Kardiyovasküler Sistem. *Diyabet Bilimi*. 2004;2(3):122-125.
25. Akdemir N, Birol L. İc Hastalıkları Hemsireliği. İstanbul: Vehbi Koc Vakfı, SANERC; 2003.