

## Achievement of the Targets of Lifestyle, Risk Factors and Drug Therapy by Patients with Coronary Artery Diseases in Turkey

Türkiye’de Koroner Arter Hastalığında Yaşam Tarzı, Risk faktörleri ve İlaç Tedavisi Hedeflerine Ulaşılması

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### ABSTRACT

**Objective:** The aim of this study was to determine the rate of achievement of lifestyle, risk factors and drug therapy targets recommended for the secondary prevention in coronary artery patients and of the effects such as age, gender and event type on the achievement of risk factor targets

**Methods:** This cross-sectional study enrolled 136 patients with coronary artery disease who had an acute myocardial infarction, coronary artery bypass graft, and percutaneous coronary intervention. The data related to the risk factors, lifestyle, and drug therapies were determined using questionnaires, anthropometric and laboratory measurements. Data analysis was conducted using descriptive statistics and the Pearson’s Chi-square test.

**Results:** Of the patients, 19.9% were smokers, 44.8% were inactive, 41.2% were obese, and 36.8% did not maintain a healthy diet. Furthermore, 44.1% had elevated total cholesterol, 78.7% had low-density lipoprotein cholesterol  $\geq 70$  mg/dL, 35.3% had blood pressure  $\geq 140/90$  mm/Hg, and 52.1% of patients previously diagnosed with diabetes had a glycated hemoglobin A1c  $\geq 6.5\%$ . Elderly patients had high low-density lipoprotein cholesterol and were physically inactive whereas younger patients had high smoking rates. Only 39.7% used lipid-lowering medication.

**Conclusion:** Results of this study showed that the achievement rate of treatment targets recommended for secondary prevention in coronary artery patients was low. Age was a factor affecting control rate of smoking, physical activity and low-density lipoprotein cholesterol.

**Key Words:** Coronary artery disease, lifestyle, risk factors, secondary prevention.

Received: 05.21.2019

Accepted: 10.02.2019

### ÖZET

**Amaç:** Bu çalışmanın amacı, koroner arter hastalarında sekonder koruma için önerilen yaşam tarzı, risk faktörleri ve ilaç tedavisi hedeflerine ulaşma oranını ve risk faktörü hedeflerine ulaşmada koroner olay, yaş ve cinsiyetin etkisini belirlemektir.

**Yöntem:** Bu kesitsel çalışmaya, akut miyokard infarktüsü, koroner arter bypass greft ve perkütan koroner girişim tanılı 136 hasta alındı. Risk faktörleri, yaşam tarzı ve ilaç tedavisi ile ilgili veriler anketler, antropometrik ve laboratuvar ölçümleri ile elde edildi. Veri analizi, tanımlayıcı istatistikler ve Pearson’s Ki-kare testi kullanılarak yapıldı.

**Bulgular:** Hastaların %19.9’u sigara içiyordu, %44.8’i inaktif, %41.2’si obez ve %36.8’i sağlıklı bir diyet uygulamıyordu. Ayrıca hastaların, %44.1’inde total kolesterol yüksek, %78.7’sinde düşük yoğunluklu lipoprotein kolesterol düzeyi 70 mg/dL ve üstünde, %35.3’ünde kan basıncı 140/90 mm/Hg ve üstünde ve daha önce diyabet tanısı alanların %52.1’inde HbA1c %6.5 ve üstünde idi. Yaşlı hastalarda, düşük yoğunluklu lipoprotein kolesterol düzeyi yüksek ve fiziksel inaktivite olmasına karşın, genç hastalarda sigara içme oranı yüksekti. Hastaların sadece %39.7’si lipid düşürücü ilaç kullanıyordu.

**Sonuç:** Bu çalışmanın sonuçları, koroner arter hastalarında sekonder koruma için önerilen tedavi hedeflerine ulaşma oranının düşük olduğunu göstermiştir. Yaş; sigara, fiziksel aktivite ve düşük yoğunluklu lipoprotein kolesterolün kontrol oranını etkileyen bir faktördü.

**Anahtar Sözcükler:** Koroner arter hastalığı, yaşam tarzı, risk faktörleri, sekonder koruma

Geliş Tarihi: 21.05.2019

Kabul Tarihi: 02.10.2019

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doi:<http://dx.doi.org/10.12996/gmj.2021.04>

## INTRODUCTION

Coronary heart disease (CHD) remains a major cause of morbidity and mortality in Turkey (1). In the age bracket of 45 to 74 years, coronary heart disease mortality is 5.5 per thousand (2). The age-standardised CHD death rate is estimated to rank among the highest in Europe (3).

The development of cardiovascular disease (CVD) is strongly related to lifestyles and modifiable risk factors. In a case-control study including participants from 52 countries were found that nine modifiable risk factors account for 90% of acute myocardial infarctions in men and women (4). These risk factors are smoking, hypertension, diabetes, abdominal obesity, abnormal lipids, unhealthy diet, psychosocial stress, physical inactivity and alcohol use. High cardiovascular mortality in Turkey may be due to a high prevalence of cardiovascular risk factors. According to the results of the studies in large adult population hypertension prevalence was 36% in men and 49% in women (5), smoking prevalence was 41.5% in men, 13.1% in women (6), low high-density lipoprotein (HDL) cholesterol prevalence was 25.1% in men and 32.3% in women, obesity prevalence was 41.3% in women and 21.1% in men (7), diabetes prevalence was 16.5% (8).

Individuals with established CHD are at the highest risk for a subsequent event, including death. There is strong scientific evidence that lifestyle modifications, risk factor management and selective use of prophylactic drugs reduce subsequent myocardial infarction and mortality, and improve quality of life (9). Consequently, several cardiovascular societies have developed and published evidence-based guidelines for preventing further coronary events in patients with coronary heart disease. These guidelines define targets with regard to lifestyle, risk factors and drug therapy, and emphasise the need for their integration into daily clinical practice. Despite the publication and use of evidence-based guidelines, the studies found that the guideline's use in daily clinic work practices was insufficient (10,11). There are a few studies in Turkey on the extent to which CHD patients whom discharged from an acute cardiac event are achieving targets for lifestyle, risk factors and use of cardioprotective drug therapies. Hereby, it is appropriate to assess the use of current scientific knowledge in clinical practice in Turkey.

The aim of this study is divided into two parts: one is to determine the achievement rate of lifestyle, risk factor and drug therapy targets recommended for secondary prevention of coronary patients; and the other one is to determine whether the patient's age, gender and diagnosis of acute myocardial infarction (AMI), coronary artery bypass graft (CABG), and percutaneous coronary intervention (PCI) differed in the achievement of risk factors recommended for cardiovascular disease prevention.

## PATIENTS and METHODS

### Study Design and Sampling

This (descriptive) cross-sectional study was carried out at an education and research hospital in Mugla, Turkey between April and June, 2014. Consecutive patients who applied to the cardiological polyclinics in this time range and met the criteria below were enrolled into this study. The inclusion criteria were: 1) diagnosis (first or recurrent clinical) of AMI, CABG and PCI; 2) at least six months past a coronary event (11) and 3) residing in Mugla province. Inability to communicate and having a mental illness were the exclusion criteria for coronary patients. In one study, there was found to be just a 35% adherence rate to a healthy lifestyle and medication of coronary patients (12). In this case, for test differences in proportion, alpha level of 0.05, at a power of 0.80, the sample size in the current study was found to be 84 (PS version 3.1.2 program), though a total of 168 patients were enrolled. However, 20 patients refused to participate for several reasons, and blood lipids could not be obtained for 12 patients. Therefore, this study was completed with a total of 136 patients.

### Data Collection

Data was collected by researchers and two trained nursing students. Physicians determined which patients met the criteria and lead them for the data collecting. Information about demographic factors, personal and family history of cardiovascular disease, hypertension, diabetes, smoking and medication were obtained using a questionnaire developed on the basis of the previous studies (10,11).

Smoking was assessed by self-reporting of patients. People who currently smoke were defined as 'smokers. Medication information (generic name and total daily dose of the anti-platelet, beta-blocker, lipid-lowering drugs, angiotensin-converting enzyme (ACE) inhibitors, calcium antagonist, diuretics and anticoagulants) was obtained from the records and patient notification. If the patient stated they took medication at the recommended dose and frequency, they were classified as complying with the treatment.

The food consumption frequency form developed based on literature (13,14) by researchers was used to determine the frequency of food consumption. Evaluation of food consumption resulted in classification as 'healthy diet' if the patient used oil (olive oil), cut out fat, decreased consumption of sugar or sweets, decreased or discontinued consumption of salt, consumed fruit and vegetable  $\geq 2$  servings daily, ate fish 1-2 times in a week, and not consumed alcoholic drinks or consumed  $\leq 2$  alcoholic drinks for men per day and  $\leq 1$  alcoholic drinks for women (13).

Physical activity levels were determined by the International Physical Activity Questionnaire (IPAQ), which measured frequency and duration of moderate activity, vigorous activity and walking performed in the last week (15). Tests for validity and reliability of the questionnaire were performed (16). In the present study, the short IPAQ form was used. The physical activity target was defined as 'vigorous activity for at least 20 minutes three or more times a week' or 'moderate-intensity activity or walking for at least 30 minutes five or more times a week'.

### Measures

Blood pressure was measured in standardized conditions. The mean of two readings was used for analysis. Elevated blood pressure was defined as systolic blood pressure (SBP)  $\geq 140$  mmHg and/or diastolic blood pressure (DBP)  $\geq 90$  mmHg. Height and weight were measured in patients wearing light clothes without shoes. Obesity was defined as body mass index (BMI)  $\geq 30$  kg/m<sup>2</sup> and overweight as BMI  $\geq 25$  kg/m<sup>2</sup>. Waist circumference (WC) was measured at the midpoint between the lowest rib and the superior iliac crest while patients were standing (13). Central obesity was defined as a waist circumference of  $\geq 102$  cm for men and  $\geq 88$  cm for women.

A 12-hour fasting blood sample was obtained on the day of physical examination. Venous blood measured serum total and HDL cholesterol, triglycerides, plasma glucose and glycated haemoglobin A1c (HbA1c). HbA1c was measured only in previously diagnosed diabetic patients. Low-density lipoprotein (LDL) cholesterol was calculated by the Friedewald equation when the triglyceride level was less than 400 mg/dL (13). Elevated total cholesterol was defined as  $\geq 190$  mg/dL, elevated LDL cholesterol  $\geq 70$  mg/dL and LDL cholesterol  $\geq 100$  mg/dL, hypertriglyceridemia  $\geq 150$  mg/dL and HDL cholesterol  $< 40$  mg/dL in men and  $< 45$  mg/dL in women. Elevated fasting plasma glucose (FPG) was defined as  $\geq 126$  mg/dL, and among patients with diabetes, elevated HbA1c as  $\geq 6.5\%$  and elevated FPG as  $\geq 110$  mg/dL.

### Ethical Considerations

For this study, University Scientific Researchs Ethics Committee approval was obtained on 25 April 2013 (protocol no. 51). Written informed consent was obtained from all patients. Written permission from the education and research hospital administrators was also obtained.

### Data Analysis

SPSS version 19.0 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp) was used for statistical analysis. Continuous variables are presented as mean  $\pm$  SD. Categorical variables were reported as count and percentage, and differences in categorical variables were evaluated using Pearson's Chi-square test. The probability values were two-sided; a value  $\leq 0.05$  was considered statistically significant.

## RESULTS

### Patients and their characteristics

A total of 136 patients were interviewed at least 6 months after admission for an acute coronary event or procedure. The majority of patients (60.3%) had AMI. The majority of participants (72.1%) were over 60 years of age. The mean age was  $64.5 \pm 10.2$  years. The majority (77.2%) were men, had completed primary school (56.6%) and were retired (84.6%). The percentage of family history reported for CHD (men  $< 55$  and women  $< 65$  years) was 56.6% (Table 1).

**Table 1.** Demographic characteristics of the patients (N=136)

Characteristics	n	%
<b>Event type</b>		
AMI	82	60.3
CABG	28	20.6
PCI	26	19.1
<b>Age( mean±SD);64.5±10.2</b>		
<50	15	11.0
50-59	23	16.9
60-69	54	39.7
≥70	44	32.4
<b>Gender</b>		
Female	31	22.8
Male	105	77.2
<b>Education</b>		
Literate	38	27.9
Primary /secondary school	77	56.6
High school	12	8.8
University	9	6.6
<b>Employment status</b>		
Working	21	15.4
Retired /does not work	115	84.6
<b>Other diseases</b>		
No	49	36.0
Yes	87	64.0
<b>Family history of CHD</b>		
Yes	77	56.6
No	59	43.4

AMI:Acute myocardial infarction.CABG: Coronary artery bypass graft, PCI: Percutaneous coronary intervention.

#### Lifestyle, risk factors and drug therapy

Of the patients, 19.9% were smokers, 44.8% were inactive (33.8% no physical activity, 11.0%, reported walking 10-20 minutes <3 times a week) and 55.2% were physically active. Moderate and vigorous physical activity was reported by 8.8% and 3.0%, respectively. Of all the patients, 43.4% of patients reported walking at least 30 minutes five or more times a week.

Despite the fact that more than half (63.2%) of patients reported that they maintained a healthy diet, 36.8% still did not. All patients (100%) reported that they used olive oil in their daily diet. The majority (88.9%) of patients reported using reduced/no salt, 82.4% consumed fruit ≥2 servings per day and 89.7% consumed vegetables ≥2 servings per day. Of the patients, 19.1% discontinued alcohol consumption, and 11.8% (men) consumed ≤ 6 alcoholic drinks per week. Of the patients, 63.9% consumed fish 1-2 times a week.

The mean (SD) BMI and WC were 29.3 (4.9) kg/m<sup>2</sup> and 103.7 (12.4) cm, respectively. Of the patients, 40.4% were overweight (BMI= 25.0-29.9 kg/m<sup>2</sup>) and 41.2% were obese (BMI ≥30 kg/m<sup>2</sup>). The percentage of central obesity (WC ≥88 cm in women and ≥102 cm in men) was 65.4%. The proportion of high total cholesterol, triglycerides and LDL cholesterol levels (≥100mg/dL) were 44.1%, 33.1% and 56.6%, respectively. Only for 21.3% the LDL cholesterol level was <70mg/dL. 19.9% of patients had low HDL cholesterol (<40 mg/dL for men and <45 mg/dL for women). Target blood pressure was reached by 64.7%. However, 35.3% of patients had high blood pressure. In this study, 33.8% of the coronary patients had diagnosed diabetes previously. 5.1% of patients who were not previously diagnosed with diabetes had FPG of >126 mg/dL.

For this reason, the percentage of diagnosed and undiagnosed diabetic patients was 38.9%. 67.4% of patients who previously had diagnosis of diabetes had a FPG ≥ 110 mg / dL and 52.1% had a HbA1c ≥ 6.5% (Table 2).

**Table 2.** Percentage of patients not reaching recommended coronary heart disease risk factor targets (N=136)

Risk Factors	n	%
Smoking	27	19.9
Physical inactivity	61	44.8
Not make a healthy diet	50	36.8
Overweight	55	40.4
Obese	56	41.2
Central Obesity	89	65.4
High triglyceride (mg/dL)	45	33.3
High total cholesterol (mg/dL)	60	44.1
High LDL-cholesterol 1(≥70mg/dL)	107	78.7
High LDL-cholesterol 2 (≥100mg/dL)	77	56.6
Low HDL- cholesterol (mg/dL)	27	19.9
Fasting plasma glucose > 126 mg/dL	26	19.1
Diabetes	53	38.9
Previously diagnosed diabetes HbA1C ≥%	24	52.1
High blood pressure	48	35.3

At the time of the interview, 98.5% of patients were taking antiplatelet medication, 80.9% beta-blockers, 33.8% angiotensin-converting enzyme inhibitors (ACEI)/angiotensin-receptor blockers (ARBs), and only 39.7% lipid-lowering medication (Table 3). Almost all subjects (92.0%) reported that they adhered to taking prescribed medication as directed. Only four patients (2.9%) reported that they had occasionally forgotten to take their lipid-lowering medication, four patients (2.9%) had occasionally forgotten to take antiplatelet medication, and three patients (2.2%) had occasionally forgotten to take beta-blockers.

**Table 3.** Medication (%) used at the time of interview (N=136)

Medication	n	%
Antiplatelets	134	98.5
Beta-blockers	110	80.9
Lipid-lowering drugs	54	39.7
ACE inhibitors/ angiotensin II receptor blockers	46	33.8
Calcium antagonists	13	9.6
Diuretics	14	10.3
Anticoagulants	8	5.9

ACE: Angiotensin-converting enzym.

There were three statistically significant differences according to age. The majority of patients ≥65 years had high LDL cholesterol (LDL ≥ 100 mg/dL;  $\chi^2=8.149$ ,  $p=0.004$ ). Patients <65 years were more likely than patients ≥65 years to smoke ( $\chi^2=5.199$ ,  $p=0.023$ ). More than half (58.3%) of patients ≥65 years were physically inactive ( $\chi^2=11.240$ ,  $p=0.001$ ). There were no age differences in terms of obesity, total cholesterol, HDL cholesterol, triglycerides, hypertension and smoking.

There were no differences among patients who had risk factors above targets such as obesity, elevated LDL cholesterol, elevated total cholesterol, decreased HDL cholesterol, elevated triglycerides, hypertension, smoking and physical inactivity according to gender and diagnosis (Table 4).

**Table 4.** Percentage of patients not reaching recommended risk factor targets by gender, age and event type

	Total N=136	Risk Factors															
		Obesity		Elevated LDL-C <sup>a</sup>		Elevated TC <sup>b</sup>		Decreased HDL-C <sup>c</sup>		Elevated TG <sup>d</sup>		Raised Blood Pressure		Current Smoking		Physical Inactivity	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
<b>Gender</b>																	
Women	31	15	48.4	19	61.3	17	54.8	6	19.4	7	22.6	10	32.3	7	22.6	18	58.1
Men	105	41	39.0	58	55.2	43	41.0	21	20.0	38	36.2	38	36.2	20	19.0	43	41.0
$\chi^2$ / P value		0,862/0,353		0,357/0,550		1,872/0,171		0,006/0,937		2,002/0,157		0,162/0,687		0,188/0,665		2,833/0,092	
<b>Age</b>																	
<65	64	26	40.6	28	43.8	24	37.5	11	17.2	22	34.4	23	35.9	18	28.1	19	29.7
≥65	72	30	41.7	49	68.1	36	50.0	16	22.2	23	31.9	25	34.7	9	12.5	42	58.3
$\chi^2$ / P value		0,015/0,902		8,149/0,004		2,147/0,143		0,540/0,463		0,090/0,764		0,022/0,882		5,199/0,023		11,240/0,001	
<b>Event Type</b>																	
AMI	82	33	40.2	47	57.3	35	42.7	15	18.3	27	32.9	29	35.4	14	17.1	37	45.1
CABG	28	15	53.6	15	53.6	10	35.7	6	21.4	8	28.6	11	39.3	6	21.4	14	50.0
PCI	26	8	30.8	15	57.7	15	57.7	6	23.1	10	38.5	8	30.8	7	26.9	10	38.5
$\chi^2$ / P value		2,968/0,227		0,134/0,935		2,814/0,245		0,339/0,844		0,598/0,742		0,429/0,807		1,259/0,533		0,732/0,694	

<sup>a</sup>Low-density lipoprotein cholesterol; <sup>b</sup>Total cholesterol; <sup>c</sup>High-density lipoprotein cholesterol; <sup>d</sup>Triglycerides.

## DISCUSSION

This study showed that the achievement rate of treatment targets recommended for secondary prevention in coronary patients was low. Almost one-fifth of patients still smoked, nearly half were inactive, more than one-third had high blood pressure, and more than half had elevated LDL cholesterol. Likewise, most were overweight or obese, more than half were centrally obese, and more than half of patients previously diagnosed with diabetes had an HbA1c ≥6.5%. The majority of patients ≥65 years had high LDL cholesterol and were physically inactive and patients <65 years were more likely than patients ≥65 years to smoke. Adherence to cardioprotective drug therapies was high, but the use of lipid-lowering medication and ACEI or ARBs was low.

Regular exercise following an acute coronary event reduces mortality (17,18). However, adherence to regular exercise after a coronary event is lower than expected. In the present study, 44.8% of patients reported they were inactive. The EUROASPIRE IV survey results showed that 59.9% of patients in Europe perform little or no physical activity after a coronary event (16). Another study, conducted in Turkey, demonstrated that more than half (54.5%) of coronary patients are immobile (10). Sedentary lifestyle is an important risk factor for coronary heart disease and conversely, regular physical activity is protective (4). Moreover, studies show that physical activity reduces the incidence of CHD among older adults (19,20). Therefore, regular physical activity and aerobic exercise should be recommended to all patients after a coronary event (13). These patients should follow up continuously with a health professional to ensure adherence to physical activity.

Adherence to a healthy diet after a coronary event is generally good (11,21). In this study, more than two-third of patients reported that they maintained a healthy diet. It is aimed to obtain the population's eating habits which decreases the risk of cardiovascular diseases in the scope of "Turkey Cardiovascular Diseases Prevention and Control Program 2015-2020 Action Plan" developed by the Ministry of Health (22). Factors such as patients' receiving diet education at the clinic and special programs conducted by health personnel about improving healthy eating habits may have affected diet compliance.

Smokers with a coronary history have an increased risk of mortality and morbidity (23). However, smoking cessation is associated with a significant decrease in long-term mortality risk in patients with AMI (24). Nevertheless, 19.9% of the patients were still smoking at least 6 months after a coronary event. Moreover, patients <65 years were more likely than patients ≥65 years to smoke. Several studies have determined that patients continue to smoke after a coronary event (10,25). Varenicline, in conjunction with low-intensity counseling, is efficacious for smoking cessation of patients with acute coronary syndrome (26). A randomized controlled trial of a nurse-led smoking cessation program significantly reduced smoking rates in coronary patients (27).

Smoking patients may need help with smoking cessation. Therefore, smoking patients should be referred to a smoking cessation clinic to receive professional advice, and, where necessary, be provided pharmacological support to stop smoking (23, 27).

In short, there is evidence that increased physical activity, smoking cessation, and combined dietary changes reduce mortality in CHD patients (17). Therefore, lifestyle modifications should be prioritized similarly to other secondary preventive medications immediately after acute coronary syndrome (17).

In this study, a majority (81.6%) of patients were overweight or obese, and more than half (65.4%) were centrally obese. The inability to control weight is a significant problem for coronary patients. Several studies show a majority of patients cannot control their weight after a coronary event (21,25,28). In the EUROASPIRE IV survey, the prevalence rates of overweight and obesity were 82.1% and 37.6%, respectively (11). Being obese and overweight are associated with a high mortality risk among those with CHD. BMI and waist circumference are also associated with higher blood pressure, lipoprotein particles, and diabetes (29). The frequency of obesity in Turkey is increasing for both genders in the age group older than 35 (30). All coronary patients should be provided with support and included in the preventive cardiology programs by health care personnel to bring BMI to the normal values and reduce central obesity rates. Diet, physical activity, behavior changes and, if necessary, drug therapy are important treatment options for the control of obesity (13).

Diabetes mellitus is associated with a higher incidence of AMI. Among those with a history of AMI, 11% are diabetic (31). At the same time, diabetic patients have a substantially higher mortality rate after acute myocardial infarction than non-diabetic patients (31,32). However, elevated glucose concentration is a modifiable risk factor for CHD. A randomized controlled study showed that intensive glucose control reduces the incidence of a combined primary outcome of major macrovascular and microvascular events in patients with type 2 diabetes (33). Furthermore, intensive glucose lowering treatment reduces risks of any myocardial infarction (34). The percentage of patients in this study with diabetes, either diagnosed or undiagnosed, was 38.9%. Of patients previously diagnosed with diabetes, 67.4% had a FPG level ≥110 mg/dL and 52.1% had an HbA1c ≥6.5%. In another study conducted in Turkey, the glucose level was below 110 mg/dl in 14.7 % of the diabetes patients (10). Therefore, diabetic patients require intensive glucose control. Management of diabetes according to the guidelines will improve patient outcomes. However, a study conducted in Turkey in recent years found the prevalence of diabetes as 16.5% (8). The results of this study showed that diabetes in adults is gradually increasing and has become a public health problem. "Turkey Diabetes Prevention and Control Program Action Plan" (35) as well as other national health practices are developed and administered for the prevention and treatment of diabetes, prevention of complications, improving quality of life and decreasing the death rate in Turkey from diabetes.

Serum lipids levels are independent risk factors for acute myocardial infarction. Lower values reduce risk (36). This study showed more than two-thirds (78.7%) of patients had LDL cholesterol  $\geq 70$  mg/dL and 56.6% had  $\geq 100$  mg/dL. Despite these results, only 39.7% of patients were using lipid-lowering medication.

Lifestyle changes and use of lipid-lowering treatment recommended by guidelines are not at the desired level, especially among elderly coronary patients. Statin therapy is effective for the prevention of major vascular events. A meta-analysis of efficacy and safety of LDL-lowering treatments showed that statin therapy reduces coronary events and death (37). However, it is important to comply with cholesterol-lowering treatment after discharge to reduce LDL cholesterol.

In this study, more than one-third (35.3%) of patients had not achieved a blood pressure target of less than 140/90 mmHg. Several studies showed that approximately half (11,25) of patients had high blood pressure. A meta-analysis of 61 cohort studies showed systolic and diastolic blood pressure is strongly and directly related to cardiovascular mortality (38). An increase in systolic and diastolic blood pressure increases cardiovascular mortality risk. Reduction of blood pressure reduces the risk of cardiovascular mortality. A recent meta-analysis of randomized trial evidence showed a reduced risk of major cardiovascular disease events in patients with a history of CVD by lowering blood pressure (39). In guidelines on cardiovascular disease prevention, it is recommended that lifestyle changes, and where necessary, blood pressure-lowering drugs, help to achieve blood pressure targets (13). The inability to control blood pressure after a coronary event is a significant problem for patients. Patients need to adhere to their prescribed antihypertensive medication and make lifestyle changes to control their blood pressure. Therefore, it is important for healthcare providers to offer sufficient follow-up and education for their patients.

Evidence-based therapies for CVD prevention are recommended in guidelines and long-term adherence is associated with lower mortality (40). The medication adherence rate in this study was good (92.0%). However, the use of lipid-lowering medication (39.7%) and ACEi or ARBs (33.8%) were much lower than expected. In another study conducted in Turkey, the use of lipid-lowering medication and ACEi/ARBs were 65.9% and 69.0%, respectively (10). Generally, adherence to secondary preventive drug treatment is good. Other studies also report a high level of medication adherence. One study showed that all patients reported taking medication as directed all the time (28). Likewise, another study reported that a majority of patients (88.0%) showed good adherence to the prescribed medication regimen (21). Although adherence to treatment in these studies was good, poor adherence is considered a critical barrier to treatment success (40) and healthcare professionals must focus on improving long-term adherence.

This study found that older patients were less successful at reaching physical activity and low-density lipoprotein cholesterol targets than younger patients. However, younger patients were less successful at quitting smoking. A study conducted in Australia found that smoking, physical activity and total cholesterol targets did not reveal differences according to age (25). A study conducted in Turkey about the frequency of chronic diseases and risk factors showed that the rate of quitting smoking at an older age was higher, and hyperlipidemia prevalence and physical inactivity increased with age (30). Although the benefit of secondary prevention for elderly patients is known (41), the participation rates of these patients in cardiology prevention programs were low and they could not complete these programs (42). Therefore, older patients need preventive cardiology programs more. In Turkey, secondary prevention in coronary patients is not at a beneficial level. The number of patients participating in the preventive cardiology programs is low (10) These programs are present only in a limited number of hospitals. Therefore, large proportions of coronary patients can not benefit from these programs. Inadequate patient education and highly insufficient regular monitoring may hinder achievement of lifestyle, risk factor and drug therapy targets (10). Therefore, dissemination of multidisciplinary cardiac rehabilitation or secondary prevention programs and development of new strategies are of primary importance.

## CONCLUSION

Results of this study showed that the achievement rate of treatment targets recommended for secondary prevention in coronary patients was low. Elderly patients had high LDL cholesterol and were physically inactive and younger patients had high smoking rates. Patients with established CHD are at the highest risk for experiencing future coronary events. The results also reveal the need for preventive cardiology programs in clinical practice.

## Conflict of interest

No conflict of interest was declared by the authors.

## Acknowledgements

This project was funded by by Mugla Sıtkı Kocman University Scientific Research Projects Coordination Unit (13/192). Our thanks to the staff and patients from Mugla Sıtkı Kocman University Education and Reseach Hospital was involved in this study.

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