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The Relationship between Framingham Risk Score and Cardiovascular Disease Knowledge Level in Adult Individuals

Armağan Tanışkan,[1] Seda Ahçı Yılmaz,[2] Berrin Telatar[2]

[1]Çınarcık Family Health Center, Yalova, Türkiye
[2]Department of Family Medicine, Fatih Sultan Mehmet Suam, İstanbul, Türkiye

ABSTRACT

Objectives: This study aims to calculate Framingham risk levels in patients aged 40 and above and to examine their relationship with the cardiovascular disease risk factors knowledge level (CARRF-KL) scale.

Methods: This cross-sectional and analytical study was conducted with 220 voluntary participants aged 40–79 who visited the family medicine outpatient clinic. Participants' knowledge levels were assessed using the CARRF-KL, while their 10-year cardiovascular disease (CVD) risk was evaluated using the Framingham risk score. Participants diagnosed with diabetes or CVD were classified as high-risk.

Results: A total of 220 participants were enrolled in the study. The mean age of the participants was 56.8±9.6 years, with 142 (64.5%) being female and 121 (55.0%) having an educational level of middle school or below. The median CARRF-KL score was 23.0 (12.0–28.0). According to the Framingham risk classification, 58 (26.4%) of participants were in the low-risk group, 36 (16.3%) in the moderate-risk group, and 126 (57.3%) in the high-risk group. A significant difference was found between CARRF-KL scale scores according to Framingham risk levels (p=0.031).

Conclusion: The present findings indicate that knowledge of disease risks alone is insufficient for adopting preventive measures or lifestyle changes. Therefore, it is essential to educate and motivate patients in primary healthcare settings regarding the importance of a healthy lifestyle in reducing CVD risk.

Keywords: Awareness, cardiovascular diseases, heart disease risk factors

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Address for correspondence: Dr. Armağan Tanışkan. Çınarcık Family Health Center, Yalova, Türkiye

Phone: +90 505 698 91 66

E-mail: armagantaniskan@gmail.com

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INTRODUCTION

Cardiovascular diseases (CVD) refer to conditions affecting the heart and/or blood vessels and are among the leading causes of mortality and morbidity both globally and in Türkiye.[1] According to data from the World Health Organization, CVD ranks first among deaths caused by non-communicable diseases, accounting for approximately 18 million deaths annually.[2] Similarly, in Türkiye, CVD was reported as the leading cause of death according to 2019 data from the Turkish Statistical Institute.

The risk of developing CVD can be mitigated by evaluating individuals based on risk factors and addressing modifiable ones.[3] CVD is associated with risk factors, such as smoking, excessive alcohol consumption, high salt intake, obesity, hypertension, diabetes, and physical inactivity. Modifying these lifestyle habits reduces mortality and hospitalization rates while improving quality of life.

The development of CVD is typically attributed to the interaction of multiple risk factors.[4,5] These factors' clustering and combined effects in determining atherosclerotic vascular risk in CVD have been well established. Guidelines recommend applying risk assessment tools for CVD prevention, as they facilitate the early identification of individuals at high risk for CVD. In this context, a comprehensive risk factor assessment is crucial for preventive strategies and treatment planning.

Researchers have developed multivariable risk prediction tools that synthesize vascular risk factor data to estimate absolute CVD risk in individual patients.[6,7] These scoring systems use multiple risk factor equations to estimate an individual's likelihood of developing cardiovascular events. Numerous risk calculation models are available today, with the Framingham risk score being the oldest and most widely used.

The Framingham score evaluates nine risk factors: Gender, age, systolic blood pressure, use of antihypertensive treatment, the level of total cholesterol and high-density lipoprotein-cholesterol, smoking status, presence of diabetes, and a history of CVD (e.g., coronary artery disease, peripheral artery disease, or stroke).[1,8] Using this model, the 10-year cardiovascular risk score is calculated, and patients are classified into three groups: Low, moderate, and high risk.

Adequate knowledge about CVD risk is a crucial pre-requisite for making informed decisions about disease prevention.[9] Several scales have been developed to assess knowledge levels regarding CVD risk factors. One such instrument is the CVD risk factors knowledge level (CARRF-KL) scale, developed by Arıkan et al., 2009.[10]

This study aims to calculate Framingham risk levels in patients aged 40 and above and to examine their relationship with the CARRF-KL scale.

METHOD

The study population comprised patients aged 40 years and older who visited the family medicine outpatient clinic of a training and research hospital with various complaints between January 2022 and March 2022 and met the inclusion criteria. It was estimated that approximately 800 patients visited the family medicine outpatient clinic during these 2 months. Based on the assumption that 400 patients were 40 or older, the required sample size was calculated as 196 cases to achieve 80% power at an α=0.05 significance level. However, the final sample size was 220 to account for potential dropouts.

Participants included in the study were individuals aged 40–79 who provided informed consent, had no communication problems or cognitive impairments, and had undergone blood tests (lipid panel) within the past 3 months, as recorded in the hospital's automation system.

Each participant was administered a sociodemographic questionnaire prepared by the researchers and the CARRF-KL scale, a validated and reliable instrument consisting of 28 questions.[10] The scale's first four items assess knowledge about CVD characteristics, their preventability, and the influence of age. Fifteen items evaluate knowledge of risk factors (items 5, 6, 9–12, 14, 18–20, 23–25, 27, and 28), while nine items (7, 8, 13, 15, 16, 17, 21, 22, and 26) assess the consequences of changes in risk behaviors. The items are presented as statements with response options of "Yes," "No," or "I don't know." Six items (items 11, 12, 16, 17, 24, and 26) contain false statements and are therefore reverse-coded. The scale's total score ranges from 0 to 28. An internal consistency analysis of the scale revealed that the Cronbach's alpha coefficient for the total CARRF-KL scale was α=0.689, indicating high reliability. This value aligns with the validity and reliability study conducted by Arıkan et al., when they developed the CARRF-KL scale.

Arterial blood pressure measurements were obtained by a physician and recorded in each patient's clinical information form. The Framingham risk score was calculated by a physician using the calculation tool available on the Framingham risk score website, based on the patient's clinical data and lipid panel results obtained from the hospital's automation system within the past 3 months.[8]

Number Cruncher Statistical System 2007 (Kaysville, Utah, USA) software was used for statistical analyses. Descriptive statistical methods (mean, standard deviation, median, frequency, percentage, minimum, and maximum) were applied to evaluate the study data. The Kruskal–Wallis test was used for quantitative variables that did not show normal distribution, and the Dunn-Bonferroni test was used for post hoc evaluations. A $p<0.05$ was considered statistically significant.

RESULTS

A total of 220 participants were enrolled in the study, with a mean age of 56.8±9.6 years. The distribution of the demographic and clinical features is summarized in Table 1.

The median Framingham score of all participants was 15.6 (1.20–30.1). According to the Framingham risk classification, 58 (26.4%) of participants were in the low-risk category, 36 (16.3%) were at moderate risk, and 126 (57.3%) were at high risk.

Table 1. Distribution of the demographic and clinical features

	n (%)
Gender	
Female	142 (64.5)
Male	78 (35.5)
Age groups	
≤65 years	170 (77.3)
>65 years	50 (22.7)
Smoking status	
Yes	54 (24.5)
No, I quit	59 (26.8)
No, never smoked	107 (48.7)
Use of antihypertensive medication	97 (44.1)
Diabetes mellitus	85 (38.6)
Cardiovascular disease	19 (8.6)
	Mean±SD
Systolic blood pressure (mmHg)	136.6±22.2
Total cholesterol (mg/dL)	206.6±44.5
HDL cholesterol (mg/dL)	53.8±14.2

HDL cholesterol: High-density lipoprotein cholesterol.
Data are presented as mean±SD and n (%) as appropriate.

An analysis of responses to the CARRF-KL scale revealed that the highest proportion of correct responses was for the statements: *"Smoking is a risk factor for heart disease" 213 (96.8%), "Consuming salty foods causes high blood pressure"* 212 (96.4%), "*Overweight individuals are at increased risk of heart disease*" 212 (96.4%), "*Regular exercise reduces the risk of heart disease*" 212 (96.4%), "*High blood pressure is a risk factor for heart disease*" 203 (92.3%), and "*If blood sugar is controlled in diabetic patients, the risk is reduced*" 201 (91.4%). Similarly, participants correctly identified the reverse-coded statements "*Fatty foods do not increase blood cholesterol levels*" 203 (92.3%) and "*Solid fats at room temperature are beneficial for heart health*" 207 (94.1%) as incorrect.

Participants most frequently answered incorrectly the following statements: "*Slow walking and strolling count as exercise*" 87 (39.5%), "*If good cholesterol (HDL) is high, there is a risk of heart disease*" 86 (39.1%), and "*All individuals with high cholesterol levels should be prescribed medication*" 103 (46.8%).

The total CARRF-KL scores with a median score of 23.0 (12.0–28.0). CARRF-KL scale scores according to Framingham risk levels are summarized in Table 2. A significant difference was found between CARRF-KL scale scores according to Framingham risk levels, between low- and high-risk groups (p=0.026).

Table 2. CARRF-KL scale scores according to Framingham risk levels

	Framingham risk level			p
	Low risk (n=58)	Moderate risk (n=36)	High risk (n=126)	
CARRF-KL score	23.0 (13.0–27.0)	23.0 (18.0–27.0)	24.0 (12.0–28.0)	0.031

CARRF-KL score: Cardiovascular disease risk factor knowledge level scale.
Data are presented as median (min-max) as appropriate.
Kruskal–Wallis test.

DISCUSSION

In the present study, the median Framingham score of all participants was 15.6 (1.20–30.1). When participants were categorized into low-, moderate-, and high-risk groups based on their Framingham scores, the majority (126 participants, 57.3%) were classified as high-risk. This result may be related to the fact that disease-specific exclusion criteria were not applied in the present study. In contrast, a study conducted by Tekkeşin et al., on 3,169 participants without CVD or diabetes found that only 9.4% of men and 4.6% of women were classified as high-risk.[1] Similarly, in a study by Dülek et al., involving 258 patients aged 40–72 years who visited a family medicine outpatient clinic and had no known history of CVD, 46.9% were classified as high-risk.[11] Another study conducted in Iran with 2,103 participants aged 40–79 years without a history of CVD found that 26.5% were in the high-risk category.[12]

The present study's total scores from the CARRF-KL scale were 22.8±2.9. Although it was expected that participants with higher CVD knowledge levels would have a lower CVD risk, the present study found that individuals with higher CARRF-KL scores were more likely to be classified as high-risk rather than low-risk. Several factors may contribute to this finding. Increased knowledge may result from personal exposure to risk factors, the disease, and experiences during hospitalization and treatment. Similar to the present findings, a study by Topuz and Bozdemir on 192 university employees found that individuals with high Framingham risk scores also had high CARRF-KL scores, with the highest CARRF-KL scorers also having the highest Framingham scores.[13] However, a study by Keleşoğlu et al., involving 122 patients aged 40–80 who visited a family medicine outpatient clinic found no significant difference between CARRF-KL scores and SCORE risk distribution.[14] Similarly, Tekin et al., in a study of 390 male patients aged 40–65 years, found a very weak negative correlation between SCORE risk scores and CARRF-KL scores, which was not sta-

tistically significant.[15] The variations in study results may be attributed to differences in patient populations and the risk assessment methods applied.

A limitation of the present study is that participants' lipid levels were evaluated without assessing whether they received treatment for dyslipidemia.

CONCLUSION

Although the CARRF-KL scale scores were generally high in the present study, 57.3% of the participants were classified in the high-risk category based on their Framingham scores. Being knowledgeable about disease risks does not necessarily translate into taking preventive measures. The present findings indicate that participants' knowledge levels did not lead to behavioral changes. Increasing awareness can help prevent or delay the onset of chronic diseases, such as CVD, slow disease progression, and improve survival rates. In this regard, primary healthcare services are crucial in educating the public, promoting healthy lifestyles, and monitoring their implementation. Integrating risk scoring systems into primary care physicians' follow-up screens could be a significant step forward.

Disclosures

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Conflict of Interest: None declared.

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Ethics Committee Approval: Ethical approval for the study was obtained from the Clinical Research Ethics Committee of the University of Health Sciences, Istanbul Fatih Sultan Mehmet Training and Research Hospital (Approval date: December 29, 2021, Approval number: 2021/113). In addition, all participants were informed about the study's content and the voluntary nature of participation, and their written consent was obtained.

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