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A Comparison of Actual Cardiovascular Disease Risks to the Perceptions of Middle-aged Men: A Cross-Sectional Study

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ABSTRACT

Objective: To determine the actual cardiovascular diseases risk and to compare it with the perceived risk in 40-65 years old men.

Methods: We conducted a cross-sectional study in a population determined to be 21.039 men and sample consisted of 400 men. The actual cardiovascular diseases risks of these respondents were calculated using HeartScore, classified as low, moderate, high, or very high. The respondents' perception of their cardiovascular disease's risks was categorized as wrong optimists/pessimists and realists. We used multivariate logistic regression models to determine the relationships between perceived cardiovascular diseases risk and independent variables (age, diabetes, hypertension, etc.). Required ethics committee and institutional permissions were obtained for the duly conduct of the study.

Results: It was determined in our study that while 8.3% (n=33) of the men had a high-risk level for cardiovascular disease, 52.5% (n=210) had a very high level. Forty-eight percent of the participants perceive their CVD risks to be lower than they are and 23.8% to perceive it higher than they are. Correct estimation rate of CVD risk was 28.2%. The variables affecting the actual cardiovascular diseases risk were diastolic blood pressure, body mass index, and level of physical activity. 13.3% (n=53) of respondents perceived their cardiovascular diseases risks as high and 8% (n=32) as very high. The variables affecting an incorrect perceived cardiovascular diseases risk are being 61-65 years of age (odds ratio=0.34, 95% confidence interval: 0.16-0.73) and a diagnosis of diabetes mellitus (odds ratio=0.45, 95% confidence interval: 0.20-0.99).

Conclusion: We observed that more than half of the residents were at a very high level of risk for cardiovascular disease, and approximately one out of every two respondents perceived their risk of cardiovascular disease to be lower than the actual risk. It is recommended risk reducing behaviors be developed and awareness of risk be raised.

Keywords: Middle age, men, cardiovascular diseases, perceived risk.

1. INTRODUCTION

Of the 56 million deaths worldwide in 2019, approximately 18 million (32%) were caused by cardiovascular disease (CVD) (1). This rate is estimated to rise to 22.2 million by 2030. CVD is reported as the most common fatal disease (2,3). Turkey has the highest rates of mortality in Europe from coronary issues (2,4), and in 2016 the province in Turkey with the highest mortality rates due to circulatory system problems was Amasya with 50.8% (5).

The incidence of CVD disease is known to be higher in men (6). Habits related to an unhealthy lifestyle increase the risk of CVD (7,8,9,10). According to the data of the Ministry of Health, rates of tobacco use, systolic blood pressure (SBP) with fasting plasma glucose (FBG), total cholesterol (TC), alcohol and substance use, occupational risks, and insufficient physical activity along with other risk behaviors are generally higher in men (11). The same data shows that noncommunicable disease attributed to Disability Adjusted Life Years (DALY) is higher in men (19%) than in women (18%). Moreover, the CVD risk was found to be higher in men (13.3 %) than women (7.8%) in 2017 (11,12). Worldwide, more than one-third (35%) of men smoke while just over 6% of women do so according to data from the years 2000-2016 (13). According to the 2019 National Survey on Drug Use and Health (NSDUH) in Turkey, 85.6 percent of people ages 18 and older reported that 59.1 percent of men in this age group and 51.0 percent of women in this age group smoke (14). Regarding the cardiovascular risk factors in Turkey, daily tobacco use in women aged between 45-64 was 14.3% while the rate was 41.5% in men of the same age range. Similarly, in Turkey, alcohol consumption in men is higher (42.5%) than in in women (3.75%) (12). Nevertheless, according to the Turkey Health Survey Data (2016), men generally receive preventive health services at lower rates than women (blood pressure, cholesterol etc.) (5).

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There is no routine screening program in Turkey for actual CVD risk (15,16). In terms of ease of use and accessibility (17), the HeartScore program, a risk assessment and management program aimed at supporting clinicians in optimizing individual cardiovascular risk reduction intended to be used by health professionals only and not by the general public (18,19,20), is suitable for screening men in the CVD risk group (19). The Ministry of Health suggests that the HeartScore program be used to evaluate the CVD risks of 40-65 aged individuals in Turkey. It has been emphasized that there is increased cardiovascular risk among this age group individuals (21). HeartScore contains broader groups and yields more reliable results (18,22). The program also free (18).

Risk perception is important for individuals to adopt healthy lifestyle behaviors in order to reduce CVD risks. Individuals with the awareness of an increased CVD risk may adapt more easily to attitude changes such as being more careful about their nutrition, quitting smoking and receiving regular medical check-up (23,24). Research indicates that men fail to perceive CVD risks (25,26,27), and commonly men perceive CVD risks at a lower level than what is actual (27,28,29).

The aim of this study was to determine the actual CVD risk level for the next ten years in the high-risk group of 40-65 age men and to compare it to the CVD risk level their perceived.

1.1. Study Questions

What are the actual CVD risk levels for men aged 40-65?

What are the perceived CVD risk levels for men aged 40-65?

Is there a difference between the actual CVD risks for men aged 40-65 years and the perceived CVD risks?

What are the factors affecting the perceived risk levels for men aged 40-65 regarding CVD?

2. METHODS

2.1. Study Design and Population

We conducted a cross-sectional study in a population determined to be 21,039 men in the 40-65 age range living in a city center of Turkey, in 2018 (5). Individuals over the age of 65 were not included in this study because the Turkish Ministry of Health considers individuals aged 40-65 years to be at risk for cardiovascular diseases (21). The sample was calculated with a 95% confidence interval (CI) and a 5% margin of error in case the number of population is known along with the sum of CVD mid-level 22% (n=72) and high-level 11.7% (n=37) determined by Akgöz & Gözüm (2019), with the HeartScore system used; and found as the minimum n=338 (20). The study aimed to reach 20% more of the specified value. 400 individuals were included in the scope of the study using the cluster sampling method. Each of the 40 neighborhoods in the central area of Amasya province was considered as a cluster in the first stage. Neighborhood names were put in alphabetical order, and 10 neighborhoods were included in the study as the field of research using the systematic sampling method (40/10=4) in the second stage. The number of participants from each neighborhood was determined using the percentage of males in the population in the third stage. In the fourth stage, volunteers in this age group who met at a specified place after an announcement by the local authorities. Volunteers were accepted until researchers reached the pre-specified number of participants.

2.2. Data Collection Tools

Research data was collected using the Demographic and Medical Information Data Collection Form, the HeartScore database (actual) and Perceived CVD Risk Defining Form, and the International Physical Activity Questionnaire (IPAQ Short Form) was used to determine the participants' physical activity levels (30).

2.2.1. Demographic Characteristics

The age of the participants was determined by their year of birth on their IDs., and their use of medication, their medical history (increased risk of CVD) (4), and their family history (first degree relatives with CVD) was evaluated by questions.

2.2.2. HeartScore Database (actual) and Perceived CVD Risk

We used HeartScore's non-HDL measurement Turkey form that was used to evaluate the actual CVD risks of individuals (17,31). It was adapted to a high-risk model. At the beginning, the researcher signed up on the system with his/her first name, last name, and email information in order to save data on the HeartScore Turkey form (31). After signing up, first-last names, birth dates (month/year), and gender information was defined on the system under the "Create New Patient Record" tab. After defining the patients on the system, participants were displayed in the "Patient List" tab. Individuals were picked in this tab to measure risks, and the "Create New Examination" tab was clicked. Researcher then recorded measured SBP and TC value along with the data about smoking/non-smoking and calculated the percentages of CVD risks of participants for the next 10 years (<1% low, 1≤-<5% moderate, 5≤-<10% high and ≥10% very high) (17,18). SBP indicates how much pressure your blood is exerting against your artery walls when the heart beats. The TC is a measure of the total amount of LDL-HDL cholesterol, and other lipid components (32). The perceived CVD risk level was ascertained when the participants were asked an open-ended question and graded their own risk as low, moderate, high, and very high. If they perceived their risk as lower than their actual risk, they were classified as wrong optimists; if they perceived their actual risks as higher that their actual risk, they were classified as wrong pessimists; and if they perceived their risk as the same as their actual risk, they were classified as realistic (24,27,33,34).

2.3. Measurements

2.3.1. Physical Activity

The Turkish version of the International Physical Activity Questionnaire/IPAQ developed by Booth was used to determine the physical activity levels of participants in terms of the risk factors for CVDs (30). It is a reliable and valid in the Turkish population (35). Physical activity was rated as the metabolic equivalent (MET) to minutes a week with the data evaluation of the IPAQ. Then, activity level was determined and classified as inactive (<600 MET-min.day/wk), low level active (600-3000 MET – min.day/wk), and sufficiently active (>3000 MET – min.day/wk) (30).

2.3.2. Height and Weight

To measure height, participants stood upright after taking their shoes off. Subsequently, a stadiometer was used for their height measurements, and the obtained value that appeared on the screen was saved. The stadiometer is a digital measurement device that is connected to the acrylic head piece and interfaces directly (36). To measure weight, individuals took their shoes off and stepped onto the digital weight scale; the number displayed on the scale was recorded (20,36). Body mass index (BMI) was calculated with a weight/height [kg m^{-2}] formula after the researcher measured weight and height and then classified (37).

2.3.3. Lipids

Lipid measurements were performed with the blood sample taken from the capillaries of the individuals and the data were obtained in this way (38). Participants' TC levels were determined after evaluation with the Accutrend Plus GCT device in which the result appears after approximately three minutes (19, 39). The measurements were carried out by the researchers, paying attention to aseptic techniques. Based on this value read on the digital screen, the TC levels of individuals were determined. The measurement confidence interval of the device is between 10%-85% (39). It has been reported that the device used is suitable for CVD risk determination (40).

2.3.4. Blood Glucose

According to the American Diabetes Association (ADA), FPG is measured at least eight hour after meals, and postprandial plasma glucose (PPG) levels is measured one to two hours after the start of a meal (41). Individuals' blood glucose value was measured by the researchers, and the ones who had diabetes according to a physician's diagnosis or whose blood glucose was determined to be within the range of diabetic values as a result of the measurements were directly considered to be at high cardiovascular risk (19). Participants were measured using the Accu-Chek Performa Nano measuring device which is calibrated. Later, these parameters were classified based on the recommendations of the ADA (41). This device gives the averages of daily measurements and is an easy and confidential professional system (42). After the coding process of the device was carried out, the fingers of the individuals were cleaned with alcohol cotton. Then, the finger of the procedure was pierced with a lancet, the first blood sample was cleaned with cotton, and the second blood sample was taken into the scope of measurement. After the measurement, the measurements taken two hours after the main meal were recorded as satiety, and the measurements taken before the main meal were recorded as fasting blood sugar.

2.3.5. Blood Pressure

The blood pressures of the individuals were measured by the researchers. Prior to the measurement, individuals were allowed to rest for five minutes. During the measurement, the individuals were not allowed to talk and they were exhorted not to cross their legs. The blood pressures of the individuals were measured twice during a five-minute interval, and a blood pressure value was formed by taking the arithmetic average of these values. In case there was a difference of more than 5 mmHg between the blood pressure values measured twice, the measurements were repeated (33,43). A calibrated aneroid sphygmomanometer (Erka Perfect, Germany) was used to measure participants' SBP and diastolic blood pressure (DBP), and these measurements were classified according to the guidelines of the American Society of Hypertension and the International Society of Hypertension (20,44). Accordingly, those with SBP <120 mm/hg were classified as normotensive, those between 120-139 mm/hg as prehypertensive, and with ≥140 mm/hg as hypertensive. In DBP, <80 mm/hg was classified as normotensive, between 80-89 mm/hg as prehypertensive, and ≥90 mm/hg as hypertensive (44).

2.3.6. Smoking History

The smoking history of the participants was rated on a three point scale from (1) current smoker (≥100 cigarettes in his lifetime and currently smokes), (2) former smoker (≥100 cigarettes in his lifetime but quit smoking), and (3) never smoker (≤100 cigarettes in his lifetime or never smoked) as recommended by the Centers for Disease Control and Prevention (45).

2.4. Data Collection Process

Data of this study was collected between April-October 2018. Researcher applied the Demographic and Medical Information Data Collection Form to the participants in the sample followed by a face-to-face interview using the HeartScore Database (actual) and the Perceived CVD Risk Defining Form. Data collected from participants was entered on the HeartScore website to determine the actual CVD risks of participants for the next ten years (17,18,31). Men in the high-risk group were sent to family physicians while men in very high-risk group were sent to cardiologists. Moreover,

all participants were given written texts with the HeartScore system's suggestions regarding the personal risk level, regardless of the risk level.

2.5. Ethical Considerations

Ethical approval was obtained from the ethics board for clinical research of Akdeniz university, (2018-02/70904504). Institutional permission was also obtained from a local governor (2018-03/522.03-E.89). All individuals provided written informed consent. This study was conducted in accordance with the principles of the Declaration of Helsinki.

2.6. Statistical Analysis

Data was analyzed using SPSS version 23.0 software. First, compliance of variables with normal distribution was evaluated using the Shapiro Wilks test. Second, the Kruskal Wallis test was applied to evaluate more than two quantitative data groups along with descriptive statistical methods (mean, standard deviation, frequency), and the FPG and PPG of participants that influenced their CVD risk perceptions was evaluated. Later, the perceived CVD risk was compared to the actual CVD risk using cross-tabulations (McNemar-Bowker test). Third, the Chi-square test was applied to evaluate the qualitative data in which descriptive characteristics were influenced by participants actual and perceived CVD risk level (except for FPG and PPG). Finally, in the assessment of perceived CVD risk factors, multivariate logistic regression analysis was applied. Coding for the logistic regression analysis was as follows. For the dependent variable. the participant's correct determination of CVD risk was coded as "1," and lower or higher determination of CVD risk than actual (wrong determination) was coded as "0." Independent variables included the following.

Age

Two dummy variables were added since age was considered in three categories. For age dummy variable 1, the 51-60 age range was coded as "1," and the 40-50 and 61-65 age ranges were coded as "0." For age dummy variable 2, the 61-65 age range was coded as "1", and the 40-50 and the 51-60 age range were coded as "0."

CVD History in the Family–Hypertension (HT) and Diabetes mellitus (DM)

They were coded as "1" for Yes and "0" for No.

BMI

Two dummy variables were added since BMI was categorized in three categories. For BMI dummy variable, overweight was coded as "1", and normal weight and obese were coded as "0". For BMI dummy variable 2, obese was coded as "1," and normal weight and overweight were coded as "0."

Physical Activity

Two dummy variables were added since physical activity was considered in three categories. For physical activity dummy variable 1, a low level of activity was coded as "1," and an inactive and sufficient level of activity was coded as "0." For physical activity dummy variable 2, a sufficient level of activity was coded as "1," and an inactive and low level of activity was coded as "0".

3. RESULTS

Actual CVD risks and these affecting variables of participants are shown in Table 1. Accordingly, 60.8% of men were at a high/very high level of actual CVD risk. Very high risk of actual CVD in participants with hypertensive DBP (60.7%) was higher than normotensive (47.3%) and prehypertensive (52.3%). This difference is significant ($p<0.01$).

The risk for obese participants (60.5%) was higher than for normal weight (40.7%) and overweight individuals (52.8%) ($p<0.01$) while a very high actual CVD risk rate in participants with a sufficient level of physical activity (38.9%) was significantly lower than with an inactive level (61%) or a low level (52.4%) of physical activity ($p<0.05$).

The comparison between actual and perceived CVD risk is presented in Table 2. Accordingly, 8.3% were at high and 52.5% of men very high risk for actual CVD risk, but only 13.3% of men perceived their CVD risks as high and only 8% as very high level. Additionally, 60.8% of men were at high or very high risk for CVD over the next ten years. However, 78.8% perceived their CVD risk as low-moderate. Therefore, there were substantial gaps between the perceived and actual risk levels. Moreover, among those at very high risk, 78% perceived themselves at low or moderate CVD risk whereas 20.3% of subjects with low risk for CVD overestimated their risk (wrong pessimism). Another important point is that only 20.3% perceived their CVD risk as a high/very level while 60.8% were at high or very high level of actual CVD risk (Table 2).

Table 1. *Influence of descriptive characteristics of participants at actual CVD risk level*

Descriptive Characteristics		Actual CVD Risk				χ^2	p
		Low Risk (n=64)	Moderate Risk (n=93)	High Risk (n=33)	Very High Risk (n=210)		
		n (%)	n (%)	n (%)	n (%)		
Age range[a]	40-50 years	58 (37.7)	36 (23.4)	0 (0.0)	60 (39.0)		
	51-60 years	6 (3.7)	51 (31.1)	17 (10.4)	90 (54.9)		
	61-65 years	0 (0.0)	6 (7.3)	16 (19.5)	60 (73.2)		
CVD history in family	Yes	14 (20.3)	14 (20.3)	2 (2.9)	39 (56.5)	4.425	0.219
	No	50 (15.1)	79 (23.9)	31 (9.4)	171 (51.7)		
DM[a]	Yes	0 (0.0)	0 (0.0)	0 (0.0)	61 (100)		
	No	64 (18.9)	93 (27.4)	33 (9.7)	149 (44.0)		
HT[a]	Yes	0 (0.0)	0 (0.0)	0 (%0.0)	82 (100)		
	No	64 (20.1)	93 (29.2)	33 (10.4)	128 (40.3)		
SBP[a]	Normotensive	37 (27.0)	34 (24.8)	9 (6.6)	57 (41.6)		
	Prehypertensive	25 (13.4)	51 (27.4)	13 (7.0)	97 (52.2)		
	Hypertensive	2 (2.6)	8 (10.4)	11 (14.3)	56 (72.7)		
DBP	Normotensive	39 (23.6)	41 (24.8)	7 (4.2)	78 (47.3)		
	Prehypertensive	18 (14.1)	32 (25.0)	11 (8.6)	67 (52.3)	23.395	**0.001****
	Hypertensive	7 (6.5)	20 (18.7)	15 (14.0)	65 (60.7)		
BMI	Normal weight	22 (24.2)	20 (22.0)	12 (13.2)	37 (40.7)		
	Overweight	32 (17.8)	47 (26.1)	6 (3.3)	95 (52.8)	24.609	**0.001****
	Obese	10 (7.8)	26 (20.2)	15 (11.6)	78 (60.5)		
Physical activity level	Inactive	20 (13.7)	28 (19.2)	9 (6.2)	89 (61.0)		
	Low level active	23 (14.0)	39 (23.8)	16 (9.8)	86 (52.4)	12.631	**0.048***
	Sufficient level active	21 (23.3)	26 (28.9)	8 (8.9)	35 (38.9)		
Total cholesterol[b]	Normal	63 (16.9)	87 (23.3)	30 (8.0)	193 (51.7)		
	Little high /High	1 (3.7)	6 (22.2)	3 (11.1)	17 (63.0)		
Smoking[a]	Yes	34 (14.9)	58 (25.4)	24 (10.5)	112 (49.1)		
	No	30 (17.4)	35 (20.3)	9 (5.2)	98 (57.0)		
Smoking classification	Current smoker	34 (14.9)	58 (25.4)	24 (10.5)	112 (49.1)		
	Former smoker	2 (14.3)	4 (28.6)	0 (0.0)	8 (57.1)	7.011	0.320
	Never smoker	28 (17.7)	31 (19.6)	9 (5.7)	90 (57.0)		

*χ^2: Chi-square test *p<0.05 **p<0.01 [a]Given that this variable is a risk factor in HeartScore, no analysis was done. [b]Combined with a small high category since there was only one participant with high total cholesterol level. CVD: cardiovascular disease, DM: diabetes mellitus, HT: hypertension, SBP: systolic blood pressure, DBP: diastolic blood pressure, BMI: body mass index*

Table 2. *Comparison of actual and perceived CVD risk*

Perceived CVD Risk	Actual CVD Risk					P*
	Low	Moderate	High	Very high	Total	
	n (%)	n (%)	n (%)	n (%)	n (%)	
Low	32 (8.0)	51 (12.8)	16 (4.0)	115 (28.8)	214 (53.5)	0.001**
Moderate	19 (4.8)	24 (6.0)	9 (2.3)	49 (12.3)	101 (25.3)	
High	7 (1.8)	11 (2.8)	8 (2.0)	27 (6.8)	53 (13.3)	
Very high	6 (1.5)	7 (1.8)	0 (0.0)	19 (4.8)	32 (8.0)	
Total	64 (16.0)	93 (23.3)	33 (8.3)	210 (52.5)	400 (100)	

**The McNemar-Bowker test was used for statistical analysis. **p<0.01*
Actual CVD risk was determined using HeartScore: low risk <1%; moderate risk ≤1-<5%; high risk ≤5-<10%, and very high risk ≥10% of CVD.
CVD: cardiovascular disease

Forty-eight percent of the participants perceive their CVD risks to be lower than they are and 23.8% to perceive it higher than they are. Correct estimation rate of CVD risk was 28.2% (Table 3).

Table 3. *Estimate condition of participants' real and perceived CVD risks*

Estimate condition of participants' real and perceived CVD risks	N	%
Underestimate the risk (↓) (Wrong optimist)	192	48.0
Identifying the risk of correctly (√) (Realistic)	113	28.2
Overestimate the risk (↑) (Wrong pessimistic)	95	23.8

*aChi-Square Test bKruskal Wallis Test *p<0.05 **p<0.01 ***Combined with little high category since there was only one participant with high total cholesterol level. CVD: cardiovascular disease, HT: hypertension, FPG: fasting plasma glucose, PPG: postprandial plasma glucose, BMI: body mass index, DM: diabetes mellitus*

Prevalence of CVD risk factors by perceived CVD risk of men may be seen in Table 4. 71.8% of participants were wrong in their perception in terms of their actual CVD risks (Table 4). Univariate analyses are shown in Table 4; accordingly, age, HT, DM, BMI, family history and physical activity variables have influence on the correct determination of CVD risk. At this point, the rate of individuals in the 40-50 age range have the same approximate determination perception and actual risk of CVD (37%) higher than individuals in the 51-60 age range (27.4%) and the 61-65 age range (13.4%).

It was an a priori expectation that the healthy men in the study would have a more accurate perceived CVD risk compared with the unhealthy men. Accordingly, the results showed this to be the case only in the BMI categories (overweight) (Table 4). The details are as follows. Accurate detection of CVD risk (Table 4) in individuals without HT (30.8%) was higher than for those with HT (18.3%); accurate detection in individuals without DM (30.7%) was higher than for those with DM (14.8%); accurate detection for overweight individuals (35%) was higher than for those of normal weight (29.7%) and those who were obese (17.9%); accurate detection for those without a family history of CVD (37.7%) was higher than for those with a family history of CVD (26.3%); and, finally, accurate detection for individuals with a sufficient activity level (34.4%) was higher than for those who were inactive (28.8%) and those with a low level of activity (24.4%).

It was determined after putting the significant factors found in univariate analyses (shown in Table 4) through logistic regression analysis (Table 5) that participants in the 61-65 age range and with DM failed to determine correct CVD risk. According to this, the 61-65 age range had 0.344 times more failure to determine the actual CVD risk compared to the 40-50 age range and the 51-60 age [odds ratio (OR)=0.34, 95% CI: 0.16-0.73, (p<0.01)]. In addition, individuals with DM had 0.45 times higher rate of failure to determine actual CVD risk compared to those without DM [OR=0.45, 95% CI: 0.20-0.99, (p<0.05)].

Table 4. *Influence of individuals' descriptive characteristics regarding their perception of CVD risk*

Descriptive Characteristics		Perceived CVD Risk			χ^2	p
		Determined below actual risk (Wrong optimists) [n=192]	Determined the same level as actual (Realist) [n=113]	Determined over actual risk (Wrong pessimists) [n=95]		
		n (%)	n (%)	n (%)		
Age range	40-50 years	24 (15.6)	57 (37.0)	73 (47.4)	128.644[a]	**0.001****
	51-60 years	102 (62.2)	45 (27.4)	17 (10.4)		
	61-65 years	66 (80.5)	11 (13.4)	5 (6.1)		
HT	Yes	48 (58.5)	15 (18.3)	19 (23.2)	6.020[a]	**0.048***
	No	144 (45.3)	98 (30.8)	76 (23.9)		
Antihypertensive intake status	Yes	37 (55.2)	13 (19.4)	17 (25.4)	3.194[a]	0.202
	No	155 (46.5)	100 (30.0)	78 (23.4)		
Total cholesterol***	Normal	173 (46.4)	108 (29.0)	92 (24.7)	5.937[a]	0.051
	Little high /High	19 (70.4)	5 (18.5)	3 (11.1)		
Antilipidemic medicine intake	Yes	4 (57.1)	1 (14.3)	2 (28.6)		
	No	188 (47.8)	112 (28.5)	93 (23.7)		
DM	Yes	39 (60.7)	9 (14.8)	15 (24.6)	7.064[a]	**0.029***
	No	155 (45.7)	104 (30.7)	80 (23.6)		
FBG	Ort±SS	132.36±74.29	110.70±25.51	114.38±38.41	1.106[a]	0.575
	Median (min-max)	106.5 (83-508)	104 (71-187)	108 (2-280)		
FBG without DM (n=142)	Normal	26 (44.8)	18 (31.0)	14 (24.1)	2.221[b]	0.695
	Risky	26 (39.4)	17 (25.8)	23 (34.8)		
	Diabetes	8 (44.4)	6 (33.3)	4 (22.2)		
PPG	Ort±SS	151.16±63.84	137.20±36.19	143.48±58.76	1.132[a]	0.568
	Median (min-max)	134.5 (82-453)	130 (94-265)	128 (87-389)		
PPG without DM (n=197)	Normal	59 (46.1)	43 (33.6)	26 (20.3)	1.897[b]	0.755
	Risky	31 (50.0)	19 (30.6)	12 (19.4)		
	Diabetes	5 (71.4)	1 (%14.3)	1 (14.3)		
BMI	Normal	36 (39.6)	27 (29.7)	28 (30.8)	20.896[a]	**0.001****
	Overweight	74 (41.1)	63 (35.0)	43 (23.9)		
	Obese	82 (63.6)	23 (17.8)	24 (18.6)		
Self-CVD history	Yes	35 (48.6)	22 (30.6)	15 (20.8)	0.487[a]	0.784
	No	157 (47.9)	91 (27.7)	80 (24.4)		
Family CVD history	Yes	23 (33.3)	26 (37.7)	20 (29.0)	7.325[a]	**0.026***
	No	169 (51.1)	87 (26.3)	75 (22.7)		
Smoking	Yes	108 (47.4)	59 (25.9)	61 (26.8)	3.116[a]	0.211
	No	84 (48.8)	54 (31.4)	34 (19.8)		
Physical activity level	Inactive level	69 (47.3)	41 (28.8)	35 (24.0)	13.087[a]	**0.011***
	Low-level active	93 (56.7)	40 (24.4)	31 (18.9)		
	Sufficient level active	30 (33.3)	31 (34.4)	29 (32.2)		

Table 5. *Analysis of the factors influencing perceived CVD risk in terms of actual CVD risk*

Variables	B	SE	OR	95% CI	P
Age (51-60 years)	-0.19	0.25	0.82	0.49-1.36	0.444
Age (61-65 years)	-1.06	0.38	0.34	0.16-0.73	**0.006**
Family CVD history	0.45	0.29	1.57	0.89-2.79	0.117
HT	-0.26	0.33	0.77	0.39-1.48	0.435
DM	-0.79	0.40	0.45	0.20-0.99	**0.048**
Overweight	0.31	0.29	1.37	0.77-2.42	0.280
Obese	-0.51	0.34	0.59	0.30-1.16	0.132
Physical activity (Low level active)	-0.32	0.27	0.72	0.42-1.22	0.232
Physical activity (Sufficient level active)	-0.06	0.30	0.94	0.51-1.71	0.845
Constant	-0.483	0.322	0.617		0.133

Multivariate logistic regression model
aActual CVD risk determination situations were included in the logistic regression model in two groups of right and wrong determinations. Moreover, only significant and close-significants were included in the analysis since not all the variables were included.
B: regression coefficient, SE: standard error, OR: odds ratio, CI: confidence interval, CVD: cardiovascular disease, HT: hypertension, DM: diabetes mellitus, BMI: body mass index

4. DISCUSSION

The most important finding of this study was that 71.8% of men were wrong in their perception of their CVD risks. Subsequently, 60.8% of men had a high/very high risk for actual CVD risk but only 20.3% of men perceived their CVD risks as high/very high. Individuals who do not think that they have a CVD risk are those who cannot adapt to risk reduction behaviors such as smoking cessation, etc. From this point forth, this finding is very important. Moreover, the study showed that in terms of substantially influencing the correct perception of CVD risk were factors that included being of a younger age; having a family history of CVD, HT, DM, or BMI; and having a physical activity level while at an older age and being DM. These findings highlights the predictors of risk perception for men for CVD.

In this study, it was observed that the participants had a skewed risk perception regarding CVD risks. About half are optimistic about CVD risks. This distorted perception may prevent them from taking action for risk management. Ideally, an individual's perceptions of their risks should be compatible with their actual risks. Only 28.2% of the participants correctly defined their risks. In previous studies, it has been determined that adults have skewed perceptions of CVD risks (23,25-28, 46-51). It is important to evaluate the 10-year CVD risk of adults and to give recommendations regarding the lifestyle appropriate to their risks in maintaining their health (15,16,18,21).

62.2% of older men perceived their CVD risks as at a low level (Table 4) although age is a CVD risk-increasing factor. In other words, they may be defined as "wrong optimists." Several other studies revealed that older men perceive their CVD risks as lower than their actual risk (23,27,46) while other studies stated that older men perceived a higher CVD risk than the actual risk (25,34,47).

The HeartScore program does not include family history in its risk calculation. A total of 33.3% of men who had a family history of CVD perceived a CVD risks lower than the actual CVD risk (Table 4). Available findings indicated that family history increased the sensitivity of family members. This study revealed that one out of three men with a family history of CVD had an incorrect perception of their CVD risk (Table 4). Contrary to this, conducted studies revealed that men with a family history of CVD tended to perceive their CVD risks at a high level (33,34,47).

Participants with HT were included in the direct high-risk group in the HeartScore calculation (18). However, in this study, more than half of men with HT (58.5%) perceived their risk as lower than the actual risk (Table 4). This finding indicates that a majority of men with HT are not aware of CVD risks. In similar studies, it was stated that men with HT perceive their CVD risks at a very low or zero level (33,46,47). This situation could be related to disease management and lack of CVD risk knowledge. Participants with DM are included in the direct very high-risk group in the HeartScore calculation (18). In this study, more than half of the men with DM (60.7%) perceived themselves to be in the low-risk group (Table 4). Similar studies revealed that men with DM perceive themselves to be in a lower risk group than their actual CVD risk level (27,33,48). It is possible to assert, upon evaluating this and other similar studies as a whole, that men with DM have a distorted CVD risk perceptions.

The correct CVD risk perception of the overweight group (35%) was higher than that of the group with normal weight (29.7%) and those who were obese (17.9%) (Table 4). Another study revealed that obese men have an accurate of risk perception of CVD (49). However, there are also studies that revealed that men with normal weight have a more accurate perception of their CVD risks (25).

This study determined that physically active men have a more correct CVD risk perception (Table 4). It is known that increased physical activity reduces CVD risks. Two other similar studies stated that physically active men perceive their CVD risks to be at a very low risk level (25,26). Hence, it can be said that physically active men have a correct perception of CVD risk.

Logistic regression analysis was performed here, as it is thought that there may be masking or confounding variables in determining the factors affecting the perceived risk of cardiovascular disease. Accordingly, it was determined that elderly (61-65) and individuals with DM misunderstood the cardiovascular disease risks ($p<0.05$). According to HeartScore, age is an important variable and advancing age increases the risk level (49). Contrary to the findings of this study, according to the relevant studies, it was determined that older men consider themselves to be at high risk for CVD (25,34,47,50). The lower educational level of older men

in this study may be a reason for not perceiving the risks correctly.

In various studies, it has been determined that the perceived CVD risks of men diagnosed with DM are at a lower level compared to the actual CVD risks (27,33,47,51). Once the studies in the literature evaluating the perceived CVD risks of men diagnosed with DM are evaluated as a whole, it is evident that the perceived CVD risks of men with diabetes are at a lower level compared to their actual CVD risks. However, it is known and acknowledged that men with DM are at a very high risk level in terms of CVD risk. Therefore, it can be said that men diagnosed with DM have a false perception of risk for CVDs, and it is necessary to provide informative trainings regarding CVD risks to men with DM and to inform them with respect to behaviors that help to reduce CVD risks in this manner.

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In various studies, it has been determined that the perceived CVD risks of men diagnosed with DM are at a lower level compared to the actual CVD risks (27,33,45,49). Once the studies in the literature evaluating the perceived CVD risks of men diagnosed with DM are evaluated as a whole, it is evident that the perceived CVD risks of men with diabetes are at a lower level compared to their actual CVD risks. However, it is known and acknowledged that men with DM are at a very high risk level in terms of CVD risk. Therefore, it can be said that men diagnosed with DM have a false perception of risk for CVDs, and it is necessary to provide informative trainings regarding CVD risks to men with DM and to inform them with respect to behaviors that help to reduce CVD risks in this manner.

5. CONCLUSION

These results showed that more than half of the participants were at a very high level of CVD risk, and approximately one out of two men perceived their CVD risk to be lower than their actual risk. We suggest that the CVD risks and risk perceptions of men in 40-65 age range should be determined periodically. Distorted CVD risk perception may hinder the search for good health. Therefore, more frequent training and consultation should be offered, especially to individuals with diseases that increase CVD risk.

Conflicts of interest: The author declare no conflict of interest

REFERENCES

[1] World Health Organization (WHO). Cardiovascular diseases [Internet]; https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(CVDs) Accessed July 13, 2021.
[2] Balbay Y, Gagnon-Arpin I, Malhan S, Öksüz ME, Sutherland G, Dobrescu A, Villa G, Ertuğrul G, Habib M. Modeling the burden of cardiovascular disease in Turkey. Anatol J Cardiol. 2018;20(4):235-240.
[3] Yin J, Jin X, Shan Z, Li S, Huang H, Li P, Peng X, Peng Z, Yu K, Bao W, Yang W, Chen X, Liu L. Relationship of sleep duration with all-cause mortality and cardiovascular events: a systematic review and dose-response meta-analysis of prospective cohort studies. J Am Heart Assoc. 2017;6(9):e005947.
[4] Onat A, Can G. Prevalence of heart disease in our adults, new coronary events and death from heart, TEKHARF 2017 Leading the medical world in its approach to chronic diseases. Istanbul: Logos; 2017 (Turkish).
[5] Turkish Statistical Institute. Turkey Health Survey [Internet], 2016-2018; http://www.turkstat.gov.tr/PreTabloArama.do?metod=search. Accessed March 5, 2019 (Turkish).
[6] Bhatnagar P, Wickramasinghe K, Williams J, Rayner M, Townsend N. The epidemiology of cardiovascular disease in the UK 2014. Heart 2015;101(15):1182-1189.
[7] Kotseva K, De Bacquer D, De Backer G, Rydén L, Jennings C, Gyberg V, Abreu A, Aguiar C, Conde AC, Davletov K, Dilic M, Dolzhenko M, Gaita D, Georgiev B, Gotcheva N, Lalic N, Laucevicius A, Lovic D, Mancas S, Miličić D, Oganov R, Pajak A, Pogosova N, Reiner Ž, Vulic D, Wood D, On Behalf of The Euroaspire Investigators. Lifestyle and risk factor management in people at high risk of cardiovascular disease. A report from the European Society of Cardiology European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE) IV cross-sectional survey in 14 European regions. Eur J Prev Cardiol. 2016;23(18):2007-2018.
[8] Kjøllesdal M, Degerud E, Næss Ø. The association between obesity and cardiovascular disease mortality in different strata of socioeconomic position: evidence from pooled Norwegian health surveys. Eur J Public Health. 2019;29(6):1160-1166.
[9] Borodulin K, Vartiainen E, Peltonen M, Jousilahti P, Juolevi A, Laatikainen T, Männistö S, Salomaa V, Sundvall J, Puska P. Forty-year trends in cardiovascular risk factors in Finland. Eur J Public Health. 2014;25(3):539-546.
[10] Li T, Hashimoto H. Household dietary salt consumption and mortality from cardiovascular diseases: an ecological panel analysis in Japan. Eur J Public Health. 2019;29(5):826-832.
[11] Ünal B, Sözmen K, Uçku R, Ergör G, Soysal A, Baydur H, Meseri R, Şimşek H, Gerçeklioğlu G, Doğanay S, Budak R, Kiliç B, Günay T, Ergör A, Demiral Y, Aslan Ö, Çimrin D, Akvardar Y, Tuncel P. High prevalence of cardiovascular risk factors in a Western urban Turkish population: a community-based study. Anatol J Cardiol. 2013;13(1):9-17.
[12] Ministry of Health, Turkey. Health Statistics Yearbook [Internet], 2017; https://dosyasb.saglik.gov.tr/Eklenti/30148,ingilizcesiydijiv1pdf.pdf?0. Accessed February 4, 2019 (Turkish).
[13] Ritchie H, Roser M. "Smoking" [Internet], 2019; https://ourworldindata.org/smoking. Accessed June 10, 2022.
[14] The Substance Abuse and Mental Health Services Administration (SAMHSA), Center for Behavioral Health Statistics and Quality. National Survey on Drug Use and Health. [Internet], 2019; https://www.samhsa.gov/data/sites/default/files/reports/rpt29394/NSDUHDetailedTabs2019/

NSDUHDetTabsSect2pe2019.htm#tab2-19b. Accessed July 21, 2021.
[15] Eray A, Ateş E, Set T. Assessment of cardiovascular disease risk in adults. Turk J Fam Pract. 2018;22(1):12-9 (Turkish).
[16] Ministry of Health, Turkey. Periodic Health Examinations and Screening Tests Proposed in Family Medicine Practice [Internet], 2015; https://dosyaism.saglik.gov.tr/Eklenti/43917,5—aile-hekimligi-uygulamasinda-onerilen-periyodik-saglik-muayeneleri-ve-tarama-testleri-rehberipdf.pdf?0. Accessed August 15, 2019 (in Turkish).
[17] Mossakowska TJ, Saunders CL, Corbett J, MacLure C, Winpenny EM, Dujso E, Payne RA. Current and future cardiovascular disease risk assessment in the European Union: an international comparative study. Eur J Public Health. 2018;28(4):748-754.
[18] Piepoli MF, Hoes AW, Agewall S, Albus C, Brotons C, Catapano AL, Cooney MT, Corrà U, Cosyns B, Deaton C, Graham I, Hall MS, Hobbs FDR, Løchen ML, Löllgen H, Marques-Vidal P, Perk J, Prescott E, Redon J, Richter DJ, Sattar N, Smulders Y, Tiberi M, van der Worp HB, van Dis I, Verschuren WMM, Binno S; ESC Scientific Document Group. 2016 European guidelines on cardiovascular disease prevention in clinical practice: the sixth joint task force of the European Society of Cardiology and other societies on cardiovascular disease prevention in clinical practice (constituted by representatives of 10 societies and by invited experts) developed with the special contribution of the European Association for Cardiovascular Prevention and Rehabilitation (EACPR). Eur Heart J. 2016;37(29):2315–2381.
[19] Catapano AL, Graham I, De Backer G, Wiklund O, Chapman MJ, Drexel H, Hoes AW, Jennings CS, Landmesser U, Pedersen TR, Reiner Ž, Riccardi G, Taskinen MR, Tokgozoglu L, Verschuren WMM, Vlachopoulos C, Wood DA, Zamorano JL, Cooney MT; ESC Scientific Document Group. 2016 ESC/EAS guidelines for the management of dyslipidemias. Eur Heart J. 2016;37(39):2999-3058.
[20] Akgöz A, Gözüm S. Cardiovascular disease risk in Turkish family health centers. J Vasc Nurs. 2019;37(2):117-124.
[21] Ministry of Health, Turkey. Cardiovascular diseases prevention and control program 2015-2020. Ankara: Report no, 988 (Turkish).
[22] Leite L, Baptista R, Leitão J, Cochicho J, Breda F, Elvas L, Fonseca I, Carvalho A, Costa JN. Chest pain in the emergency department: risk stratification with Manchester triage system and HEART score. BMC Cardiovasc Disord. 2015;15(1):48-55.
[23] Ko Y, Boo S. Self-perceived health versus actual cardiovascular disease risks. Jpn J Nurs Sci. 2016;13(1):65-74.
[24] de Lima MM Jr, da Silva GR, Jensem Filho SS, Granja F. Association between perceived lifetime risk of cardiovascular disease and calculated risk in a male population in Brazil. Vasc Health Risk Manag. 2016;12:279-286.
[25] Alwan H, William J, Viswanathan B, Paccaud F, Bovet P. Perception of cardiovascular risk and comparison with actual cardiovascular risk. Eur J Cardiovasc Prev Rehab. 2009;16(5):556-561.
[26] Barnhart JM, Wright ND, Freeman K, Silagy F, Correa N, Walker EA. Risk perception and its association with cardiac risk and health behaviors among urban minority adults: the Bronx Coronary Risk Perception study. Am J Health Promot. 2009;23(5):339-342.
[27] Desgraz B, Collet TH, Rodondi N, Cornuz J, Clair C. Comparison of self-perceived cardiovascular disease risk among smokers with Framingham and PROCAM scores: a cross-sectional analysis of baseline data from a randomized controlled trial. BMJ Open. 2017;7(1):e012063.
[28] Katz M, Laurinavicius AG, Franco FG, Conceicao RD, Carvalho JA, Pesaro AE, Wajngarten M, Santos RD. Calculated and perceived cardiovascular risk in asymptomatic subjects submitted to a routine medical evaluation: the perception gap. Eur J Prev Cardiol. 2015;22(8):1076-1082.
[29] Temu TM, Kirui N, Wanjalla C, Ndungu AM, Kamano JH, Inui TS, Bloomfield GS. Cardiovascular health knowledge and preventive practices in people living with HIV in Kenya. BMC Infect Dis. 2015;15(1):421-429.
[30] Cleland C, Ferguson S, Ellis G, Hunter RF. Validity of the International Physical Activity Questionnaire (IPAQ) for assessing moderate-to-vigorous physical activity and sedentary behavior of older adults in the United Kingdom. BMC Med Res. Methodol 2018;18(1):176.
[31] European Society of Preventive Cardiology. HeartScore Turkey website [Internet]. https://heartscore.escardio.org/2016/Login.aspx?ReturnUrl=%2f2016%2fdefault.aspx%3fmodel%3dturkey&model=turkey. Accessed May 2, 2019.
[32] Kleindorfer DO, Towfighi A, Chaturvedi S, Cockroft KM, Gutierrez J, Lombardi-Hill D, Kamel H, Kernan WN, Kittner SJ, Leira EC, Lennon O, Meschia JF, Nguyen TN, Pollak PM, Santangeli P, Sharrief AZ, Smith SC Jr, Turan TN, Williams LS. 2021 Guideline for the prevention of stroke in patients with stroke and transient ischemic attack. Stroke. 2021;52: e364–e467.
[33] Boo S, Froelicher ES, Yun JH, Kim YW, Jung JY, Suh CH. Perceived and actual risk of cardiovascular disease in patients with rheumatoid arthritis in Korea: a cross-sectional study. Medicine (Baltimore). 2016;95(40): e5117.
[34] Petr EJ, Ayers CR, Pandey A, de Lemos JA, Powell-Wiley TM, Khera A, Lloyd-Jones DM, Berry JD. Perceived lifetime risk for cardiovascular disease (from the Dallas Heart Study). Am J Cardiol. 2014;114(1):53-58.
[35] Saglam M, Arikan H, Savci S, Inal-Ince D, Bosnak-Guclu M, Karabulut E, Tokgozoglu L. International physical activity questionnaire: reliability and validity of the Turkish version. Percept Mot Skills. 2010;111(1):278-284.
[36] World Health Organization (WHO). Guide to Physical Measurements [Internet]. https://www.who.int/ncds/surveillance/steps/Section%204%20Step%202%20Physical%20Measurements.pdf. Accessed May 3, 2019.
[37] Centers for Disease Control and Prevention (CDC). About Adult BMI [Internet]; https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html. Accessed August 1, 2019.
[38] Martinez TLR, Santos RD, Armaganijan D, Torres KP, Loures-Vale A, Magalhães ME, Lima JC, Moriguchi E, Amodeo C, Ortiz J. National alert campaign about increased cholesterol: determination of cholesterol levels in 81, 262 Brazilians. Arq Bras Cardiol. 2003;80(6):635-638.
[39] Roche Diagnostic Turkey. Products [Internet], 2022; https://diagnostics.roche.com/gb/en/home.html Accessed June 6, 2022.
[40] Coqueiro Rda S, Santos MC, Neto Jde S, Queiroz BM, Brügger NA, Barbosa AR. Validity of a portable glucose, total cholesterol, and triglycerides multi-analyzer in adults. Biol Res Nurs. 2014;16(3):288-294.
[41] American Diabetes Association (ADA). Standards of medical care in diabetes. Diabetes Care. 2020;43(suppl 1):S16-S71.
[42] Freckmann G, Schmid C, Baumstark A, Pleus S, Link M, Haug C. System accuracy evaluation of 43 blood glucose monitoring systems for self-monitoring of blood glucose according to DIN EN ISO 15197. J Diabetes Sci Technol. 2012;6(5):1060-1075.

[43] Arıcı M, Birdane A, Güler K, Yıldız BO, Altun B, Ertürk Ş, Aydoğdu M, Özbakkaloğlu M, Ersöz HÖ, Süleymanlar G, Tükek T, Tokgözoğlu L, Erdem Y. Turkish hypertension consensus report. Turk Kardiyol Dern Ars. 2015;43(4):402-409. (Turkish)

[44] Weber MA, Schiffrin EL, White WB, Mann S, Lindholm LH, Kenerson JG, Flack JM, Carter BL, Materson BJ, Ram CV, Cohen DL, Cadet JC, Jean-Charles RR, Taler S, Kountz D, Townsend RR, Chalmers J, Ramirez AJ, Bakris GL, Wang J, Schutte AE, Bisognano JD, Touyz RM, Sica D, Harrap SB. Clinical practice guidelines for the management of hypertension in the community: a statement by the American Society of Hypertension and the International Society of Hypertension. J Clin Hypertens (Greenwich). 2014;16(1):14-26.

[45] Centers for Disease Control and Prevention (CDC). National Health Interview Survey, Adult Tobacco Use Information [Internet]; https://www.cdc.gov/nchs/nhis/tobacco/tobacco_glossary.htm. Accessed August 16, 2019.

[46] Mohd Azahar NMZ, Krishnapillai ADS, Zaini NH, Yusoff K. Risk perception of cardiovascular diseases among individuals with hypertension in rural Malaysia. Heart Asia. 2017;9(2):1-4.

[47] Frijling BD, Lobo CM, Keus IM, Jenks KM, Akkermans RP, Hulscher ME, Prins A, van der Wouden JC, Grol RP. Perceptions of cardiovascular risk among patients with hypertension or diabetes. Patient Educ Couns. 2004;52(1):47-53.

[48] van der Weijden T, van Steenkiste B, Stoffers HE, Timmermans DR, Grol R. Primary prevention of cardiovascular diseases in general practice: mismatch between cardiovascular risk and patients' risk perceptions. Med Decis Making 2007;27(6):754-61.

[49] Masic I, Dilic M, Raljevic E, Vulic D, Mott D. Trends in cardiovascular diseases in Bosnia and Herzegovina and perspectives with HeartScore Programme. Med Arh 2010;64(5):260-263.

[50] Meischke H, Sellers DE, Sellers DE, Goff DC, Daya MR, Meshack A, Taylor J, Zapka J, Hand MM. Factors that influence personal perceptions of the risk of an acute myocardial infarction. Behav Med 2000;26(1):4-13.

[51] Choi S, Rankin S, Stewart A, Oka R. Perceptions of coronary heart disease risk in Korean immigrants with type 2 diabetes. Diabetes Educ 2008;34(3):484-492.

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