

# Survey of Risk Factor Management (SURF) data of Turkey: Cardiovascular risk factor control ratios in 15 different types of healthcare centers

## SURF (Survey of Risk Factor Management) çalışması Türkiye değerlendirmesi: Farklı basamaklardan 15 sağlık merkezinin verilerinde kardiyovasküler risk faktörleri kontrol oranları

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### ABSTRACT

**Objective:** The aim of this study was to evaluate the adherence to recommendations for secondary prevention and the achievement of treatment targets for the control of risk factors in patients with established coronary heart disease (CHD) who were followed-up at various healthcare facilities in Turkey.

**Methods:** According to the protocol of the international Survey of Risk Factor Management study, questionnaire forms were completed and demographic, anthropometric, and laboratory data of CHD patients who were followed-up at a total of 15 selected primary, secondary, and tertiary healthcare centers were recorded.

**Results:** Among a total of 724 CHD patients (69.8% male; mean age: 63.3±10.7 years) included in the study, 18.4% were current smokers, only 19.1% had normal body mass index, and 22.1% had waist circumference below the limit of abdominal obesity. Physical activity was insufficient in 53% of the patients, 47.3% had low high-density lipoprotein cholesterol value, 46% had triglyceride level above 150 mg/dL, and 67% had glycated hemoglobin value of 6.5% or above. Of all the patients, 88.1% were using antiplatelet drugs, 71.4% were using beta-blockers, 55.7% were using statins, and 41.9% were using angiotensin-converting enzyme inhibitors/angiotensin receptor blockers. Blood pressure was under control in 56.7% of the hypertensive patients using antihypertensive drugs, and the proportion of diabetic patients who reached glycemic control targets using antidiabetic drugs was 35.9%. Low-density lipoprotein cholesterol was below 70 mg/dL in 12.2% of the patients using statins.

**Conclusion:** According to the data obtained, among Turkish CHD patients, the control rate of cardiovascular risk factors is low, and implementation of the recommendations regarding lifestyle modification and medication use for secondary prevention in the current guidelines are insufficient.

### ÖZET

**Amaç:** Bu çalışmanın amacı, ülkemizdeki değişik basamaklardaki sağlık merkezlerinde izlenmekte olan koroner kalp hastalığı (KKH) olan hastalarda sekonder koruma önerilerine uyum ve risk faktörleri kontrolü için önerilen hedef değerlere ulaşım oranlarının değerlendirilmesi.

**Yöntemler:** Birinci, ikinci ve üçüncü basamaklardan seçilmiş toplam 15 merkezde izlenmekte olan KKH'li hastaların uluslararası SURF (Survey of Risk Factor management) protokolüne uygun olarak anket formları doldurularak, demografik, antropometrik ve laboratuvar verileri kaydedildi.

**Bulgular:** Çalışmaya alınan toplam 724 KKH'li hastanın (%69.8 erkek, ortalama yaş: 63.3±10.7) %18.4'ü halen sigara kullanmakta, sadece %19.1'inin beden kütle indeksi normal sınırlarda ve %22.1'inin bel çevresi abdominal obezite sınırının altında idi. Hastaların %53'ünün fiziksel aktivite düzeyleri yetersiz, %47.3'ünün yüksek yoğunluklu lipoprotein kolesterol düzeyi düşük, %46'sının trigliserit düzeyi 150 mg/dL'nin üstünde, %67'sinin HbA1c düzeyi %6.5 ve üzerindedir. Hastaların %88.1'i antiagregan, %71.4'ü beta bloker, %55.7'si statin ve %41.9'u anjiyotensin dönüştürücü enzim inhibitörü/anjiyotensin reseptör blokleri kullanmaktaydı. Hipertansiyonu olan ve antihipertansif ilaç kullanan hasta grubunun %56.7'sinde kan basıncı kontrol altında, diyabet tanısı olan ve antidiyabetik ilaç kullanan hasta grubunda glisemik kontrol hedeflerine ulaşma oranı %35.9 idi. Statin kullanan hasta grubunun %12.2'sinde düşük yoğunluklu lipoprotein kolesterol 70 mg/dL'nin altındaydı.

**Sonuç:** Ülkemizdeki çeşitli basamaklardaki sağlık merkezlerinden elde edilen verilere göre, KKH'li hastalarda kardiyovasküler risk faktörleri kontrol oranı düşük, güncel kılavuzların önerdiği yaşam tarzı değişiklikleri ve ilaç kullanımı yetersizdir.

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Recently, the mortality of age-related coronary artery disease has been reduced, especially in countries with a high income level, with the increase in application of therapies performed for primary and secondary prevention of atherosclerotic cardiovascular diseases (ASCVD). However, statistical results show that cardiovascular diseases are still the most important cause of mortality both in our country and worldwide.<sup>[1]</sup>

Since the risk of development of disease-related complications is high in patients with a diagnosis of ASCVD, secondary prevention strategies consisting of both lifestyle modifications and therapeutic management are very important in the follow-up of patients.<sup>[2,3]</sup> Therefore, the guidelines consider patients with proven ASCVD the highest risk group, and suggest treatment recommendations.<sup>[4]</sup>

Population-based studies are being conducted in order to investigate how successfully the recommended therapies have been applied. The European Action on Secondary Prevention by Intervention to Reduce Events (EUROASPIRE) questionnaire study conducted in Europe, including our country, is the most important example. The results of EUROASPIRE studies have demonstrated that the control of modifiable risk factors in secondary prevention is generally insufficient.<sup>[5,6]</sup>

Instead of a long questionnaire, as used in the EUROASPIRE study, a questionnaire that can be completed in a very short period during a routine outpatient visit might be more feasible for common usage. Such a form could eliminate effects related to selection and participation, decrease the cost, and suggest data about a larger population. The Survey of Risk Factor Management (SURF) study was planned with this objective, and used a simple questionnaire that involved demographic, anthropometric, and laboratory data of patients with established cardiovascular dis-

#### Abbreviations:

|       |                                         |
|-------|-----------------------------------------|
| ARB   | Angiotensin receptor blocker            |
| ASCVD | Atherosclerotic cardiovascular diseases |
| BP    | Blood pressure                          |
| CAB   | Coronary artery bypass                  |
| CABG  | Coronary artery bypass graft            |
| CHD   | Coronary heart disease                  |
| CVD   | Cardiovascular disease                  |
| DBP   | Diastolic blood pressure                |
| DM    | Diabetes mellitus                       |
| HbA1c | Glycated hemoglobin                     |
| HDL   | High-density lipoprotein                |
| HT    | Hypertension                            |
| LDL   | Low-density lipoprotein                 |
| PCI   | Percutaneous coronary intervention      |
| SBP   | Systolic blood pressure                 |
| SURF  | Survey of Risk Factor Management study  |

ease.<sup>[7]</sup> This pilot study and its first report, as well as a subsequent report of 11 countries' data, confirmed the viability of this questionnaire as an international risk factor audit system that can be completed within a very short time, less than 2 minutes per patient, to complement the EUROASPIRE study.<sup>[8]</sup>

The objective of our study was to evaluate the adherence to the recommendations for secondary prevention in coronary heart disease (CHD) patients, and to assess the treatment targets achieved, using data obtained from different types of healthcare facilities in Turkey, and to determine possible management gaps in CHD patient follow-up.

## METHODS

The SURF study was initiated in countries representing Europe, Asia, and the Middle East, with the cooperation of the European Association for Cardiovascular Prevention and Rehabilitation. The results of 7 countries were reported in a pilot study.<sup>[7]</sup> Subsequently, results were published for 11 countries, representing Europe (Belgium, Croatia, Denmark, Ireland, Italy, Northern Ireland, Romania, Russia), the Middle East (Saudi Arabia), and Asia (Taiwan and China).<sup>[8]</sup> Turkey joined the SURF trial after receiving the results of this follow-up. The present study is an analysis of the SURF data of the study population from Turkey who were enrolled in the trial from a number of different care centers.<sup>[7]</sup> Colleagues working at primary, secondary, and tertiary healthcare centers from various regions of Turkey were asked to participate, and those that agreed were included. The centers contributing to the study consisted of 3 primary, 5 secondary, and 7 tertiary healthcare centers in Ankara, İstanbul, Antalya, Ordu, Balıkesir, Şırnak, Elazığ, Mardin and Çanakkale.

Fifteen centers of different healthcare settings (i.e., primary, secondary and tertiary healthcare facilities) from Turkey participated in the SURF Turkey study between November 2014 and November 2015. The study protocol was approved by the ethics committee of Hacettepe University. The study was conducted according to the recommendations of the World Medical Association Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects, Guidelines for Good Clinical Practices and Guidelines for Good Laboratory Practices.

Questionnaires were completed regarding CHD patients who were seen during routine follow-up visits once the study was initiated in these centers. Consecutive adult patients with the following objective findings related to CHD who presented for outpatient follow-up visits were included in the study.

CHD was defined as:

- Having coronary artery by-pass graft (CABG) or elective or urgent percutaneous coronary intervention (PCI),
- Acute coronary syndrome (ischemic changes on consecutive electrocardiograms with cardiac chest pain at rest, and/or increased troponin or serum creatine kinase MB isoenzyme), or,
- Stable angina pectoris (presence of at least one of the following findings together with clinical angina: definitely positive effort test, positive myocardial perfusion scintigraphy, presence of stenosis above 70% in any vessel on coronary angiography).

The centers were asked to obtain the demographic, clinical, and laboratory data stated below during examination and to record them in the study form.

- CHD category (CABG, elective or urgent PCI, acute coronary syndrome, stable angina pectoris),
- Smoking history (current smoker/non-smoker [quit >6 months ago] never smoked),
- Education level (age of final graduation from school),
- Physical activity (less, more, or equal to recommended level, defined as 30 minutes of moderately vigorous activity most days of the week),
- Familial history of early cardiovascular disease (history of ASCVD in first degree relatives at the age of <55 years in males and <65 years in females),
- Diagnoses previously reported to the patient: hypertension, hyperlipidemia, type 1 or type 2 diabetes mellitus (DM),
- Participation in cardiac rehabilitation,
- Cardiac medication (use of anti-platelet, beta-blocker, calcium antagonist, statin, other hy-

perlipidemia drugs, angiotensin converting enzyme inhibitors, angiotensin receptor blockers, other antihypertensive drugs, nitrates, insulin, other oral antidiabetic drugs.).

In addition to these data, the systolic and diastolic blood pressure (SBP and DBP), height, weight, and waist circumference were measured during outpatient follow-up visits. The measurements were performed by physicians or nurses.

Fasting blood glucose, total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL) cholesterol, and triglyceride values measured in the last 1 year, and glycated hemoglobin (HbA1C) values (if the patient was diabetic) were recorded. These data were not recorded if they were lacking.

Hypertension (HT), dyslipidemia, and DM were respectively defined as:

- HT: use of antihypertensive or elevated blood pressure level ( $>140/90$  mmHg),
- Dyslipidemia: use of statin or total cholesterol level of  $\geq 200$  mg/dL, LDL-cholesterol level of  $\geq 130$  mg/dL, triglyceride level of  $\geq 150$  mg/dL, HDL cholesterol level of  $\leq 40$  mg/dL in men and HDL cholesterol level of  $\leq 50$  mg/dL in women,
- DM: use of antidiabetic drug and/or fasting blood glucose level of  $\geq 126$  mg/dL or glycated hemoglobin (HbA1c) level of  $\geq 6.5\%$

Disease control for HT, dyslipidemia, and DM were respectively defined as:

- BP control: BP in control = SBP  $<140$  mmHg and DBP  $<90$  mmHg vs. Uncontrolled BP = SBP  $\geq 140$  mmHg or DBP  $\geq 90$  mmHg,
- DM control: DM in control = glycated hemoglobin (HbA1c)  $<7\%$  vs. Uncontrolled DM = HbA1c  $\geq 7\%$ ,
- LDL control 1: LDL in control = LDL  $<70$  mg/dL vs. Uncontrolled LDL = LDL  $\geq 70$  mg/dL,
- LDL-control 2: LDL in control = LDL-C  $<100$  mg/dL vs. Uncontrolled LDL = LDL  $\geq 100$  mg/dL.

### Statistical analysis

Descriptive statistics were used to define continuous variables (mean  $\pm$  SD, minimum, median, maximum,

25<sup>th</sup> and 75<sup>th</sup> percentiles). Frequency and percentage were used to define discontinuous variables. In comparison of categorical variables, chi-square test was used generally, and Fisher's exact test and Mantel-Haenszel chi-square test were used when appropriate. In comparison of 2 groups, Student's t-test was used for continuous variables that showed a normal distribution, and Mann-Whitney U test was used for continuous variables that did not show normal distribution. All statistical tests were 2-tailed, with  $p < 0.05$  regarded as being statistically significant. All statistical analyses were performed using MedCalc Statistical Software version 12.7.7 (MedCalc Software BVBA, Ostend, Belgium).

## RESULTS

A total of 724 patients were included in the analysis; 505 (69.8%) patients were male, while 219 (30.2%) were female. The mean age of the patients was  $63.3 \pm 10.7$  years.

Of all the patients, 54% had history of PCI (urgent or elective coronary balloon angioplasty or stent), 35.6% had previously undergone CABG, 21.7% had been diagnosed with acute coronary syndrome, and 8% had been diagnosed with stable angina pectoris. The difference in diagnosis according to gender is provided in Table 1.

The demographic, anthropometric, and laboratory data of the patients are summarized in Table 2.

Of the patients, 18.4% were current smokers. The rate of smoking was found to be 6.8% in female patients, and 23.4% in male patients; that difference was statistically significant ( $p < 0.001$ ). In all, 47.8% had quit smoking, whereas 33.8% had never smoked. The

rate of having never smoked was found to be 74.4% in female study participants, and 16.2% in males. The rate of smoking cessation was determined to be 18.7% in female subjects and 60.4% in male subjects.

In the evaluation of physical activity, 53% of the patients included in the study (69.9% of the female patients and 45.7% of the male patients), performed physical activity for a shorter period than specified (30 minutes, 3 to 5 times a week). Approximately 47% of the patients performed physical activity for 30 minutes or longer, 3 to 5 times a week.

Of the patients, 41% had a familial history of early cardiovascular disease, 74.2% had history of hypertension (83.6% of female patients and 70.1% of male patients;  $p < 0.001$ ), 60.8% had dyslipidemia (53% of female patients and 64.2% of male patients;  $p = 0.005$ ), and 42.5% had Type 2 DM (50.2% of the female patients and 39.2% of the male patients;  $p = 0.005$ ). Only 1.2% of the patients had Type 1 DM (0.5% of female patients and 1.2% of male patients;  $p < 0.05$ ). Among all the patients, 9.4% participated partially or fully in cardiac rehabilitation programs.

The mean systolic blood pressure (SBP) value of the patients was found to be 131.9 mmHg and the mean diastolic blood pressure (DBP) was 79.5 mmHg. The mean pulse rate was determined to be 76.4 beats/minute. No significant difference was observed between female and male patients in terms of the mean value of SBP, DBP, and pulse rate ( $p = 0.948$ ,  $p = 0.622$ ,  $p = 0.637$ , respectively).

There was no difference between female and male patients in terms of elevated SBP (39.3% in female patients and 40.8% in male patients;  $p = 0.701$ ) and elevated DBP values (26% in female patients and

**Table 1. Diagnosis of coronary artery disease by gender**

| n (%)                                                                | Female     |            | Male       |            | Total      |            | p     |
|----------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|-------|
|                                                                      | Yes        | No         | Yes        | No         | Yes        | No         |       |
| Coronary artery bypass graft                                         | 59 (26.9)  | 160 (73.1) | 199 (39.4) | 306 (60.6) | 258 (35.6) | 466 (64.4) | 0.001 |
| Percutaneous coronary intervention                                   | 116 (53)   | 103 (47)   | 275 (54.5) | 230 (45.5) | 391 (54)   | 333 (46)   | 0.712 |
| Acute coronary syndrome                                              | 55 (25.1)  | 164 (74.9) | 102 (20.2) | 403 (79.8) | 157 (21.7) | 567 (78.3) | 0.140 |
| Stable angina                                                        | 26 (11.9)  | 193 (88.1) | 32 (6.3)   | 473 (93.7) | 58 (8)     | 666 (92)   | 0.012 |
| Admission to hospital due to cardiovascular disease in the last year | 113 (51.6) | 106 (48.4) | 253 (50.1) | 252 (49.9) | 366 (50.6) | 358 (49.4) | 0.711 |

**Table 2. Demographic, anthropometric, and laboratory data of the patients by gender**

|                                                   | Male<br>(n=505) | Female<br>(n=219) | Total<br>(n=724) | p            |
|---------------------------------------------------|-----------------|-------------------|------------------|--------------|
| Age (years)                                       | 62.4            | 65.3              | 63.3             | <0.001       |
| Smoking (%)                                       |                 |                   |                  |              |
| Non-smoker                                        | 16.2            | 74.4              | 33.8             | <0.001       |
| Quit                                              | 60.4            | 18.7              | 47.8             |              |
| Current smoker                                    | 23.4            | 6.8               | 18.4             |              |
| Physical inactivity (30 minutes 3-5 times a week) | 45.7            | 69.9              | 53               | <0.001       |
| Cardiovascular disease in the family (%)          | 42.4            | 37.9              | 41               | =0.261       |
| Present morbidity (%)                             |                 |                   |                  |              |
| Hypertension                                      | 70.1            | 83.6              | 74.2             | <0.001       |
| Diabetes mellitus                                 | 39.2            | 50.2              | 42.5             | <0.005       |
| Dyslipidemia                                      | 64.2            | 53                | 60.8             | <0.005       |
| Blood pressure (mmHg)                             |                 |                   |                  |              |
| Systolic/diastolic                                | 131.9/79.6      | 131.8/79.1        | 131.9/79.5       | 0.948, 0.622 |
| Pulse rate (beat/min)                             | 76.3            | 76.7              | 76.4             | 0.637        |
| Height (cm)                                       | 170             | 159               | 167              | <0.001       |
| Weight (kg)                                       | 82              | 76.3              | 80.3             | <0.001       |
| Body mass index (kg/m <sup>2</sup> )              | 28.4            | 30.4              | 29               | <0.001       |
| Waist circumference (cm)                          | 100.3           | 99.5              | 100.1            | 0.393        |
| Cholesterol mg/dL (male/female)*                  |                 |                   |                  |              |
| Total (269/120)                                   | 186.1           | 196.8             | 189.4            | 0.048        |
| Low-density lipoprotein (303/141)                 | 113.9           | 116.6             | 114.8            | 0.528        |
| High-density lipoprotein (293/130)                | 42.2            | 42.2              | 44.4             | <0.001       |
| Triglyceride (305/138)                            | 167             | 162.1             | 165.5            | 0.833        |
| Mean glucose (mg/dL)                              | 127.4           | 142.4             | 132.1            | 0.031        |
| Mean HbA1c                                        | 7.3             | 7.6               | 7.4              | 0.231        |

\*Number of patients whose laboratory data were recorded.

26.3% in male patients; p=0.931).

The mean waist circumference was 100.1 cm (99.5 cm in female patients, 100.3 cm in male patients; p=0.393), mean height was found to be 1.67 m (1.59 m in female patients, 1.70 m in male patients; p<0.001), mean body weight was found to be 80.3 kg, (76.3 kg in female patients, 82 kg in male patients; p<0.001) and mean body mass index (BMI) was found to be 29.0 kg/m<sup>2</sup> (30.4 kg/m<sup>2</sup> in female patients and 28.4 kg/m<sup>2</sup> in male patients; p<0.001). Only 19.1% of the patients who were included in the study had a normal BMI value. The prevalence of obesity was determined to be 52.1% in female patients and 31.3% in male patients. The waist circumference value was found to be high in 77.9% of the patients.

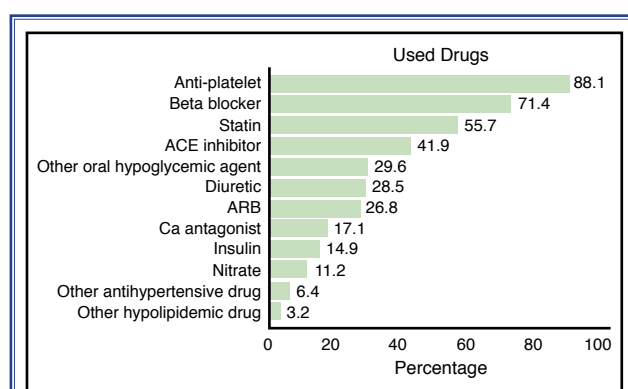
The mean total cholesterol value was 189.4 mg/dL, the mean LDL-C value was 114.8 mg/dL, mean HDL value was 44.4 mg/dL, median triglyceride value was 144 mg/dL, mean glucose level was 132.1 mg/dL, and mean HbA1c level was 7.4%. There was no significant difference between male and female patients in terms of LDL-C, triglyceride, or HbA1c values (p=0.528, p=0.832, p=0.231, respectively). However, total cholesterol, HDL, and glucose levels were found to be higher in female patients compared with male patients (p=0.048, p<0.001, p=0.031). Triglyceride level was found to be below 150 mg/dL in 54% of the patients. No statistically significant difference was present between female and male patients (p=0.765).

The glucose level was found to be below 100 mg/

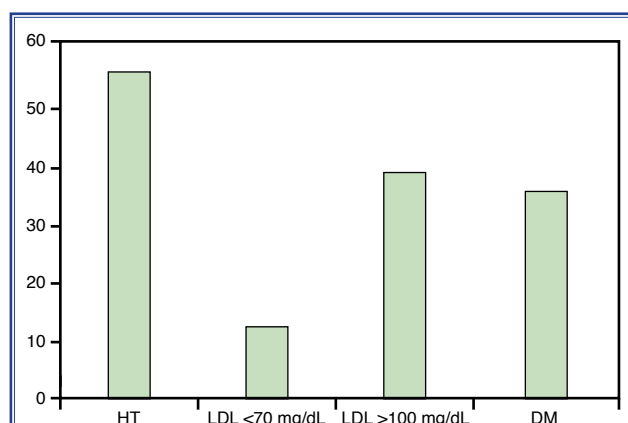


dL in 29.5% of the patients, 100–126 mg/dL in 34.9%, and 126 mg/dL or above in 35.6%. The HbA1c level was below 5.7% in 9.6% of the patients, 5.7% to 6.4% in 23.4%, and 6.5% or above in 67%. No statistically significant difference was found between female and male patients in terms of blood glucose or HbA1c level.

Of the participants, 88.1% were using anti-platelet drugs (84% of female patients and 89.9% of male patients;  $p=0.025$ ), 71.4% were using beta-blockers (70.3% of female patients and 71.9% of male patients;  $p=0.669$ ), 55.7% were using statins (49.8% of female patients and 58.2% of male patients;  $p=0.036$ ), and 41.9% were using angiotensin-converting enzyme (ACE) inhibitors (32% of female patients and 28.3% of male patients;  $p=0.445$ ). The rate of any other drug usage was below 30% (Figure 1).



**Figure 1.** Rate of drug use in patients with known coronary artery disease. ACE: Angiotensin converting enzyme; ARB: Angiotensin receptor blocker; Ca: Calcium.



**Figure 2.** Percentage of disease control in hypertensive, hyperlipidemic, and diabetic patients who were using medication. DM: Diabetes mellitus; HT: Hypertension; LDL: Low-density lipoprotein.

In all, 88.7% of the patients were using antihypertensive drugs, 68% were using renin-angiotensin-aldosterone system blockers, 57.3% were using hypolipidemic drugs and 38.3% were using antidiabetic drugs. Only 1.4% of the patients were using dual hypolipidemic drug combination. Use of hypolipidemic drug combination was higher in male patients compared with female patients ( $p=0.040$ ). Use of anti-diabetic drug combination was higher in female patients compared with male patients ( $p=0.002$ ).

BP was under control in 56.7% of the patient group who had hypertension and who were using antihypertensive drugs. There was no statistically significant difference between female (56.3%) and male (56.9%) patients ( $p=0.904$ ). No statistically significant difference was present between female and male patients in terms of blood glucose control in any group. In the patients who were using a statin, LDL-C level was 70 mg/dL in 12.2% and below 100 mg/dL in 39% (Figure 2). No statistically significant difference was present between female and male patients in terms of LDL control in any group.

## DISCUSSION

Generally, it can be stated that secondary prevention strategies, such as implementing lifestyle changes and drug usage, are not applied sufficiently for patients with known CHD. The SURF questionnaire study<sup>[7]</sup> was conducted to understand the risk profile and to specify how widespread and efficiently the secondary prophylactic precautions recommended by guidelines are used in patients with known coronary artery disease. The present SURF study<sup>[7]</sup> comprised a questionnaire that can be filled out easily and quickly, and healthcare centers of various types were included in the study. Therefore, it reflects the data of a wide population.

The primary data from the international SURF study for Turkey are presented in this article. According to the study results, secondary prevention is generally insufficient in the patient group with known coronary disease in Turkey, given lifestyle changes, anthropometric measurements, and laboratory data.

The positive effects of smoking cessation, diet control, and regular exercise on cardiovascular morbidity and mortality have been demonstrated in many studies.<sup>[9,10]</sup> When the general population was evalu-

ated in Turkey, the rate of smoking in the population aged 15 years or more decreased from 33.4% in 2006 to 27.1% in 2012 as a result of services provided in the fight against tobacco, according to the data of the Ministry of Health.<sup>[11]</sup> According to questionnaire data of the SURF study, the rate of smoking in patients with known coronary artery disease is 18.4%.<sup>[7]</sup> The rate of smoking cessation in the whole group was 48.7%. Considering the marked effect of smoking cessation on cardiovascular mortality, it is very important to refer patients who have not stopped smoking to centers where they can receive better professional support.

The level of physical activity was insufficient in half of the patients who were included in the study. This ratio reached up to 70% in women and higher, compared with men. Since evaluation of physical activity is performed using different intensity and time limits in secondary prevention studies, it is not possible to compare the results. According to the results of the Prospective Urban Rural Epidemiology (PURE) study, only one-third of patients in countries with high-to-moderate income level, including our country, performed a high level of physical activity.<sup>[12]</sup> In the EUROASPIRE III study, change in physical activity following diagnosis of coronary artery disease was evaluated, and it was reported that two-fifths of the patients increased their physical activity, but only one-third performed regular exercise.<sup>[5]</sup>

Cardiac rehabilitation programs are professional programs in which lifestyle changes, including smoking cessation, diet, exercise, and other therapies included in secondary prevention, are recommended and monitored in a multidisciplinary fashion. The rate of participation in these programs was found to be only 9.4% in the SURF study.<sup>[7]</sup> This low rate arises from the fact that these programs are present in only a limited number of hospitals, referral to rehabilitation programs is limited, and patients often do not take note of these programs in our country.

Only 19.1% of the patients included in this study had a normal BMI. Half of the female patients were obese and one-third were overweight. One-third of the male patients were also obese, and more than half were overweight. When waist circumference was evaluated, it was found that only 3.7% of the patients had a normal waist circumference, and one-third of the male patients had a normal waist circumference. In the Metabolic Prevalence Syndrome (METSAR)

study, the mean BMI was found to be 27.7 kg/m<sup>2</sup>, 66.3% of the patients were found to be overweight, and 30.3% were found to be obese.<sup>[13]</sup> When the results of the Turkish Diabetes Epidemiology (TURDEP I and TURDEP II) studies, conducted with an interval of 12 years, were compared, it was found that body weight had increased by 6 kg, waist circumference had increased by 6 cm, and hip circumference had increased by 7 cm in the adult female population, and body weight had increased by 8 kg, waist circumference had increased by 7 cm, and hip circumference had increased by 2 cm in the adult male population. In this study, the prevalence of obesity in Turkey was found to be 32%. In this period, increase in obesity was determined to be 34% in women (from 32.9% to 44.2%) and 107% in men (from 13.2% to 27.3%).<sup>[14]</sup> In the Turkish Adult Risk Factor (TEKHARF) study, mean BMI was found to be 24.4 kg/m<sup>2</sup> in men and 26.4 kg/m<sup>2</sup> in women, and obesity rate was 9% in men and 24% in women.<sup>[15,16]</sup> In another population study conducted later, it was demonstrated that the mean BMI increased over time in a follow-up period of 15 years.<sup>[17]</sup>

When the comorbidities were evaluated, it was found that 74.2% of the patients had HT, 60.8% had dyslipidemia, and 42.5% had type 2 DM. When disease control rates were evaluated, it was observed that increased BP was controlled in only 55.9% of patients.

Dyslipidemia was present approximately in two-thirds of patients. It was found that 39.7% had LDL-C value below 100 mg/dL and 12.2% had LDL-C value below 70 mg/dL. Thus, LDL-C level did not reach the targets recommended by the guidelines in 60.3% of patients. The reason for this was understood when the rates of statin use were examined. Only 57.3% of the total patient group was taking a statin. As is known, statins are recommended for patients as a secondary prevention, independent of cholesterol level.<sup>[4]</sup> Despite this, rates of statin use are markedly low in Turkey. The reason for this may be negative campaigns about statin treatment conducted in social media. When HDL-C levels were evaluated, it was found that approximately half of patients had a low HDL-C level. In the Turkish Heart study performed by Mahley 20 years ago, it was found that HDL-C level was low in the Turkish population.<sup>[18]</sup> However, population studies conducted later did not support this finding. In the METSAR study, the mean HDL-C level

was found to be 49.2 mg/dL.<sup>[13]</sup> In another study that investigated HDL-C level impact on presence of coronary artery disease in the Turkish population, it was determined that the mean HDL-C level was  $45.0 \pm 10.5$  mg/dL in the group with CHD and  $47.7 \pm 9.0$  mg/dL in the group without CHD.<sup>[19]</sup> Although the HDL level was statistically significantly lower in the group with CHD, it was concluded that it was not generally as low as epidemiological studies had conducted previously.

The rate of anti-platelet use is currently 88.1%, and the rate of statin use is only 57.3%, as discussed previously. In the PURE study, the rate of use of secondary prevention drugs in patients with coronary artery disease was investigated in countries with different income levels.<sup>[20]</sup> In low-income countries, the rate of non-use of cardiovascular medications was 82.8%, whereas this rate was only 12.7% in high-income countries. In moderate-high income countries, including our country, this rate was 67.5%. In the same analysis, it was found that 64.6% of patients with CHD used aspirin, and 72.2% used a statin in high-income countries. This rate decreased further as income level decreased. In moderate-high income countries, the rate of statin and aspirin use was about 20%. When we compare these rates with the SURF data,<sup>[7]</sup> considering the dates of the studies, we can state that use of aspirin and statins have increased over time.

In addition to aspirin and statins, ACE inhibitors are recommended for patients with coronary artery disease, especially when accompanying HT, left ventricular dysfunction, DM, or chronic renal failure.<sup>[21]</sup> An angiotensin receptor blocker (ARB) may be given to this group of patients if ACE inhibitor is not tolerated. Many studies have shown that beta-blockers decrease mortality in CHD in patients with left ventricular dysfunction or previous myocardial infarction. According to the SURF data,<sup>[7]</sup> 68% of patients with CHD used ACE inhibitor or ARB, and 71.4% used beta-blockers. In the PURE study, the rate of ACE/ARB usage was found to be 53.2% and the rate of beta-blocker usage was found to be 47.6% in high income countries, whereas these rates were found to be 30% and 25.4%, respectively, in moderate-high income countries. When the SURF data<sup>[7]</sup> were compared with the PURE data,<sup>[20]</sup> a marked increase was observed in drug use for secondary prevention, though this increase was still not sufficient.

In another study conducted in Turkey, it was demonstrated that mortality and morbidity were high, especially in patients with vascular disease, and that medications recommended for prevention were not used sufficiently in a follow-up period of 1 year in a patient group who had vascular disease or a high risk in terms of cardiovascular disease. In this patient group, hypercholesterolemia (51.4%), obesity (28.7%), and low HDL-C (37.7%) were found to be the most important risk factors and the rate of anti-platelet use (41.3%) and statin use (25.8%) were found to be markedly low. It was observed that the rates did not improve in 1-year follow-up period.<sup>[22]</sup>

The EUROASPIRE III is a multi-center study that investigates lifestyle changes, drug use, and compliance with guidelines in patients with coronary artery disease in 22 European countries, including Turkey. When Turkey and other European countries were compared, it was observed that the age of myocardial infarction was younger, the rate of continuing to smoke was higher, sedentary lifestyle was more prevalent, HDL-cholesterol level was lower, and follow-up rate following a diagnosis of cardiac disease was lower in Turkey. When examined in terms of drug use, it was also found that rate of statin use decreased markedly after hospital discharge, despite prescription, and remained at lower levels when compared with European countries.<sup>[23]</sup>

### Limitations of the study

We are reporting these results as “the data of study population,” but not “Turkey data,” because the study was not conducted with stratified sampling method. Nevertheless, the results represent our country beyond the data of a single center or region because the data was gathered from different regions and from divergent regional and tertiary healthcare organizations.

The strengths of this project include the ease of administration. The project was particularly cost effective, and as such, it allowed for the survey to be undertaken in multiple regions of our country, which will eventually allow nationwide comparisons of risk factor control. However, our study has several limitations. First, it included different kinds of investigators, such as internal medicine, cardiology, and family medicine, and we, therefore, do not know the possible effect(s) of this situation on the study results. Second, 15 centers from Turkey participated in the SURF ques-



tionnaire study. These centers are healthcare facilities that provide services in various healthcare settings. Patient groups from different population profiles were included in this questionnaire study. Thus, it can be inferred that they represent the general population. However, these patients constitute patient groups who present for routine follow-up. It should be kept in mind that there is a patient group with morbidity who was never admitted for control visits. Therefore, we can assume that prophylactic precautions may be lower than the figures we obtained.

## Conclusion

According to data obtained from various healthcare facilities in the country, among Turkish CHD patients, lifestyle change and usage of medications recommended by the guidelines are still not at the desired level and should be enhanced. Medication compliance is poor, especially in terms of statin use. Community-oriented programs should be conducted in order to raise the awareness of the general public in terms of these issues. Since lifestyle change is not easily accepted or adopted by patients, performance by multidisciplinary-trained teams and long-term follow-up will help in efficient implementation of preventive strategies.

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None

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