The relationship between knowledge of cardiovascular disease risk factors and health anxiety among caregivers of patients undergoing open-heart surgery

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ABSTRACT

Objectives: Cardiovascular diseases, characterized by their chronic nature, frequently lead to considerable physical strain and psychological distress in affected individuals. In managing these challenges, the involvement of caregivers plays a pivotal role. The effectiveness and consistency of the care they offer are substantially influenced by both their psychological health and their understanding of the disease's risk profile. This study aims to examine the relationship between caregivers' knowledge of cardiovascular risk factors and their levels of health anxiety while caring for patients recovering from open-heart surgery.

Methods: Participants who were identified as caregivers for individuals undergoing open-heart surgery were assessed using three instruments: a demographic and descriptive questionnaire, the Cardiovascular Disease Risk Factors Knowledge Level Scale (CARRF-KL), and the Health Anxiety Inventory (HAI).

Results: The study included 58 participants, with females comprising 56.9% of the sample. The average score obtained on the Cardiovascular Disease Risk Factors Knowledge Level Scale (CARRF-KL) was 19.16±4.99, whereas the mean score on the Health Anxiety Inventory (HAI) was 21.1±14.84. The analysis showed a statistically significant, positive but weak correlation between the total scores of the Health Anxiety Inventory (HAI) and the Cardiovascular Disease Risk Factors Knowledge Level Scale (CARRF-KL) (r= 0.282, P=0.032). Additionally, participants' education levels were significantly related to their CARRF-KL scores (P<0.001).

Conclusions: This research highlights the vital importance of caregivers' knowledge about the disease and their mental health status in providing quality care to patients. Improving caregivers' comprehension of cardiovascular diseases, clearly defining their caregiving roles, and managing their health-related anxieties may enhance the well-being of both caregivers and patients. These findings point to the necessity of implementing specialized educational programs and psychological support services tailored for caregivers in cardiac care environments.

Keywords: Cardiovascular disease, risk factors knowledge, health anxiety, caregivers, open heart surgery

Cardiovascular disease (CVD) stands as the most widespread non-communicable illness worldwide. According to the World Health Organiza-tion CVD encompasses a spectrum of disorders involving the heart and vascular system, including but not limited to coronary artery disease, cerebrovascular

incidents, peripheral artery disease, rheumatic heart conditions, deep vein thrombosis, and pulmonary embolism [1].

In addition to its high incidence, CVD is a leading cause of mortality globally. Deaths attributed to cardiovascular conditions have been increasing steadily, with 17.9 million fatalities recorded in 2016 alone. Projections estimate this figure will rise to 22.2 million by 2030. That same year, CVD was responsible for nearly 31% of all deaths worldwide [2]. Within Turkey, ischemic heart disease (IHD) and cerebrovascular disease ranked as the top two causes of premature death in 2010, according to data from the Institute for Health Metrics and Evaluation [3].

Recognizing and understanding the risk factors associated with CVD is essential for identifying individuals who are at heightened risk, thereby facilitating prompt interventions aimed at risk reduction. Since the mid-1900s, significant advancements have been made in pinpointing major contributors to CVD development, aiding in the effective control of the disease, particularly in developed countries [4]. Key modifiable risk factors—including hypertension, diabetes, obesity, elevated lipid levels, smoking, and physical inactivity—have consistently been associated with higher rates of CVD incidence and mortality [5]. Because many of these factors can be prevented or managed, the onset and worsening of CVD are often avoidable. Consequently, knowledge about these risk factors is fundamental to both preventing and managing cardiovascular conditions [6]. Public health efforts that promote healthy behaviors and raise awareness about CVD symptoms are crucial for early detection, prevention, and better health outcomes [7].

Individuals diagnosed with cardiovascular disease often rely on caregivers due to the emergence of acute complications or the chronic nature of their condition [8]. Caregivers are generally described as those who offer informal, unpaid support to relatives or friends coping with chronic illnesses or disabilities. They form an essential part of the long-term care framework for patients facing both physical and mental health challenges [9]. Their responsibilities encompass aiding patients in daily activities, managing intricate treatment plans, coordinating with healthcare providers, and reducing the likelihood of medical errors [10]. Nevertheless, the caregiving role can impose significant emotional and social strain. Many caregivers report symptoms such as depression, anxiety, social withdrawal, exhaustion, familial tensions, financial difficulties, and worries regarding their own well-being [11].

Health anxiety can manifest at various stages throughout an individual's life, often triggered by unfamiliar circumstances, unexpected events, bodily sensations, discomfort, or increased exposure to illness-related media content. In many instances, this anxiety is transient, diminishing as physical symptoms resolve or effective treatment is provided. However, in more severe cases, health anxiety persists despite appropriate medical intervention [12]. The experience of losing a loved one has been shown to intensify health-related worries, causing individuals to become overly focused on their own well-being. According to cognitive-behavioral models of health anxiety, people develop beliefs about illness based on both personal experiences and external influences, such as past illness encounters and information obtained from their surroundings. While early life experiences play a foundational role, exposure to health-related content through social media, cultural factors, and interpersonal relationships also significantly shape enduring health perceptions and anxieties [13]. Research examining health perceptions and anxiety among nursing students found that factors including chronic illness presence, history of hospitalization, and family history of chronic disease were linked to elevated health anxiety levels [14].

To the best of current knowledge, there has been no comprehensive study conducted in Turkey that explores the association between caregivers' awareness of CVD risk factors and their levels of health anxiety within the context of caring for patients undergoing open-heart surgery. The aim of this cross-sectional study is to assess caregivers' awareness of cardiovascular disease risk factors and to investigate the relationship between this knowledge and their level of health anxiety.

METHODS

Study Population and Sample
This cross-sectional study was carried out at the cardiovascular surgery outpatient clinic between August and December 2024. Approval was granted by the Ethics Committee for Non-Interventional Studies prior

to the commencement of the research. Before enrolling in the study, all participants received detailed information from the researchers regarding the study's objectives and the nature of the questionnaires and scales to be used. Written informed consent was obtained from each participant, with assurances that their data would remain anonymous and be utilized exclusively for research purposes.

Participants were considered eligible if they were caregivers of patients undergoing open-heart surgery, aged 18 years or older, possessed at least a primary school education, and voluntarily consented to take part in the study. Exclusion criteria included diagnoses of intellectual disability, psychotic disorders, or primary/acquired neurological conditions potentially affecting cognitive abilities (such as stroke, dementia, head trauma, or cranial surgery). Additionally, individuals with current alcohol or substance abuse issues, as well as those who declined to provide informed consent, were excluded from the study.

The researchers initiated the process by introducing themselves and confirming that each participant met the criteria for being a caregiver as defined by the study. They then provided a comprehensive explanation of the study's objectives and procedures. In situations where patients had multiple caregivers, the individual who spent the greatest amount of time caring for the patient was selected to participate, ensuring that only one caregiver per patient was included in the study.

The calculated sample size needed to achieve a 95% confidence level (P<0.05) was 50 participants. Initially, 61 caregivers were approached for inclusion in the study. Among them, 2 declined to participate due to time limitations, and 1 was excluded from the analysis because of incomplete or inaccurately completed questionnaires and scales. Consequently, the final sample comprised 58 caregivers.

Data Collection and Analysis

Caregivers received a printed set that included a demographic questionnaire, the Cardiovascular Disease Risk Factors Knowledge Level Scale (CARRF-KL), and the Health Anxiety Inventory (HAI). The administration of these instruments was supervised by a psychiatrist to maintain uniformity and provide assistance when necessary. Completion of the questionnaire took approximately 15 minutes per participant.

Measures

Descriptive Questionnaire Form

The researchers designed a descriptive questionnaire encompassing various socio-demographic and health-related variables. The collected data encompassed variables such as participants' age, sex, educational attainment, marital and employment status, income level, residential setting, their relation to the patient, individual medical background, familial cardiovascular disease history, smoking behavior, physical activity patterns, and anthropometric measurements including body weight and height.

Cardiovascular Diseases Risk Factors Knowledge Level (CARRF-KL)

The Cardiovascular Diseases Risk Factors Knowledge Level (CARRF-KL) scale was developed by adapting 16 items from the Heart Disease Fact Questionnaire (HDFQ) and 4 items from the 40-item Coronary Heart Disease Knowledge Test, both of which were translated into Turkish from their original [15]. Furthermore, eight additional items (numbers 5, 8, 9, 10, 17, 18, 22, and 26) were included to comprehensively evaluate knowledge of CVD risk factors, resulting in a 28-item instrument. This scale was validated for reliability and content validity by Arıkan *et al*. [16]. The first four items cover general aspects of CVD such as characteristics, preventability, and age-related factors. Fifteen items target specific risk factors (items 5, 6, 9, 12, 14, 18, 20, 23, 25, 27, 28), while nine items (7, 8, 13, 15, 16, 17, 21, 22, 26) evaluate outcomes associated with behavioral risk changes. Responses are recorded as 'yes,' 'no,' or 'don't know,' with correct answers scored as one point. Of the 28 items, 22 are scored directly, and 6 (items 11, 12, 16, 17, 24, 26) are reverse-scored. The highest attainable score is 28, with higher totals reflecting greater knowledge of cardiovascular risk factors. An internal consistency coefficient (Cronbach's alpha) of 0.76 was obtained, reflecting an acceptable level of reliability for the scale.

The Health Anxiety Inventory (HAI)

The Health Anxiety Inventory (HAI) is a self-administered questionnaire consisting of 18 items, developed to assess individuals' levels of health-related anxiety [13]. Its validity and reliability have been confirmed in prior research [17]. The initial 14 items as-

sess cognitive and behavioral components of health anxiety, while the final 4 items evaluate beliefs related to the presence of serious mental illness. Each item is scored on a 0 to 3 scale, with higher scores indicating increased health anxiety. Total scores range from 0 to 54, where elevated scores represent greater health anxiety. The scale demonstrated strong internal consistency, with a reported Cronbach's alpha of 0.91.

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics version 26 (IBM Corp., 2019). The normality of the data distribution was evaluated using the Kolmogorov-Smirnov and Shapiro-Wilk tests. For variables following a normal distribution, group comparisons based on socio-demographic factors were conducted with independent two-sample t-tests and one-way ANOVA. When ANOVA indicated significant differences, Duncan's post-hoc test was applied. For variables that did not meet normality assumptions, the Mann-Whitney U and Kruskal-Wallis H tests were utilized to assess differences across socio-demographic categories. A Bonferroni-corrected Z test was utilized to assess differences in total CARRF-KL and HAI scores across comorbidity categories with multiple response options. Spearman's rho correlation coefficient was used to investigate relationships between non-normally distributed variables - such as age, BMI, duration of the patient's illness, and time since surgery - and the scores on the CARRF-KL and HAI scales. Additionally, correlations between total and subscale scores of the CARRF-KL and HAI were examined using Spearman's rho. Results were reported as mean±standard deviation for normally distributed data, median (range) for non-normally distributed data, and frequency (percentage) for categorical variables. Statistical significance was determined at a threshold of $P<0.05$.

RESULTS

The study included 58 participants with a mean age of 49.34 years, ranging from 22 to 75 years. Females comprised 56.9% of the sample. The average body mass index (BMI) was 26.86, with values spanning from 18.5 to 40.2. Regarding marital status, the ma-

Table 1. Sociodemographic and clinic characteristics of the participants

Characteristics	Data (n=58)
Age (years)	49.34±11.58
Gender, n (%)	
Female	33 (56.9)
Male	25 (43.1)
BMI (kg/m^2)	26.86±4.55
Marital status, n (%)	
Single	7 (12.1)
Married	51 (87.9)
Education Status, n (%)	
Illiterate	4 (6.9)
Primary-secondary school	30 (51.7)
High School	16 (27.6)
University	8 (13.8)
Economic Status, n (%)	
Low	5 (8.6)
Middle	43 (74.1)
High	10 (17.2)
Occupation, n (%)	
Housewife	25 (43.1)
Labourer	5 (8.6)
Officer	5 (8.6)
Self-employment	5 (8.6)
Retired	15 (25.9)
Other	3 (5.2)
Place of residence, n (%)	
Village	13 (22.4)
District	15 (25.9)
Province centre	30 (51.7)
Comorbidity*, n (%)	
Allergy	1 (1.7)
DM	11 (19)
Goiter	4 (6.9)
Hyperlipidaemia	2 (3.4)
COPD	3 (5.2)
CVD	8 (13.8)
Psoriasis	2 (3.4)
None	29 (50)

Table 1 contunied. Sociodemographic and clinic characteristics of the participants

Characteristics	Data (n=58)
Smoking, n (%)	
Did not smoke	23 (39.7)
Quit smoking	13 (22.4)
Still smoking	22 (37.9)
Alcohol, n (%)	
Did not drink	45 (77.6)
Quit drinking	6 (10.3)
Still drinking	7 (12.1)
Dietary Practices, n (%)	
No	44 (75.9)
Yes	14 (24.1)
Exercise, n (%)	
No sport at all	35 (60.3)
Occasionally	20 (34.5)
Regularly	2 (3.4)
Yes	1 (1.7)
Death in the family due to CVD, n (%)	
No	28 (48.3)
Yes	30 (51.7)
Duration of illness of the patient under care (month)	65.37±107.25
Time elapsed since the date of surgery of the patient under care (month)	8.34±20.21

Data are shown as mean±standard deciation or n (%). BMI=Body mass index, COPD=Chronic obstructive pulmonary disease, CVD=Cardiovascular disease, DM=Diabetes mellitus
*Multiple response

jority (87.9%) were married. Educationally, 51.7% had completed either primary or secondary school. Most participants (74.1%) reported a middle-income level, and 46.6% lived with their spouses. In terms of occupation, 43.1% identified as housewives, and 51.7% resided in urban settings. Half of the participants reported no comorbid conditions, while 19% had diabetes mellitus. Lifestyle behaviors revealed that 37.9% were smokers, 12.1% consumed alcohol, 24.1% followed a diet, and 34.5% engaged in exercise sporadi-

cally. Only 31% had received information regarding cardiovascular disease (CVD), whereas 51.7% had experienced a family loss related to CVD. The average duration of illness for the patients under their care was 65.3 months, with an average of 8.24 months elapsed since the patients' surgery (Table 1).

A significant difference was identified in the total CARRF-KL scores across educational levels (P<0.001). Illiterate participants had a mean score of 11.25, whereas those with primary to secondary education averaged 17.93. Participants with a high school education scored an average of 21, and university graduates achieved a mean score of 24. These findings suggest a positive association between higher education levels and increased CARRF-KL scores. Additionally, nutritional status was significantly related to CARRF-KL scores (P=0.036); individuals not adhering to a diet had a mean score of 18.39, while those following a diet scored higher, with a mean of 21.57. Moreover, a weak but statistically significant negative correlation was found between age and total CARRF-KL score (r= -0.285, P=0.030). Similarly, a negative weak correlation was observed between BMI and the CARRF-KL subscale measuring changes in risk behaviors (r= -0.285, P=0.030) (Table 2).

Based on the results obtained, no statistically significant associations were observed between participants' socio-demographic characteristics and their HAI scores (P>0.05). The mean score for the CARRF-KL subscale assessing knowledge of disease characteristics, preventability, and age-related factors was 2.48. Participants' average score on the risk factors subscale was 11.1, while the mean score for the risk behavior change subscale was 5.57. The overall mean total score on the CARRF-KL scale was 19.16, and the mean HAI score was 21.1 (Table 3).

A weak but statistically significant positive correlation was identified between participants' HAI scores and the CARRF-KL subscale related to disease characteristics, preventability, and age factors (r=0.262, P=0.047). Similarly, a significant positive weak correlation was found between the overall HAI scores and total CARRF-KL scores (r=0.282, P=0.032). In contrast, no significant associations emerged between HAI scores and the CARRF-KL subscales measuring risk factors and changes in risk behaviors (P>0.05) (Table 4).

Table 2. Examination of the relationship between age, BMI, duration of the patient's illness, time since surgery, and participants' CARRF-KL and HAI scores

		Age	BMI	Duration of illness of the patient under care (month)	Time elapsed since the date of surgery of the patient under care (month)
CARRF-KL (Properties, Preservability, Age Factor)	r	-0.224	-0.187	-0.030	-0.131
	P value	0.090	0.160	0.826	0.327
CARRF-KL (Risk Factors)	r	-0.294	-0.166	0.113	-0.019
	P value	**0.025**	0.213	0.399	0.887
CARRF-KL (Change in Risk Behaviour)	r	-0.185	-0.285	0.085	-0.256
	P value	0.164	**0.030**	0.524	0.053
CARRF-KL (Total)	r	-0.285	-0.250	0.059	-0.193
	P value	**0.030**	0.059	0.662	0.147
HAI	r	-0.160	-0.078	0.032	0.101
	P value	0.231	0.560	0.810	0.449

CARRF-KL=Cardiovascular Diseases Risk Factors Knowledge Level, HAI=Health Anxiety Inventory
r=Spearman's rho correlation coefficient

DISCUSSION

The study included 58 participants, of whom 56.9% were female. The average total score on the CARRF-KL was 19.16±4.99, while the mean score on the HAI was 21.1±14.84. A weak but statistically significant positive correlation was identified between the total scores of the HAI and CARRF-KL (r=0.282, P=0.032). Additionally, significant differences in CARRF-KL scores were found across educational levels (P<0.001), with higher education associated with greater knowledge scores. This cross-sectional study sought to assess caregivers' awareness of cardiovascular disease risk factors and to analyze the connection between this knowledge and levels of health anxiety.

In our study, the average total score on the CARRF-KL was 19.16. Kazim *et al.* [18] reported that around 71.5% of their participants demonstrated adequate knowledge of cardiovascular disease risk factors. Conversely, lower levels of CVD awareness were observed in studies conducted in Lebanon (47.3%) and Saudi Arabia (47.1%) [19, 20]. These variations in knowledge

Table 3. Distribution of total and subscale scores of the CARRF-KL and mean HAI scores among participants

	Mean±SD	Median (min-max)
CARRF-KL (Properties, Preservability, Age Factor)	2.48±1.16	2 (0-4)
CARRF-KL (Risk Factors)	11.1±2.52	12 (3-15)
CARRF-KL (Change in Risk Behaviour)	5.57±2.14	6 (1-9)
CARRF-KL (Total)	19.16±4.99	19.5 (7-27)
HAI	21.1±14.84	16.5 (0-51)

CARRF-KL=Cardiovascular Diseases Risk Factors Knowledge Level, HAI=Health Anxiety Inventory, SD=Standard deviation

Table 4. Examination of the relationship between participants' HAI scores and the total and subscale scores of the CARRF-KL

	HAI	
	r	P value
CARRF-KL (Properties, Preservability, Age Factor)	0.262	**0.047**
CARRF-KL (Risk Factors)	0.220	0.097
CARRF-KL (Change in Risk Behaviour)	0.229	0.084
CARRF-KL (Total)	0.282	**0.032**

CARRF-KL=Cardiovascular Diseases Risk Factors Knowledge Level, HAI=Health Anxiety Inventory
r=Spearman's rho correlation coefficient

levels might be explained by differences in participants' educational backgrounds as well as the distinct measurement instruments employed across studies.

Our findings revealed a statistically significant variation in CARRF-KL total scores according to participants' educational levels (P<0.001). Specifically, illiterate individuals had a mean score of 11.25, those with primary or secondary education scored 17.93 on average, high school graduates achieved a mean of 21, and participants with a university degree obtained an average score of 24. This pattern demonstrates a clear positive association between education level and knowledge of cardiovascular disease risk factors. These results align with prior research indicating that higher education correlates with increased awareness of CVD risk factors [18].

A previous research has not identified any statistically significant differences between male and female caregivers in terms of health anxiety levels [21]. In line with these results, our study similarly found no statistically significant associations between participants' socio-demographic variables and their scores on the Health Anxiety Inventory (HAI) (P>0.05).

Multiple studies investigating factors affecting caregivers' knowledge have identified a tendency for younger individuals to demonstrate greater awareness [22, 23]. Consistent with this, our findings revealed a statistically significant, albeit weak, negative correlation between participant age and the total CARRF-KL score (r= -0.285, P=0.030). This relationship may reflect the greater propensity of younger adults to access health information via the internet and social media. In terms of lifestyle habits, 37.9% of participants reported smoking, 12.1% consumed alcohol, 24.1%

were adhering to a diet, and 34.5% engaged in physical activity intermittently. These results correspond with similar observations reported in studies by Koohi and Khalili [24] and Kazim *et al*. [18], conducted in Iran and the United Arab Emirates, respectively.

Our findings demonstrated a statistically significant difference in the total CARRF-KL scores according to participants' dietary habits (P=0.036). Specifically, those not adhering to a diet had a mean score of 18.39, whereas participants who were following a diet achieved a higher mean score of 21.57. Furthermore, a statistically significant weak negative correlation was observed between participants' body mass index (BMI) and their scores on the CARRF-KL subscale measuring changes in risk behaviors (r= -0.285, P=0.030).

These findings indicate that participants who possess sufficient knowledge may play an active role in preventing modifiable risk factors. Supporting this, Pallangyo *et al*. [25] reported that individuals with higher health concerns tend to have greater health-related knowledge. Similarly, our study identified a statistically significant positive yet weak correlation between participants' HAI scores and their total scores on the CARRF-KL scale (r=0.282, P=0.032). This relationship could be explained by the motivating effect of anxiety, which may encourage individuals to seek health information and thereby enhance their knowledge.

Limitations

This study has a some limitations. Firstly, the cross-sectional design precludes the establishment of causal inferences between the variables examined. Secondly, the single-center nature of the study limits

the external validity and generalizability of the findings. Lastly, the utilization of self-administered questionnaires may have introduced recall bias, potentially affecting the accuracy of the collected data.

CONCLUSION

To the best of our knowledge, this is the first study to explore the association between caregivers' knowledge of cardiovascular disease (CVD) risk factors and their levels of health anxiety. This study demonstrates that caregivers' knowledge of the disease and their psychological well-being play a crucial role in the effective management of patient care. By identifying gaps in knowledge and their association with health-related anxiety, the findings may contribute to the development of targeted educational programs and psychosocial support interventions. Increasing caregivers' knowledge about CVD and providing them with tools to manage their health-related concerns effectively can foster improvements in both their well-being and the health outcomes of the patients they support.

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