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Risk Factors for Acute Coronary Syndrome

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Abstract **Original Research Article**

Aim: Cardiovascular diseases are one of the important reasons for mortality and morbidity. In this study, it was aimed to analyze risk factors for acute coronary syndrome in relation to the different age groups and other factors. ***Material and Methods:*** 270 patients were included in this study and the patients were recruited from Bagcilar Egitim ve Arastirma Hastanesi Cardiology Department and Coronary Intensive Care Unit in between 01.05.2016-15.07.2016. All patients had the diagnosed of acute coronary syndrome. For each participant of this study; gender, age, income level, education, diabetes, hypercholesterolemia, hypertension, family history, Framingham and SCORE risk scores, lipid panel were evaluated. ***Findings:*** In the study, 69,63% of the sample was male and 30,37% of was female. Among all participants, 8,89% was at the 30-40 of age group, 19,26% was at the 41-50 age group, 30% was at the 51-60 of age group, and 41,85% was more than 60 years of age group. Having NSTEMI was significantly associated with being older than 60 years of age. Diabetes mellitus and hypertension were higher for the participants older than 60 years of age, and lower for the participants younger than the age of 60. At the age group of 30-40, Framingham score and SCORE mean points were significantly lower compared to other age groups. For the participants with NSTEMI, Framingham and SCORE mean risk scores were significantly lower. Also, female participants had a significant higher chance of having DM and HT than men. ***Conclusion:*** This study showed that prevalence of risk factors for acute coronary syndrome shows variation in relation to age groups and gender. It is important to evaluate the patients, including young age groups, regarding their risk status of cardiovascular disease, and it is important to intervene to patients' risk factors efficiently within the scope of preventive medicine.

Key words: Acute coronary syndrome, coronary artery disease, risk factors.

INTRODUCTION AND PURPOSE

Cardiovascular diseases are the most common cause of death worldwide. According to 2013 World Health Organization (WHO) data, cardiovascular diseases have been the cause of death of 17.3 million people worldwide. This figure corresponds to 31.5% of all deaths and 45% of non-communicable disease-related deaths [1]. According to available data, WHO predicts that deaths due to coronary artery disease will increase by 120% in women by 137% in men by 2020 [2].

Acute coronary syndromes refer to the life-threatening clinical manifestations of atherosclerosis, which usually begin with acute thrombosis. All known risk factors trigger the development of underlying atherosclerosis and pave the way for acute coronary syndrome. Acute coronary syndrome includes unstable angina pectoris (USAP), ST segment elevation MI (STEMI), and ST segment elevation-free MI (NSTEMI) [3].

Coronary heart disease risk factors in the Coronary Heart Disease Prevention and Treatment Guidelines published by the Turkish Society of Cardiology in 2002 [5] are; age (≥45 for men, ≥55 or early menopause in women), family history (first-degree relatives 55 years in men, 65 years in women before coronary arterial disease), smoking, hypertension (blood pressure ≥140 / 90 mmHg or being under antihypertensive treatment), hypercholesterolemia (total cholesterol ≥200 mg/dl, LDL-cholesterol ≥130 mg/dl), Low HDL-cholesterol value (< 40 mg/dl), diabetes mellitus (diabetes is a risk factor, as it carries a risk equivalent to the presence of coronary heart disease has a separate place in risk assessment).

By identifying and modifying risk factors, it is possible to prevent the disease and stop its progression. Identifying the patients at risk, evaluating and guiding them according to the risk status of the patient is critical in terms of precautions to be taken and treatment approach. The most effective and valid way of carrying out these evaluations and interventions is the primary level health institutions.

In this study, the risk factors in acute coronary syndrome patients analyzed on the basis of their age and presented with Framingham and SCORE values; recommendations and precautions were discussed in the context of preventive medicine.

MATERİAL AND METHODS

This is a prospective, descriptive, cross-sectional study. Total 270 patients admitted to Istanbul Bagcilar Training and Research Cardiology Department and Coronary Intensive Care Unit between 01.05.2016 and 15.07.2016 with the diagnosis of acute coronary syndrome were included in the study. The study was conducted with the approval of the non-invasive clinical research ethics committee of Istanbul Bagcilar Training and Research Hospital. All patients were informed and their written informed consent was obtained. The study protocol was consistent with the 2008 Helsinki Declaration. In the study, patients who were unconscious, uncooperative-oriented, who had impaired cognitive functions such as dementia and refused to participate in the study were excluded from the sample.

Each patient's gender, age, income range, educational background, diabetes, hypercholesterolemia, hypertension, family history, smoking history, Framingham (cardiovascular risk development version) score and SCORE risk score and lipid profile values were recorded. Data were collected from patients by face to face interview method. Framingham risk score Framingham Heart Study, the official website (framinghamheartstudy.org) using an interactive calculation table, the SCORE risk score Turkey Society of Cardiology on the official website (tkd.org.t) were calculated using published SCORE Turkey Risk Reporting System table (access date: 29 September 2016). For both calculation systems, those in the high-risk group (CAD, peripheral arterial disease, presence of DM, renal parenchymal disease, previous SVO or TIA attack) were calculated as high risk according to the guidelines. Those who were outside the age range specified in the guidelines were calculated by accepting the age below the lower limit and those who were older than the upper limit. The diagnosis of ACS in patients included in the study was made by the presence of at least two of the following three criteria:

- Ischemic type chest pain and/or chest discomfort
- Changes in series ECGs
- Characteristic elevation in serum cardiac markers

Patients who were supported with clinical or laboratory findings with ST elevation on admission ECG were grouped as STEMI, and patients without ST elevation on admission ECG were grouped as NSTEMI or USAP according to whether myocardial damage developed. Patients with no ST elevation on admission ECG but who had increased biochemical markers in follow-up were NSTEMI, and those without biochemical markers were USAP.

The presence of family history was accepted in the presence of CAD in relatives of the first degree. The patient was considered to be hypertensive by using antihypertensive drugs before or after systolic blood pressure higher than 140 mmHg and diastolic blood pressure higher than 90 mmHg. The definitions of current smoking and smoking until the last year were defined for smoking. The multiplication of the year and number of packages was accepted as not having 5 products. The diagnosis criteria for the diagnosis of diabetes mellitus was the presence of a previously established diagnosis or laboratory values of HbAlc ≥6.5% or fasting plasma glucose (PG) ≥126 mg/dl. Lipid profiles of the patients were studied in the laboratory after 12 hours of fasting and in the first 72 hours after admission. Presence of hyperlipidemia was defined as the initiation of hypercholesterolemia treatment by LDL >130 mg/dl or total cholesterol >200 mg/dl or earlier by the doctor. The previous values of the patients whose lipid profile was taken in the last three months were recorded.

In this study, statistical analysis was performed with NCSS (Number Cruncher Statistical System) 2007 Statistical Software (Utah, USA). In addition to descriptive statistical methods (mean, standard deviation), Tukey multiple comparison test was used for one-way variance analysis subgroup comparisons, independent t test was used for comparison of binary groups, and chi-square test was used for comparison of qualitative data. The results were evaluated at $p<0.05$ level of significance.

RESULTS

Patients who were admitted to Istanbul Bagcilar Training and Research Hospital Cardiology Department and Coronary Intensive Care Unit between 01.05.2016 and 15.07.2016 with the diagnosis of acute coronary syndrome were included in the study. The age range of 270 patients included in the study was 29-70 and the mean age was 58.31±12.74 years. The age range of men was 29-84 and the mean age was 56.14±11.84 years. Sociodemographic fetures of the patients are summarized in table-1 and risk factors together with risk scores are in table-2.

Table-1: Sociodemographic features of the patients

		N	%
Age group	30-40 Age	24	8.89
	41-50 Age	52	19.26
	51-60 Age	81	30.00
	> 60 Age	113	41.85
Gender	Male	188	69.63
	Female	82	30.37
Education	No	60	22.22
	Primary education	173	64.07
	High school	26	9.63
	University	11	4.07
Income rate	<1500TL	170	62.96
	1501-2500TL	75	27.78
	2501-5000TL	25	9.26
Cigaret	Non Smoking	84	31.11
	Old Smoker	55	20.37
	Smoking	*131*	*48.52*

Table-2: Risk factors of the patients together with risk scores

		n	%
Diagnosis	NSTEMI	125	46.30
	STEMI	110	40.74
	USAP	35	12.96
Family Story	No	134	49.63
	Yes	136	50.37
CAD	No	183	67.78
	Yes	87	32.22
DM	No	162	60.00
	Yes	108	40.00
HT	No	128	47.41
	Yes	142	52.59
HL	No	124	45.93
	Yes	146	54.07
Cigarette	Non Smoking	84	31.11
	Old Smoker	55	20.37
	Smoking	131	48.52
Framingham	Low	29	10.74
	Middle	58	21.48
	High	183	67.78
SCORE	1-4 Medium Score	63	23.33
	5-9 High Score	27	10.00
	>10 Very High	180	66.67

The mean LDL value of the cases was 117.47±42.67. The mean HDL value was 39.32±18.31. The mean value of triglyceride was 177.02±110.59. The mean value of total cholesterol was 189.95±50.00.

The statistical differences between the age groups and lipid levels and risk scores were described on table 3.

Table-3: Statistical differences between the age groups and lipid levels and risk scores

	30-40 age n:24	41-50 age n:52	51-60 age n:81	> 60 age n:113	p
LDL	121,58±32,14	119,58±45,99	118,48±49,64	114,9±37,74	0,850
HDL	33,35±10,17	37,29±11,18	37,02±8,58	43,17±25,43	**0,023**
Triglycerides	194,15±118,2	196,17±92,81	204,02±138,85	145,22±83,86	**0,001**
Total Cholesterol	191,83±42,38	196,46±54,11	193,19±55,92	184,24±44,81	0,438
Framingham	11,28±6,53	18,55±12,02	26,05±14,47	35,4±20,35	**0,0001**
Score	2,71±3,43	5,62±3,94	8,44±3,67	15,81±9	**0,0001**

One Way Analysis of Variance

There was no statistically significant difference between the diagnosis, family history and presence of CAD in male and female patients (p>0.05). Diabetes mellitus and hypertension were higher in female group than male group (p:0.0001). The rate of non-smokers in female patients was found to be significantly higher than male patients (p:0.0001).

There was no statistically significant difference between the mean LDL, triglyceride, total cholesterol levels of male and female patients (p>0.05). The mean HDL of female patients was significantly higher than male patients (p:0.001). Mean Framingham was found to be significantly lower in females than males (p:0.018).

There was no statistically significant difference between the groups according to education level in terms of diagnosis, family history, presence of CAD, DM, HL (p>0.05). There was a statistically significant difference between the presence of HT (p = 0.012); HT distribution of high school and university graduates was found to be low. Moreover; there was a statistically significant difference between smoking distributions (p:0.0001).

There was no statistically significant difference between groups in terms of LDL, HDL, Total Cholesterol and Framingham mean values (p>0.05). Among the triglyceride averages; a

statistically significant difference was observed (p:0.021). Mean triglyceride levels of high school graduates were found to be statistically higher than those who had no education (p:0.015), and no statistically significant difference was found between the other groups (p>0.05). A statistically significant difference was observed between the SCORE means (p:0.0001). SCORE scores of university graduates were significantly higher than those who had no education (p:0.018), and no statistically significant difference was observed between the other groups (p>0.05).

There was a statistically significant difference between the diagnostic distributions of the patients according to their monthly income differences (p:0.017). In addition, a statistically significant difference was observed between CAD distributions (p:0.041). The presence of CAD was low in the patient group with income over 2500 TL. A statistically significant difference was observed between HT distributions (p:0.004).

No statistically significant difference was observed between LDL, HDL and Total Cholesterol distributions of the patients according to their monthly income differences (p>0.05). There was a statistically significant difference between the mean triglyceride (p:0.002) and the triglyceride averages of the patients with income over 2500TL were significantly higher than the other two groups (p:0.003, p:0.001).

Risk factors according to diagnostic groups were investigated. There was a statistically significant difference between CAD distributions (p:0.001) and the presence of CAD in STEMI group was low. There was also a statistically significant difference between DM and HT distributions (p:0.001, p:0.011). While the presence of DM was low in the USAP group, the presence of HT in the NSTEMI group was found to be high. The presence of HL was high in STEMI group.

When the lipid values were investigated according to diagnostic groups; statistically significant difference was observed (p:0.004) among the Framingham averages. The Framingham means of the NSTEMI group were significantly higher than the STEMI group (p:0.004), statistically significant difference was found between the SCORE means (p:0.002) and the SCORE means of the NSTEMI group were significantly higher than the STEMI and USAP groups (p:0,008, p:0,022).

DISCUSSION

It is accepted that non-fatal coronary events can be reduced and cardiovascular deaths can be halved by risk factor modification in patients with coronary artery disease [11,12]. It is possible to prevent or postpone the development of the disease with the management of risk factors in people who have not yet developed the disease. Adequate secondary and primary protection in patients with and without CAD is closely related to the well-known risk factor distribution in patients with this disease.

Primary health care institutions play a key role in reducing the mortality and morbidity of CVD on a community basis as it is the most appropriate and accessible place to evaluate patients' CVD in terms of existing risk factors and lifestyle change, patient education, patient follow-up and treatment. plays. These services fall under the scope of preventive health services and the execution of these services is primarily the duty of primary health care institutions. Family physicians and other primary health care personnel play a major role at this point. The World Health Organization published "Better Results in Non-Communicable Diseases: Challenges and Opportunities for Health System" in 2014. In this assessment report; it is mentioned that family physicians are not yet systematically involved in the diagnosis and management of risk factors such as CVD and hypertension, high cholesterol and diabetes, and screening for these diseases has not been made systematic and chronic cases are managed by other physicians [13].

In this study, 69.63% of the patients with acute coronary syndrome were male and 30.37% were female. This rate is similar to the rates found in GRACE, Euro Heart Survey and ENACT studies [14-16].

In the TEKHARF study (1998), Onat and friends found prevalance of CAD 14.4% in the 40-49 age group, 13.3% in the 50-59 age group, 21.6% in the 60-69 age group [17]. According to the data of other TEKHARF studies conducted in the following years, the prevalence of coronary artery disease was reported to be 6% in the 45-54 age group in the general population, 17% in the 55-64 age group and 28% in individuals aged 65 and above [18]. In the Euro Heart Survey study, it was observed that ACS patients were mostly in the 65-74 age group [19].

Sönmez *et al*. performed a study in 2002 with a total of 612 cases of coronary artery disease confirmed by angiography. 50-59 age range was observed to be the most risky age and the rate of CAD under 40 years was found to be below 4% [20].

It should be remembered that the most powerful risk factor is advanced age. However, it is noteworthy that our rate of patients under 40 is 8.89%. This raises the question of whether ACS cases will gradually shift to younger age groups. At this point, it was believed that risk screening for CVD should be performed under 40 years of age, especially among those who have at least one risk factor and risk interventions should be performed accordingly.

In all cases, NSTEMI was found to be 46.30% (n:125), STEMI was 40.74% (n:110), and USAP 12.96% (n:35). When the literature is examined, it is seen that the selected population has different rates depending on the age range. In the GRACE recordings, 29% of USAP cases, 30% of NSTEMI cases and 34% of STEMI cases were detected [14]. In the study of Bugiardini *et al*. while NSTEMI and unstable angina pectoris were observed in 2/3 of all ACS patients, they found STEMI only 1/3 of all cases [21]. Considering these rates, the rate of USAP in the performed study seems to be low.

When the patients were grouped according to their educational level; 22.22% (n:60) of those did not receive any education, 64.07% (n:73) were primary school graduates, 9.63% (n:26) were high school graduates, and 4.07% (n:11) were university graduates. These ratios show us that, the population we work represents the lower education group.

Our population in the study group represents the lower income group of the society in terms of socioeconomics. This result shows accordance with the socioeconomic status of the region [22]. The fact that hospital admissions were generally from the close environment, it was considered as the cause of the situation.

In the Turkish Heart Study, LDL-cholesterol was found to be 136 mg/dl in men and 111 mg/dl in women [23]. In the METSAR study conducted in 2006, total cholesterol was 176.67 mg/dl, HDL: 49.27 mg/dl and triglyceride: 138.97 mg/dl in the general population [24]. In the EUROSPIRE-3 study, HDL was found to be 38.3 mg/dl in men and 45.5 mg/dl in women [25]. The results are partially similar to the conducted study, but the populations studied were those with ACS, most of whom were on antihyperlipidemic therapy or in the group at risk for CVD. Therefore, the mean values in the study indicate that primary and secondary protection is insufficient. In the Eurika study, total cholesterol in dyslipidemic patients under control, the ratio of LDL cholesterol was stated as 30.4%, and that was demonstrated the importance of the measures should be taken in this regard [26]. In their study, Toksöz *et al*. emphasized that HDL averages were below the European averages [25]. It was believed that studies and recommendations about HDL at the social level, should be considered within the scope of preventive medicine.

When the lipid averages of the age groups were examined, the group below 40 years of age had the lowest HDL mean to the general population. Although young people are more advantageous in terms of factors such as sedentary life and insulin levels that reduce HDL, the low mean HDL values may be related to the high prevalence of smoking in this group. Obesity is another factor explaining the low HDL. In the Euro Heart Survey study, obesity was found to be significantly more common in the younger age group, but the youngest age group was considered to be under 55 years of age [19]. Since obesity rate was not examined in our study, it seems difficult to comment on this issue.

When Framingham and SCORE averages are analyzed by age groups, it is seen that both outcomes are lower in the lower limit of the medium risk classes and in terms of quantitative value in the 30-40 age group (Framingham; 11,28, SCORE; 2,71). It is seen that age is the most important factor that increases the total risk in risk calculation tables and this may cause low risk in young individuals. Therefore, it is stated that the relative risk calculation may be a more effective method in the young patient group [9].

Cardiovascular diseases account for 60% of mortality in people with diabetes. The incidence of cardiovascular diseases in people with diabetes is 2-3 times higher. Women have higher risk [27-29]. People with diabetes have a worse prognosis after cardiovascular disease than those without diabetes. The risk of cardiovascular disease increases with high glucose values [30,31].

The prevalence of diabetes is increasing in Turkish population. In the CREDIT study, the prevalence of diabetes in Turkey was found to be 12.7% [4]. According to the data of TURDEP 2, the prevalence of DM in men in 2010 is 16% and in women is 17.20% [7]. In a meta-analysis study conducted by Huxley *et al*. The presence of DM was reported to increase the risk of fatal coronary events in women [33]. In our study, the prevalence of diabetes was found to be 62.20% in men and 30.32% in women. It is possible that the average age of women in the population is 7 years older than men. However, we believe that the relative high risk of women plays an absolute role in the study.

Hypertension is another independent risk factor for CVD. Systolic 115 mmHg, diastolic 75 mmHg above the blood pressure level, both CAD and stroke-induced death was found to increase progressively and linearly [34]. In the Turkish Hypertension Prevalence Study 2 (PatenT2) conducted in 2012, the prevalence of hypertension was 28.4% in males; It was found to be 32.3% in women [35]. In our study, a significant difference was found between male and female patients in terms of HT frequency. According to Rich-Edwards JW *et al*. published in 1995, a stronger relationship was found between hypertension and CAD in older women than in men [36]. Kits indicated that antihypertensive treatment is not as effective in women as in the male population [37]. In 1995, Kaplan reported that women received less benefit from antihypertensive treatment than men [38]. In the SALTurk study, it was also emphasized that BMI was higher in women and mean blood pressure was proportional to BMI [39]. In our

study, it was similar to the studies mentioned in the finding of a high difference in the frequency of HT between men and women. There is a stronger relationship between HT and CVD in women.

There are studies showing that there is a relationship between education level and risk factors, but in our study, the fact that the number of those who were educated above the level of primary education was very low was the result that the results were not significant.

There is no significant relationship between income brackets and presence of HT and CAD. While the rate of being diagnosed in the low income group was high for both diagnoses, it was seen that these rates decreased significantly in the high income group. No significant relationship was found in women. However, more than 10 years have passed since these data and the level of awareness about lifestyle in society may have changed. Our data support the view that welfare level and risk status will decrease. Only TG was found to be significantly higher in the distribution of lipid values compared to income tranches. LDL level is not significant but increases with income level. This may be related to eating habits. In our study, the fact that the majority of patients were receiving antilipidemic treatment may have affected these results.

In our study, risk factors and risk scores in patients diagnosed with acute coronary syndrome; general distribution percentages, age groups, gender, diagnostic groups, income and educational factors were examined in the context of preventive medicine recommendations were made. Despite WHO's explanation that the risk and mortality of cardiovascular diseases will be reduced to a great extent by the modification of risk factors, unfortunately, as in the rest of the world, our country is far from the desired point. This study also supports these data.

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