EUROASPIRE III: a comparison between Turkey and Europe

EUROASPIRE III: Türkiye ile Avrupa'nın karşılaştırılması

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Objectives: The EUROASPIRE III survey was conducted in 2006-2007 in 22 countries in Europe (76 centers) to describe risk factors, lifestyle and therapeutic management of patients with coronary heart disease (CHD), compliance with current guidelines, and to document changes over time. This study aimed to assess the results of the EUROASPIRE III survey in terms of differences between Turkey and other European countries.

Study design: The results of the EUROASPIRE III survey were compared with those of 17 centers from Turkey. Consecutive patients with a diagnosis of CHD (669 medical records, 23.8% women) were identified retrospectively, of which 338 patients (50.5%) were followed-up, interviewed, and examined at least six months after the index event (acute coronary syndrome or interventional procedure).

Results: Compared to the EUROASPIRE III data, recordings from Turkey's centers at discharge on classical risk factors did not exhibit remarkable differences; however, data on weight, height, waist circumference, lipid profile, glucose, and HbA1c measurements were more incomplete. In comparison to Europe population, the most important differences were observed in the higher rates of the following: young patients with myocardial infarction (<50 years, 20% vs. 12.7%), persistence in smoking (23.1% vs. 17.2%), immobility, low HDL-cholesterol (50.2% vs. 36.7%), insufficient follow-up by physicians after the index event (12% vs. 2.2%-except Turkey), and insufficient patient education.

Conclusion: The data from the Turkey arm of the survey show that efforts for cardiovascular disease prevention fall short of the targets, similar to Europe.

Key words: Cardiovascular diseases/prevention & control; coronary disease/prevention & control; life style; risk factors; Turkey/epidemiology.

Amaç: EUROASPIRE III çalışması, koroner arter hastalarında risk faktörlerini, yaşam tarzı ve ilaç tedavilerinin kullanımını ve yeni kılavuzlara uyumu belirlemek vezaman içindeki değişimi görmek amacıyla, 2006-2007 yıllarında, Türkiye de dahil Avrupa'da 22 ülkenin katılımıyla (76 merkez) gerçekleştirilmiştir. Bu çalışmada, EUROASPIRE III'ün sonuçları, Türkiye ile diğer Avrupa ülkeleri arasındaki farklılıklar açısından değerlendirildi.

Çalışma planı: EUROASPIRE III'ün sonuçları Türkiye'den 17 merkezin sonuçları ile karşılaştırıldı. Klinik koroner kalp hastalığı tanısı konan ardışık hastalar (669 medikal kayıt, %23.8'i kadın) geriye doğru tarandı; bu hastaların izlemi sırasında 338 hasta (%50.5) ile indeks olaydan (akut koroner olay veya girişimsel işlem) en az altı ay sonra görüşüldü ve hastalar muayene edildi.

Bulgular: EUROASPIRE III ile karşılaştırıldığında, Türkiye'nin verilerinde klasik risk faktörlerinin kaydındaçok önemli bir farklılık olmamasına rağmen, kilo, boy, bel çevresi, lipit (total kolesterol, HDL-, LDL-kolesterol, trigliserit), glukoz ve HbA1c ölçümleri kaydının daha yetersiz olduğu gözlendi. Avrupa ile kıyaslandığında gözlenen en önemli farklılıklar, miyokart enfarktüslü genç hasta oranının (<50 yaş, %20 ve %12.7-tüm hastalar), sigaraya devam etme (%23.1 ve %17.2-tüm hastalar) ve hareketsizlik oranlarının, düşük HDL-kolesterol düzeylerinin (%50.2 ve %36.7), indeks olay sonrasında hekim tarafından izlenmeme (%12 ve 2.2-Türkiye hariç) ve eğitilmeme oranlarının daha yüksek olmasıydı.

Sonuç: EUROASPIRE III çalışmasının Türkiye kolunun verileri, Avrupa'ya benzer şekilde, kardiyovasküler korunma hedeflerinin gerisinde kalındığını göstermiştir

Anahtar sözcükler: Kardiyovasküler hastalık/önleme ve kontrol;koroner hastalık/önleme ve kontrol; yaşam tarzı; risk faktörü; Türkiye/epidemiyoloji.

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Despite marked differences in cardiovascular mortality rates among countries cardiovascular diseases are one of the most important causes of death in Europe.[1] Cardiovascular diseases (CVD) were responsible for the death of 4.35 million Europeans in the year 2000, with men contributing 43% and women 55% of all mortality cases. Apart from their physical and psychological abnormalities on patients CVD also pose a great financial burden to the health system. Despite a decrease in the age-specific cardiovascular mortality rate in many European countries, there remains a continuous increase in the number of patients with CVD.[2] The rate of atherosclerotic vascular diseases is on a decrease in western Europe as a result of aggressive risk factor modification; however, a continuous increase is reported in eastern Europe. Risk factors for atherosclerotic vascular diseases are well known. The Framingham study was the first to demonstrate the effect of classical risk factors such as smoking, hyperlipidemia, hypertension, and diabetes mellitus.[3] On the other hand, the INTERHEART study stressed the role of life style changes such exercise, daily fruits and vegetable consumption and psychological factors, in addition to the classical risk factors.[4]

Turkey is a large country with a population of about 70.5 million inhabitants and a median ager of 29 years.[5] Despite the young population the incidence of atherosclerotic vascular diseases in Turkey is unexpectedly high. Coronary mortality is higher than that of many European countries with a rate of 5 per 100 person-years.[6] Risk factors in the Turkish population were investigated particularly in studies conducted from the 1990s (TARF,[7] THS,[8] TURDEP,[9] PATENT,[10] TURKSAHA[11]). Results of these studies have outlined the relationship of the increase in the incidence of CVD in Turkey with risk factors.[12]

The European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE) survey of the European Society of Cardiology conducted three studies to investigate lifestyle and risk factor modification and the effect of drug therapy in patients with CVD. The EUROASPIRE I survey[13] was carried out in 1995-1996 and involved nine countries (The Czech Republic, Finland, France, Germany, Hungary, Italy, The Netherlands, Slovenia and Spain), EUROASPIRE II[14] was carried out in 1999-2000 (involving Belgium, Greece, Ireland, Poland, Sweden and UK, in addition with countries of EUROASPIRE I), whereas the EUROASPIRE III[15] which involved 22 countries including Turkey (addition of Bulgaria, Croatia, Cyprus, Lithuania, Latvia, Romania, Russia and Turkey, with the exception of Sweden) was carried out in 2006-2007. EUROASPIRE III survey was conducted to investigate whether patients with coronary heart diseases (CHD) were monitored in accordance with the new European guidelines on CVD prevention and to determine if there was any improvement in preventive cardiology practice, in comparison with the EUROASPIRE I and II surveys. In the study which was carried out at 76 centers from 22 countries a total of 13935 medical records (27% women) were reviewed and 8966 patients were interviewed. The survey demonstrates that the majority of CHD patients do not achieve lifestyle changes, risk factor and therapeutic modification targets for cardiovascular disease prevention.[15] This study demonstrates that there are marked differences between countries in the prevalence of risk factors and the use of cardioprotective drugs.

The aim of this study was to identify the differences in cardiovascular risk factors, lifestyle changes and therapeutic modifications between Turkey and other European countries.

PATIENTS AND METHODS

Geographical region and hospital sampling frame. One or more geographical regions were selected within each country including a defined population section and all hospitals providing services to these sections were identified. One or more hospitals or all the hospitals were sampled. By so doing every patient with acute symptoms of coronary disease, or patients requiring revascularization in the form of balloon angioplasty or coronary artery surgery in the region had an equal chance of being enrolled in the study. Patients who visited hospitals outside this geographical region were excluded from the sample. Although new hospitals were added within the region, countries (with the exception of Spain) of the EUROASPIRE I and II used the same geographical region and hospitals.

Consecutive male and female patients who were diagnosed for the first time with CHD or who had recurrent disease and were on treatment, those who were aged ≥18 at the time of diagnosis, and those less than 80-years-old were retrospectively identified from diagnostic records, discharge forms or from other medical records. Time from the starting date to the expected interview date was to be less than six months. Those who died during surgery or during their period of hospitalization at a date earlier than three years to the expected interview date were also included in the survey. Patients who fulfilled one or more of the following criteria were included in the survey.

(i) Elective or emergency coronary artery bypass grafting (CABG) (including emergency CABG for acute myocardial infarction-AMI).

(ii) Elective or emergency percutaneous transluminal coronary angioplasty (PTCA) (including emergency PTCA for AMI)

(iii) Acute myocardial infarction (myocardial infarction with or without ST segment elevation) (AMI: ICD-10 code 121).

(iv) Acute myocardial ischemia without symptoms of infarction (troponin negative) (ischemia: ICD-10 code 120).

Hospital diagnoses for acute myocardial infarction and acute myocardial ischemia without symptoms of infarction were not always found to comply with the World Health Organization (WHO) or the other standard diagnostic criteria. However, it was essential for all patients diagnosed with AMI or myocardial ischemia in the hospital clinical practice to participate in the study, since all patents were supposed to be receiving appropriate management with regards to lifestyle, other risk factors, and the use of cardioprotective drugs at the end of the diagnosis.

Data collection. Data were collected by a trained research personnel who reviewed medical records of the patient, and who interviewed and examined patients using standard procedures and devices at least six months after an acute coronary event.

Review of patient medical records. The following information was obtained from patient medical record at presentation in the hospital and at discharge:

a. Personal and demographic details;

b. Personal cardiovascular history including stroke, and transient ischemic attack;

c. Other details in the medical history such as hypertension, dyslipidemia and diabetes;

d. Data on blood pressure, diabetes, lipid, glucose and smoking status;

e. Medication (generic name and the total daily dose).

Patient interview and examination. The following information was obtained from patient medical record at presentation in the hospital and at discharge:

a. Personal and demographic details;

b. Personal cardiovascular history including stroke, transient ischemic attack and peripheral artery disease;

c. Other details in the medical history such as hypertension, dyslipidemia and diabetes;

d. Family history of CHD for patients with premature disease (<55 years in men and <65 years in women);

e. Recorded lifestyle and other risk factor methods in relation to cigarette smoking, diet (including weight reduction), exercise, blood pressure, lipid and glucose;

f. Medication (generic name and the total daily dose).

g. Level of education, school attendance and employment status.

The following measurements were performed:

a. Height, weight: Height and weight measurements were obtained with light indoor clothes and without shoes. The SECA scale (model number 701, measurement stick model number 220) was used for measurements. The scales were calibrated at the beginning of the survey.

b. Waist circumference

c. Blood pressure: Blood pressure was obtained twice in the sitting position on the right upper arm using an automatic digital sphygmomanometer (Omron M5-I, Omron Healthcare, Japan). A systolic blood pressure of ≥140 mmHg and/or diastolic blood pressure of ≥90 mmHg (systolic blood pressure of ≥130 mmHg and/or diastolic blood pressure of ≥80 mmHg in diabetics) were considered as a hypertensive state.

d. Heart rate

e. Breath carbon monoxide (CO): Breath carbon monoxide was recorded (Smokerlyser, Model Micro 4; Bedfont Scientific Ltd., Rochester, Kent, UK). A smoking and/or breath CO of >10 ppm was considered as cigarette smoking.

f. Venous blood for serum total cholesterol, high density lipoprotein (HDL) cholesterol, triglycerides, low density lipoprotein (LDL) cholesterol, plasma glucose, and glycated hemoglobin (HbA1c) were measured in patients with diabetes. A serum total cholesterol level of ≥4.5 mmol/l (174 mg/dl) was defined as hypercholesterolemia; HDL cholesterol of <1 mmol/l (40 mg/dl) in men, and 1.2 mmol/l (45 mg/dl) in women was defined as decreased HDL cholesterol; a fasting serum triglyceride level of ≥1.7 mmol/l (150 mg/dl) was defined as hypertriglyceridemia; whereas a fasting plasma glucose level of ≥7 mmol/l (126 mg/dl) and/or a history of diabetes was defined as having the diagnosis of diabetes.

The central laboratory of the survey was the Laboratory of Analytical Biochemistry of the National Public Health Institute in Helsinki, Finland. The laboratory was accredited by the Finnish Accreditation Service and complied with requirement of the standard SFS-EN ISO/IEC 17025:2005 conditions. The accreditation covered all analyses apart from HbA1c. Laboratories were

at the Lipid Standardization Program carried out by CDC (Atlanta, Georgia, USA) and External Quality Assessment Schemes carried out by Labquality of Helsinki.

Serum total cholesterol, HDL cholesterol, triglycerides and plasma glucose analyses of all patients were performed during the interview. HbA1c was measured only in patients with documented diabetes. Venous blood samples were obtained in the sitting position with a light stasis. The samples were collected into a clot activator-containing collection tube (Venosafe, Terumo Europe, Leuven, Belgium) for lipid assay, into a fluoride-citrate tube (Venosafe) for glucose assay and into potassium EDTA tube (Venosafe) for HbA1c assay. Separation of serum and fluoride-citrate plasma was performed by centrifuging at 2000 g for 10min at room temperature. The serum, plasma and EDTA blood were then fractionated into two tubes with bar-code labels and stored locally at a minimum of -70 ºC. All samples were later transported frozen to the central laboratory where all measurements were performed on a clinical chemistry analyzer (Architect c8000; Abbott Laboratories, Abbott Park, Illinois, USA). The enzymatic method was used for measuring serum total cholesterol, homogenous method for direct measurement of serum HDL cholesterol, enzymatic glycerol phosphate oxidase method for measuring serum triglycerides, the enzymatic hexokinase method for plasma glucose and the immunoturbidimetric method for blood HbA1c. During the course of the study comprising 12 months in 2007, the coefficient of variation (mean±SD) and systematic error (bias) (mean±SD) were 0.8%±0.2 and 0.8%±0.5 for total cholesterol, 2.3%±0.6 and –0.6% ±1.4 for HDL cholesterol, 1.1%±0.4 and – 1.1%±1.2 for triglycerides, 1.7%±0.1 and –0.2±2.5 for glucose and 3.9%±1.3 and 0.2%±6.7 for HbA1c.

Quality assurance. All equipment were calibrated and serviced according to the manufacturer's recommendations to ensure standardization of the measurements. Venous blood samples were collected and stored in accordance with the guidelines prepared by the central laboratory. All national coordinators and the principal research personnel responsible for teaching the local data collectors were trained in the Coordinating Centre of the Department of Cardiovascular Medicine, National Heart and Lung Institute, Imperial College London, UK. A total of 10 medical records randomly selected during the period of the survey were audited by each national coordinator in the same manner and all inconsistencies were discussed and corrected.

Ethical procedures. National coordinators were responsible for securing approval from the Local Ethics Committees. Approval from the Ministry of Health Central Ethics Committee was obtained on 31.08.2006. A written and signed informed consent was obtained from each participating volunteer by the investigator. A case report form was signed by the research assistant in order to confirm that informed consent was obtained. The signed original copy of the informed consent form was then kept in the patient's files.

Responsibility statement. The authors had full access to all data and took responsibility for its integrity. All authors have read and agreed to the manuscript as written.

Statistical analysis. All data were evaluated using the SPSS 12.0 for Windows program. Definitive statistical analyses (mean, median, standard deviation, lowest and highest values) were used for numerical variable, whereas frequency tables were used for categorical variables. The Chi-square test was used for comparison of categorical variables between the groups. The Kaplan-Meier survival analysis was used to evaluate new events and survival without death, while the Cox regression analysis was used for the evaluation of factors affecting new events and survival without death outcomes. A p value of <0.05 was considered as statistically significant.

RESULTS

Patients and their characteristics. A total of 17 centers from three provinces in Turkey were included in the study. A total of 669 medical records (510 men and 159 women) were reviewed and 338 patients (50.5%) were interviewed at least six months after an acute coronary event or after the interventional proce-

Table 1. Comparison of European and Turkish gender, according to age and diagnostic categories based on medical records (in percentage)

	Europe (n=13935)	Turkey (n=669)
Gender		
Male	27.5	23.8
Female	72.5	76.2
Age at index event		
<50	12.7	20.0
50-59	28.7	27.5
60-69	35.5	32.3
≥70	23.1	20.2
Diagnostic category.		
Coronary artery bypass grafting	17.7	14.8
Percutaneous coronary intervention	39.4	34.4
Acute myocardial infarction	22.6	35.1
Ischemia	20.3	15.7

dure. The percentage distribution of patient gender according to age at index event and diagnostic categories is presented in Table 1. 23.8% of the patients were women. Comparison with European data demonstrates that patients who were less than 50 years old at index event were reported from Turkey with a large margin (20% and 12.7%-all patents).

Proportions by diagnostic categories were: 99 patients (14.8%) with CABG, 230 patients (34.4%) with PTCA, and 235 patients (35.1%) with AMI. The rate of cardiovascular events recorded before index event were as follows: CABG 10.7%, PTCA 13.0%, AMI 23.4%, ischemia 6.5%, angina pectoris 26.9%, stroke 1.2%, transient ischemic attack 2.1% and peripheral artery disease 0.9%. Of the patients 9.8% underwent CABG after the index event, whereas 12.8% underwent PTCA. AMI developed in 4.8% of the patients, ischemia in 5.2%, angina pectoris in 11.6%, stroke in 0.6%, transient ischemic attack in 0.3% and peripheral artery disease in 0.3% of the patients.

Distribution of risk factors according to discharge documents. Evaluation of measurements and risk factors of patients at discharge demonstrated that risk factor records between countries were inadequate with a wide margin of difference. Despite the absence of significant differences in the classical risk factors obtained from Turkish data, records for weight, height, waist circumference, lipids (total cholesterol, HDL cholesterol, LDL cholesterol, and triglycerides), glucose and HbA1c were observed to be more inadequate. On the other hand, patients with higher rates of systolic blood pressure measurements were found to have been registered (75.5% and 63.4%).

Risk factor and lifestyle status during the interview

General Turkish data. Lifestyle changes reported by patients during the interview after the index events and the proportions of patients with risk factors above the guideline targets are shown in Table 2. In the European study, 64.3% of patients whose medical records were obtained were interviewed, whereas 50.5% were interviewed in Turkey. The most common reasons for not being interviewed were personal reasons (39%), refusal to participate due to other reasons (16.3%), death of the patient (13%), change in patient's location (10.6%), no time to spare (3.9%), change in health status (2.4%), unknown (0.3%), and other reasons (14.5%).

A total of 78 patients (23.1%) were found to continue smoking during the interview (self-reported and/or CO in breath >10 ppm). The vast majority of smokers during the interview reported to have received verbal (85.1%) and written (12.2%) advice to quit smoking.

Table 2. Comparison of the rat of patients with risk factors regarding lifestyle changes and guideline targets after the index events reported by patients during the interview (in percentage)

	Europe (n=8966)	Turkey (n=338)
Quitting cigarette smoking	70.8	76.9
Healthy diet	92.3	93.7
Increased physical activity	59.1	48.6
Weight loss	58.2	69.4
Cigarette smoking[a]	17.2	23.1
Overweight[b]	81.8	83.6
Obesity[c]	35.3	35.5
Increased waist circumference[d]	52.7	41.2
High blood pressure[e]	56.0	55.2
Increased total cholesterol[f]	51.1	48.3
Decreased HDL cholesterol[g]	36.7	50.2
Increased triglycerides[h]	34.7	36.6
Diabetes[i]	34.8	33.6

[a]Reported cigarette smoking and/or CO in breath of >10 ppm. [b]Body mass index of ≥25 kg/m^2. [c]Body mass index of ≥30 kg/m^2. [d]Waist circumference of ≥102 cm (men) and ≥88 cm (women). [e]Systolic blood pressure of ≥140 mmHg and/or diastolic blood pressure of ≥90 mmHg (a systolic blood pressure of ≥130 mmHg and/or diastolic blood pressure of ≥80 mmHg in diabetics). [f]Serum total cholesterol of ≥4.5 mmol/l. [g]Serum HDL cholesterol of <1 mmol/l (men) and 1.2 mmol/l (women). [h]Fasting serum triglycerides level of ≥1.7 mmol/l. [i]Fasting plasma glucose of ≥7 mmol/l and/or presence of a history of diabetes.

Only a small minority of patients (14.9%) was advised to seek professional help or prescribed pharmacological support. About 5% of the patients were advised to use nicotine-replacement therapy and 7% to use bupropion. A total of 144 patients (42.6%) reported a decrease in their smoking habit after the index event, while 194 patients (57.4%) patients were observed to have stopped smoking. However, the proportion of patients who attended a smoking cessation clinic (n=2, 1.4%), those who were prescribed nicotine-replacement therapy (n=4, 2.8%) and bupropion (n=2, 1.4%) was reported to be small.

Overall, 93.7% of the patients were reported to change their diet by reducing salt consumption (75.5%) reduce fat (81.7%) and calorie intake (61.4%), reduce sugar (54.1%) and excessive alcohol (41.4%) intake, change fat type consumed (76.6%), increasing fruit and vegetables (82.5%), fish (67.8%) and fish oil (40.8%) consumption.

Increased physical activity after their coronary event was reported in only 48.6% of the patients. The majority of patients reported a mild (37.2%) or no (26.7%) degree of physical activity outside work. Of the patients 28.7% reported to perform moderate physical activity

Table 3. Comparison of medication used at discharge with those administered during the interview (in percentage)

	Europe	Turkey
Antiplatelets		
Discharge	95.1	99.4
Interview	90.5	91.4
Beta blockers		
Discharge	82.5	83.1
Interview	79.8	73.8
ACE/ARB		
Discharge	69.0	73.6
Interview	70.9	69.0
Calcium antagonists		
Discharge	22.5	11.4
Interview	24.5	14.2
Diuretics		
Discharge	29.5	17.7
Interview	30.2	27.6
Lipid lowering drugs		
Discharge	79.7	82.0
Interview	79.8	65.9
Statins		
Discharge	80.7	82.3
Interview	78.1	65.0
Anticoagulants		
Discharge	7.8	2.7
Interview	5.6	2.1

ACEI: Angiotensin converting enzyme inhibitor; ARB: Angiotensin receptor blocker.

(effective active activity at least 20 minutes once or twice a week), while only 7.4% reported to perform intensive physical activity (effective active activity at least 20 minutes three or four times a week). The proportion of patients who reported to be doing regular physical exercise to lose weight was 42.0%.

The mean body mass index (BMI) of the patients was 28.6 kg/m^2 and the waist circumference (WC) was 96.7cm. The prevalence of obesity (BMI >30 kg/m^2) and central obesity (waist circumference >102 cm for men and >88 cm for women) was 35.5% and 41.2%, respectively, in the group with a majority of overweight (83.6%) patients. Diabetes (fasting plasma glucose >126 mg/dl) was reported in 33.6% of the patients. Self-reported diabetes was registered in 27.1% of these patients, whereas 8.5% of these diabetics had no knowledge of their condition. Of the self-reported diabetes patients only 14.7% attained the fasting plasma glucose target (<110 mg/dl) and 23.8% attained the HbA1c target (<6.5%). 55.2% of the patients were reported to have raised blood pressure, whereas 44.8% of patients were reported to attain blood pressure targets with or without medication. Increased total cholesterol was reported in 48.3% of patients, increased triglycerides in 36.6% and decreased HDL cholesterol in 50.2% of the patients. Treatment targets were attained by 67.1% of the patients with the help of lipid lowering drugs.

Comparative data with Europe. The number of patients not found to have been followed-up by any physician during the interview was higher in Turkey compared to the other countries (12% and 2.2%-excluding Turkey). The number of patients who were enrolled in the cardiac rehabilitation program (7.3% and 44.9%) and those who participated in the cardiopulmonary resuscitation program (2.1% and 33.9%) after the index event were also found to be markedly small in Turkey. On the other hand, the Turkish prevalence of cigarette smoking after a coronary event (said to be 23.1% in Turkey) was second only to Southern Cyprus (23.1% and 17.2%-all patients). Despite a similar prevalence of implementation of a healthy diet in Turkey and Europe, increased rate physical activity in Turkey was found to be markedly low (48.6% and 59.1%). Evaluation of the International Physical Activity Questionnaire (IPAQ) classification demonstrated that Turkey had the highest rate of low physical activity (54.5% and 23.1%) and the lowest rate of intensive physical activity (10.5% and 39.4%). Data for the prevalence of obesity, high blood pressure, diabetes, high total cholesterol and triglyceride levels were found to be similar in Turkey and Europe. However, decrease in HDL cholesterol levels was found to be markedly higher in Turkey (50.2% and 36.7%). The mean HDL cholesterol level was markedly low in both men and women (39.4 and 43.3 mg/dl in men, 46.0 and 49.5 mg/dl in women).

Comparison of medication used at discharge with those administered during the interview is outlined in Table 3. Interviews conducted after discharge demonstrated a marked decrease in lipid lowering drugs (from 82% to 65.9%) and statin (from 82.3% to 65%), compared to European values. However, a marked increase was observed in diuretic use during the interview (from 17.7% to 27.6%).

DISCUSSION

Results of the EUROASPIRE III survey demonstrate that the majority of coronary patients in Turkey do not achieve the lifestyle, risk factor and therapeutic targets set by the guidelines on CVD prevention, similar to results obtained from other European countries. The markedly highest rate observed in Turkey with a young and large population in the patients group with less than 50 years old during a coronary event is interestingly im-

portant. On the other hand, inadequacy of the history and measurements of risk factors was very significant in Turkey, as documented from patient discharge records. The height and weight of two out of five patients were recorded in Europe at discharge, whereas the records of only one out of six patients were recorded in Turkey. Similarly, waist circumference values of one out of 20 patients, and the lipid parameters of one third of the patients were recorded in Turkey. Blood glucose values of half of the patients were not registered.

Various studies have demonstrated that lifestyle modifications in relation to reduction in quitting smoking, an appropriate diet, adequate and regular physical activity significant reduced recurrent cardiovascular events in patients with coronary disease.[1,16-18] Cigarette smoking continues to pose a problem in Turkey, in both men and women. Although the prevalence of cigarette smoking has been on a decrease in Europe in the past decade, an increase of about 20% was recorded in Turkey.[19] Results of studies show that at least half of the male population are cigarette smokers.[9] The TARF study demonstrated that cigarette smoking was the most important independent determinant in the increase of plasma fibrinogen levels.[6] The relative risk of coronary mortality among patients who quit smoking following myocardial infarction is known to decrease by approximately 50% compared to cigarette smokers.[16] This not withstanding, cigarette smoking following a coronary event is an important problem in Turkey. Approximately half of individuals known to be smoking prior to an index event continue smoking after the coronary event. Recent developments in the legal system have seen great importance vested in tackling the issue of cigarette smoking, regarded as an important health problem in Turkey. In addition to these legal regulations, professional advice and support to help coronary patients quit smoking is also an important step in tackling the problem of cigarette smoking. The channeling of patients to smoking cessation clinic is very low, which is a similar trend in many EUROASPIRE countries. On the other hand, out of 100 individuals six are know to receive nicotine-replacement therapy, whereas only one individual is reported to use pharmacological drugs such as bupropion. One-third of patients have also been reported to take no action to stop smoking after their coronary event. Results of this study show that despite advantages of secondary prevention following a coronary event, many obstacles have been identified in Turkey particularly in the area of patient education. The proportion of patients enrolled in cardiac rehabilitation programs and those who participated in cardiopulmonary resuscitation programs has also been reported to be very low in Turkey. The proportion of patients who participated in cardiopulmonary resuscitation course in countries such as The Netherlands, Germany and Italy are said to be 40-50%, whereas the rate is 2.1% in Turkey. Large-scaled development plans formed by many institutions and specialist organizations including all sectors (health care professional, patients and other personnel) would certainly contribute substantially to the success of these programs. Cardiopulmonary resuscitation courses initiated by the Turkish Society of Cardiology should be considered as an important contribution. Another important secondary preventive measure is the regular follow-up of patients. Results of this study also show that the non-follow-up rate of patients in Turkey is higher than in the other countries. This rate is reported to be 1-2% in many European countries, whereas in Turkey one in every ten individuals is not followed up by the health care professional. Physical activity, considered as an important component of lifestyle changes is also another determinant of coronary morbidity and mortality. The positive direct effect of regular exercise on myocardial oxygen requirement, endothelial functions, autonomic tonus, coagulation and clotting factors, markers of inflammation and the coronary collateral circulation, together with its positive effect on other risk factors such as lipid profile, hypertension, obesity, and diabetes is well known.[18] The rate of increased physical activity to reduce the risk of coronary events following an index event in Turkey is also lower than the European average. Turkey is second only to Spain in the rate of physical inactivity, apart from the 26.7% working rate. The physical activity level in Turkey according the IPAQ classification is also reported to be low.

The Turkish Heart Study is the first in Turkey to demonstrate low HDL cholesterol level in Turkey.[8] The mean HDL cholesterol level was reported in this study as 38.3 mg/dl in men and 45.5 mg/dl in women. Despite indications of a genetic predisposition in the low HDL cholesterol level also identified in Turkish national leaving abroad, the multivariate analysis of the TARF study demonstrated that age, cigarette smoking, waist circumference, physical inactivity, insulin and CRP levels were related with decreased HDL cholesterol levels.[7] Results of the EUROASPIRE III study stress the importance of low HDL cholesterol levels in Turkey in patients with coronary artery disease. Low HDL cholesterol levels are reported in approximately half of patients who have experienced a coronary event. Turkey is third only to Romania and Southern Cyprus among 22 European countries, with regards to the prevalence of low HDL cholesterol levels. The increased prevalence of low HDL cholesterol levels in

Turkey may be attributed to continuous cigarette smoking and the high rate of physical inactivity among Turkish patients.

The striking difference between Turkey and other European countries is medication use after discharge. There is a particular decrease in the use of lipid lowering drugs during follow-up. One of the most important reasons for this situation is the inadequate information given to patients concerning their ability of increase drug compliance. Inadequate patient education may explain the lack of success in areas of drug use and lifestyle changes.

In conclusion, the EUROASPIRE III study demonstrates that targets for CVD prevention have not been attained in Turkey, a result similar to other European countries. The most striking differences between Turkey and Europe is the higher number of young patients with myocardial infarction, higher proportion of patients who continue to smoke and the increased rate of inactivity, and also the importance of low HDL cholesterol as a determinant, the low rate of patient follow-up and inadequate education of patients by health care professionals after an index event.

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