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TURKISH JOURNAL OF CARDIOVASCULAR NURSING

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Examination of Well-Being, Comfort, and Anxiety Levels of Patients With Non-ST-Elevation Myocardial Infarction Prior to Angiography: A Cross-Sectional Study

ST Segment Yükselmesiz Miyokard Enfarktüsü Geçiren Hastaların Anjiyografi Öncesi İyilik Hali, Konfor ve Anksiyete Durumlarının Değerlendirilmesi: Kesitsel Bir Çalışma

ABSTRACT

Objective: This study aimed to examine the well-being, comfort, and anxiety levels of patients with non-ST-elevation myocardial infarction prior to angiography.

Method: The study sample consisted of patients (n=264) hospitalized in a coronary intensive care unit. Data were collected between June and December 2023 using the Patient Information Form, Shortened General Comfort Questionnaire (SGCQ), Flourishing Scale (FS), State Anxiety Inventory (SAI), and Trait Anxiety Inventory (TAI). The data were analyzed using numbers, percentages, means, standard deviations, medians, minimum and maximum values, the Mann–Whitney U test, Kruskal–Wallis test, Bonferroni correction, and Spearman correlation test.

Results: The mean age of the patients was 62.04±12.19 years, and the mean body mass index was 25.05±4.15 kg/m^2. The mean total scores were 94.35±11.55 for the SGCQ, 30.35±8.22 for the FS, 56.44±11.14 for the SAI, and 49.13±7.84 for the TAI. Male patients had significantly higher comfort and well-being scores, whereas female patients reported higher anxiety levels ($P < 0.05$). Higher education levels, sufficient income, and employment were positively associated with comfort and well-being scores ($P < 0.05$). Patients who regularly used medications also had higher SGCQ and FS scores ($P < 0.05$). A positive correlation was found between SGCQ and FS scores, whereas both scales were negatively correlated with SAI and TAI scores ($P < 0.05$).

Conclusion: It was concluded that the patients in the present study had moderate levels of comfort and well-being. Their anxiety, on the other hand, was found to be severe.

Keywords: Acute myocardial infarction, cardiac nursing, coronary angiography, nursing care, patient comfort

ÖZET

Amaç: Bu araştırma, ST segment yükselmesiz miyokard enfarktüsü geçiren hastaların anjiyografi öncesi iyilik hali, konfor ve anksiyete durumlarını incelemek amacıyla yapıldı.

Yöntem: Araştırmanın örneklemini bir koroner yoğun bakım ünitesinde yatan hastalar (n=264) oluşturdu. Veriler, Haziran-Aralık 2023 tarihleri arasında Hasta Tanıtım Formu, Genel Konfor Ölçeği Kısa Formu (SGCQ), İyilik Hali Ölçeği (FS), Durumluk Kaygı Envanteri (SAI) ve Sürekli Kaygı Envanteri (TAI) kullanılarak toplandı. Veriler; sayı, yüzde, ortalama, standart sapma, ortanca, minimum ve maksimum değerler, Mann-Whitney U testi, Kruskal-Wallis testi, Bonferroni düzeltmesi ve Spearman korelasyon testi kullanılarak değerlendirildi.

Bulgular: Hastaların yaş ortalaması 62,04±12,19 yıl, beden kitle indeksi ortalaması ise 25,05±4,15 kg/m^2 idi. Ölçeklerden alınan ortalama toplam puanlar SGCQ için 94,35±11,55, FS için 30,35±8,22, SAI için 56,44±11,14 ve TAI için 49,13±7,84 olarak bulundu. Erkek hastaların konfor ve iyilik hali puanları anlamlı düzeyde daha yüksekken, kadın hastaların kaygı düzeyleri daha yüksekti ($P < 0,05$). Yüksek eğitim düzeyi, yeterli gelir ve istihdam durumu, konfor ve iyilik hali puanlarıyla pozitif yönde ilişkiliydi ($P < 0,05$). Düzenli ilaç kullanan hastaların SGCQ ve FS puanları da daha yüksekti ($P < 0,05$). SGCQ ve FS puanları arasında pozitif yönde bir ilişki bulunurken, her iki ölçek puanı da SAI ve TAI puanlarıyla negatif yönde ilişkiliydi ($P < 0,05$).

Sonuç: Araştırmada hastaların konfor ve iyilik hali düzeylerinin orta düzeyde olduğu belirlendi. Hastaların kaygı düzeylerinin ise ağır düzeyde olduğu saptandı.

Anahtar Kelimeler: Akut miyokart infarktüsü, kardiyak hemşireliği, koroner anjiyografi, hemşirelik bakımı, hasta konforu

ORIGINAL ARTICLE
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Introduction

Cardiovascular diseases are serious health problems associated with risk factors such as living conditions, diet, sedentary lifestyle, smoking, and obesity, all of which can affect life expectancy.[1] Cardiovascular diseases, which cause millions of deaths each year, are recognized as the leading cause of death worldwide.[2] Myocardial infarction (MI), which results from coronary artery disease, is considered a major health problem because of its high mortality rate, severe complications, and risk of recurrence.[3]

Myocardial infarction is pathologically defined as myocardial tissue death secondary to prolonged cellular ischemia.[1] Acute coronary syndromes include conditions such as unstable angina pectoris, non-ST-elevation myocardial infarction (NSTEMI), and ST-elevation myocardial infarction (STEMI).[4] STEMI and NSTEMI are two distinct types of acute coronary syndrome with different clinical presentations and outcomes. Although both conditions are characterized by acute myocardial ischemia, they differ in several fundamental aspects. STEMI is typically associated with complete occlusion of a coronary artery, leading to myocardial infarction and ST-segment elevation on electrocardiography (ECG).[5] In contrast, NSTEMI generally results from partial occlusion or severe narrowing of a coronary artery and leads to myocardial infarction without ST-segment elevation on ECG.[6] Patients with STEMI have a higher prevalence of lipid plaques, macrophages, and luminal thrombi than patients with NSTEMI.[7] In terms of outcomes, previous studies have shown that patients with STEMI have a higher risk of early mortality, whereas those with NSTEMI have a higher risk of long-term mortality.[8] Therefore, patients diagnosed with STEMI generally undergo urgent intervention and coronary angiography, whereas those diagnosed with NSTEMI typically receive planned intervention. In other words, patients diagnosed with NSTEMI are hospitalized in the intensive care unit or ward on a scheduled date and subsequently undergo coronary angiography.

The diagnosis of NSTEMI is based on cardiac biomarkers, including cardiac enzyme levels, ECG findings, physical examination, and patient history.[9] Recent epidemiological studies have reported an increase in the prevalence of NSTEMI but a decrease in the prevalence of STEMI, highlighting the growing significance of NSTEMI.[10]

Myocardial infarction is a severe, life-threatening health problem associated with a risk of recurrence and a high mortality rate.[3] Therefore, in addition to various physical problems, it can also cause psychological problems in patients.[11] Patients who experience MI frequently develop psychological distress, such as anxiety and depression, which may substantially affect their quality of life and clinical outcomes.[12] Conversely, psychological support has been associated with better quality of life and a reduced risk of recurrent infarction in post-MI patients.[13] Therefore, the well-being, comfort, and anxiety levels of patients who have experienced MI are highly important for the overall management and long-term prognosis of the disease. These patients require support to maintain their well-being, improve their comfort, and reduce their anxiety levels. Well-being and comfort play crucial roles in patients with myocardial infarction because they influence treatment adherence, recovery, and overall prognosis.[14] Patients who report higher levels of comfort and psychological well-being are more likely to tolerate invasive procedures, adhere to medical and lifestyle recommendations, and experience a better quality of life. In contrast, reduced well-being is associated with increased levels of depression and anxiety, which have been shown to impair adherence, delay recovery, and worsen clinical outcomes. These findings highlight the importance of nursing interventions, such as psychosocial support, patient education, and comfort-enhancing practices, because these interventions can improve patients' overall care experience and contribute to better long-term outcomes. From a nursing care perspective, supporting patients' well-being and comfort is essential for optimizing recovery and improving quality of life.[15-18] In addition, the outcomes and quality of life of patients with MI should be optimized by implementing appropriate measures and providing comprehensive care to enhance patient comfort. In this context, our study aims to contribute to the literature by examining the pre-angiography well-being, comfort, and anxiety levels of patients with NSTEMI, identifying factors affecting well-being, comfort, and anxiety, and determining the relationships among these variables.

MAIN POINTS

- Heart disease is a serious, life-threatening condition.
- Non-ST-elevation myocardial infarction is a type of acute coronary syndrome.
- Angiography is a commonly performed procedure in patients with myocardial infarction.
- Patients may experience anxiety before undergoing angiography.

Aim of the Study

The aim of this study was to examine the well-being, comfort, and anxiety levels of patients with NSTEMI prior to angiography.

Research Questions

What is the well-being status of patients with NSTEMI prior to angiography?

What is the comfort level of patients with NSTEMI prior to angiography?

What is the anxiety status of patients with NSTEMI prior to angiography?

What effects do the sociodemographic characteristics of patients with NSTEMI have on their well-being, comfort, and anxiety levels?

Are there significant relationships among the well-being, comfort, and anxiety levels of patients with NSTEMI prior to angiography?

Methods

Design

The study was conducted using a descriptive, cross-sectional research design.

Setting and Participants

The study population consisted of patients (N=660) hospitalized in the coronary intensive care unit of a training and research hospital

in Türkiye. The minimum sample size was calculated as 244 patients based on a 95% confidence interval, 5% margin of error, and 95% power. The study was completed with a total of 264 patients who met the inclusion criteria and agreed to participate. Data were collected between June and December 2023.

Inclusion Criteria
Patients who were hospitalized in the coronary intensive care unit, diagnosed with NSTEMI, conscious, able to communicate and cooperate, aged 18 years or older, and willing to participate were included in the study.

Exclusion Criteria
Patients who were younger than 18 years, had dementia or other mental disorders, had clinically diagnosed intellectual disability, had received a psychiatric diagnosis, left questions unanswered, or were unwilling to participate were excluded from the study.

Data Collection Instruments
Data were collected using the Patient Information Form, Shortened General Comfort Questionnaire (SGCQ), Flourishing Scale (FS), State Anxiety Inventory (SAI), and Trait Anxiety Inventory (TAI).

Patient Information Form
This form was developed by the researchers to assess the patients' sociodemographic and clinical characteristics. The form consisted of 13 items, including age, height, weight, body mass index, gender, marital status, education level, income level, and employment status. In addition, clinical information, such as family history of cardiac disease, regular medication use, use of antihypertensive, cholesterol-lowering, oral antidiabetic/insulin, or anticoagulant medications, and history of previous angiography, was recorded. The form provided descriptive data for analyzing the associations between patients' background characteristics and their well-being, comfort, and anxiety levels.

Shortened General Comfort Questionnaire
The instrument was developed by Kolcaba in 2006 and adapted into Turkish by Çıtlık and colleagues in 2018.[19,20] It was used in the present study to measure patients' overall comfort levels prior to angiography. Lower scores on the questionnaire indicate lower levels of comfort.[19] The Cronbach's alpha reliability coefficient of the scale was 0.82 in the study conducted by Çıtlık and colleagues and 0.73 in the present study.

Flourishing Scale
Developed by Diener and colleagues, the Flourishing Scale (FS) was adapted into Turkish by Fidan and Usta.[21,22] It was used in this study to evaluate patients' psychological well-being. Higher scores on the scale indicate a higher level of well-being. The Turkish version of the scale has a Cronbach's alpha value of 0.83, whereas the value was 0.82 in the present study.

State-Trait Anxiety Inventory
The inventory was developed by Spielberger and colleagues in 1970, and its Turkish validity and reliability study was conducted by Öner and Le Compte.[23,24] The scale is designed to measure individuals' anxiety levels and consists of 40 items in total. The inventory uses a four-point Likert scale and consists of two components: the SAI (first 20 items) and TAI (last 20 items). In this study, the SAI was used to evaluate patients' situational anxiety levels related to angiography, whereas the TAI was used to measure their general and long-term anxiety tendencies. The Cronbach's alpha values ranged from 0.94 to 0.96 for the SAI and from 0.83 to 0.87 for the TAI in the Turkish version of the scale, whereas they were 0.87 and 0.81 for the SAI and TAI, respectively, in the present study.

Data Collection
The patients were informed about the aim of the study, assured that their information would be kept confidential, and informed that they were free to withdraw at any time. Written consent was obtained from patients who agreed to participate in the study. The researchers then collected patient data by administering the questionnaires face-to-face. The researchers remained with the patients until they completed the forms to avoid any influence from accompanying individuals. It took the participants 20–25 minutes to complete the forms. The questionnaire forms were checked for missing data upon collection.

Data Analysis
The data obtained were analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were calculated using numbers, percentages, means, standard deviations, medians, and minimum and maximum values. Normality was assessed using the Kolmogorov–Smirnov test and graphical methods. The Mann–Whitney U test, Kruskal–Wallis test, Bonferroni correction, and Spearman correlation analysis were performed for non-normally distributed data. Total scale scores and the internal consistency reliability of the subscales were determined by calculating Cronbach's alpha values. The level of significance was set at $P < 0.05$ for all statistical analyses.

Ethical Considerations
Approval for the research was granted by the Batman University Ethics Committee (Approval Number: 2023/04-09, Date: 13.06.2023). Written informed consent was obtained from the patients using voluntary informed consent forms. The study was conducted in accordance with the ethical standards of the Declaration of Helsinki.

Results
The mean age of the participating patients was 62.04±12.19 years. The mean body mass index of the patients included in the study was 25.05±4.15 kg/m^2, and 72.7% had a body mass index of 25 kg/m^2 or higher. Of the patients, 51.9% were male, 89% were married, the majority (68.2%) had completed primary education, 48.5% had an income lower than their expenses, and 56.4% were unemployed. A family history of cardiac disease was reported by 42.8% of the patients. In the present study, 80.3% of the patients were found to use medications regularly. In addition, 28.4% were using cholesterol-lowering medications, 33.7% were taking oral antidiabetic medications or insulin, 63.3% were using antihypertensive medications, and 61% were using anticoagulant medications. More than half of the patients

(52.3%) reported that they had never undergone angiography before, whereas 37.1% stated that they had undergone angiography once (Table 1).

One of the scales used to determine the patients' comfort levels in the present study was the SGCQ, and the mean total score on this questionnaire was 94.35±11.55. The mean scores for the relief, ease, and transcendence subscales were 33.95±3.96, 31.01±5.80, and 28.48±5.82, respectively. The patients' mean total FS score was 30.35±8.22, indicating a moderate level of perceived well-being. The mean SAI and TAI scores were

Table 1. Sociodemographic characteristics (n=264)

Characteristic	Category / $\bar{x}$±SD (min–max)	n	%
Age, years	62.04±12.19 (24–89)		
Body mass index, kg/m²	25.05±4.15		
Body mass index, kg/m²	≤18.4	24	9.1
	18.5–24.9	48	18.2
	≥25.0	192	72.7
Gender	Female	127	48.1
	Male	137	51.9
Marital status	Married	235	89.0
	Single	29	11.0
Education level	Illiterate	45	17.0
	Primary education	180	68.2
	High school graduate	31	11.2
	Bachelor's degree or higher	8	3.0
Income level	Income exceeds expenses	15	5.7
	Income equals expenses	121	45.8
	Income is less than expenses	128	48.5
Are you employed?	Yes	115	43.6
	No	149	56.4
Is there a family history of heart disease?	Yes	113	42.8
	No	151	57.2
Do you take any medication regularly?	Yes	212	80.3
	No	52	19.7
Do you take cholesterol-lowering medication?	Yes	75	28.4
	No	189	71.6
Do you use oral antidiabetic medication or insulin?	Yes	89	33.7
	No	175	66.3
Do you take antihypertensive medication?	Yes	167	63.3
	No	97	36.7
Do you use anticoagulant medication?	Yes	161	61.0
	No	103	39.0
Have you ever undergone angiography?	No	138	52.3
	Once	98	37.1
	Twice	17	6.4
	Three times	11	4.2

Table 2. Comparison of Total and Subscale Scores for the SGCQ, FS, SAI, and TAI

Scale	$\bar{x}$±SD*	Median	Observed Score, Min–Max	Possible Score, Min–Max
SGCQ	94.35±11.55	90.50	72.00–151.00	28–168
Relief	33.95±3.96	33.00	25.00–52.00	9–54
Ease	31.01±5.80	30.00	15.00–45.00	9–54
Transcendence	28.48±5.82	27.00	15.00–41.00	10–60
FS	30.35±8.22	25.00	14.00–53.00	8–56
SAI	56.44±11.14	52.00	29.00–79.00	20–80
TAI	49.13±7.84	52.00	26.00–74.00	20–80

*SD, standard deviation.

56.44±11.14 and 49.13±7.84, respectively, indicating that the patients had severe levels of anxiety (Table 2).

Table 3 shows the comparison of the mean total SGCQ, FS, SAI, and TAI scores and mean subscale scores according to the patients' sociodemographic characteristics. The groups responsible for the differences were identified using Bonferroni correction. The mean total FS score and mean relief subscale score of the SGCQ were significantly higher among male patients than among female patients (z=-3.605, z=-2.863, P < 0.05). In contrast, female patients had significantly higher SAI and TAI scores than male patients (z=-2.489, z=-3.187, P < 0.05). Patients who were high school graduates had significantly higher mean SGCQ and FS scores, as well as higher mean relief and transcendence subscale scores, than patients who were illiterate (P = 0.042; P = 0.001; P = 0.009; P = 0.032). The mean total FS score of patients with a bachelor's degree or higher was significantly higher than that of illiterate patients (P = 0.000). Patients whose income was equal to their expenses had significantly higher mean total SGCQ, ease subscale, and FS scores than those whose income was lower than their expenses (P = 0.007; P = 0.000; P = 0.002). The mean total SGCQ and FS scores of employed patients were significantly higher than those of unemployed patients (z=-2.322, z=-4.121, P < 0.05). The mean SGCQ and FS scores of patients who regularly used medications were significantly higher than those of patients who did not (z=-1.956, z=-2.253, P < 0.05). The mean SGCQ and FS scores, as well as the mean relief subscale score, were significantly higher among patients who were not using cholesterol-lowering medications than among those who were using them (z=-2.928, z=-3.440, z=-1.998, P < 0.05). Patients who were not using oral antidiabetic medications or insulin had a significantly higher mean total FS score than those who were using them (z=-2.231, P < 0.05). In contrast, patients who were using oral antidiabetic medications or insulin had a significantly higher mean total TAI score than those who were not (z=-3.174, P < 0.05). The mean total FS score of patients who were not using antihypertensive medications was significantly higher than that of patients who were using them (z=-3.603, P < 0.05). Patients who were taking anticoagulant medications had significantly higher SGCQ and FS scores, as well as higher relief subscale scores (P < 0.05). In addition, the mean ease subscale scores of patients who were using anticoagulants were significantly higher (z=-3.470, z=-3.441, P < 0.05).

Table 4 presents the relationships among age and the mean SGCQ, FS, SAI, and TAI scores. Accordingly, a significant moderate positive correlation was found between the mean total SGCQ and FS scores (rho=0.447, P = 0.000). A significant weak negative correlation was found between the mean total SGCQ and SAI scores (rho=-0.145, P = 0.018). Similarly, a significant weak negative correlation was observed between the mean total SGCQ and TAI scores (rho=-0.233, P = 0.000). In contrast, no significant relationship was found between the mean total SGCQ score and age (rho=-0.101, P > 0.05). A significant weak negative correlation was found between the mean total FS and SAI scores (rho=-0.387, P = 0.000). A significant weak negative correlation was also found between the mean total FS and TAI scores (rho=-0.347, P = 0.000). Another significant weak negative correlation was found between the mean total FS score and age (rho=-0.300, P = 0.000). However, the mean total SAI and TAI scores were significantly and moderately positively correlated (rho=0.666, P = 0.000). No significant relationship was found between the mean SAI score and age (rho=0.008, P > 0.05). Likewise, no significant relationship was found between the mean TAI score and age (rho=-0.044, P > 0.05) (Table 4).

Discussion

The leading risk factors for cardiovascular disease include smoking, insufficient physical activity, poor nutrition, obesity, diabetes, hypertension, high cholesterol levels, gender, age, and family history.[1] The incidence and prevalence of coronary heart disease increase with age. Obesity may also contribute to cardiovascular disease by increasing the risk of diabetes, hypertension, and high cholesterol levels. In our study, these risk factors were also prevalent among the patients, and sociodemographic characteristics and medical history were found to play an important role in cardiovascular risk.

In the present study, the mean age of the patients was 62.04±12.19 years, the mean body mass index was 25.05±4.15 kg/m^2, and 72.7% of the patients had a BMI of 25 kg/m^2 or higher. The incidence of cardiovascular disease is lower among women than among men because of the protective effects of estrogen. Indeed, the proportion of male patients (51.9%) was higher in the present study. Another risk factor for cardiovascular disease is insufficient physical activity. Among the patients who participated in the study, most (56.4%) were unemployed and

Table 3. Comparison of Total and Subscale Scores for the SGCQ, FS, SAI, and TAI According to Patients' Sociodemographic Characteristics

Characteristic	Category	Relief Subscale, Median (Min–Max)	Ease Subscale, Median (Min–Max)	Transcendence Subscale, Median (Min–Max)	SGCQ Total Score, Median (Min–Max)	FS, Median (Min–Max)	SAI, Median (Min–Max)	TAI, Median (Min–Max)
Gender	Female	33.00 (25.00-45.00)	31.00 (22.00-45.00)	24.00 (15.00-39.00)	88.00 (72.00-150.00)	24.00 (14.00-49.00)	53.00 (42.00-71.00)	53.00 (37.00-74.00)
	Male	33.00 (28.00-43.00)	31.00 (22.00-38.00)	30.00 (18.00-41.00)	93.00 (76.00-151.00)	31.00 (17.00-53.00)	51.00 (29.00-79.00)	50.00 (26.00-62.00)
	Mann–Whitney U test	z=-1.573, *P = 0.116*	z=-2.863, ***P = 0.004***	z=-1.627, *P = 0.104*	z=-0.073, *P = 0.942*	z=-3.605, ***P = 0.000***	z=-2.489, ***P = 0.013***	z=-3.187, ***P = 0.001***
Education level	Illiterate	31.00 (25.00-40.00)	30.50 (22.00-45.00)	24.50 (15.00-41.00)	88.50 (72.00-151.00)	24.00 (14.00-47.00)	52.50 (41.00-71.00)	52.00 (38.00-74.00)
	Primary education	34.00 (29.00-45.00)	31.00 (22.00-35.00)	29.50 (19.00-35.00)	94.00 (83.00-107.00)	31.00 (19.00-53.00)	47.50 (29.00-71.00)	52.50 (26.00-59.00)
	High school graduate	33.00 (29.00-43.00)	30.00 (23.00-34.00)	27.50 (19.00-39.00)	91.00 (82.00-108.00)	35.50 (18.00-49.00)	53.00 (29.00-79.00)	53.50 (36.00-62.00)
	Bachelor's degree or higher	36.00 (31.00-44.00)	32.00 (26.00-36.00)	33.50 (29.00-38.00)	108.00 (86.00-147.00)	45.50 (25.00-53.00)	49.00 (38.00-56.00)	48.00 (37.00-57.00)
	Kruskal–Wallis test	KW:10.435, ***P = 0.015***	KW:5.636, *P = 0.131*	KW:8.821, ***P = 0.032***	KW:11.780, ***P = 0.008***	KW:34.478, ***P = 0.000***	KW:5.173, *P = 0.160*	KW:3.603, *P = 0.308*
Income level	Income exceeds expenses	37.00 (37.00-43.00)	30.00 (22.00-38.00)	33.00 (33.00-39.00)	98.00 (97.00-105.00)	31.00 (17.00-53.00)	38.00 (29.00-43.00)	44.00 (36.00-46.00)
	Income equals expenses	33.00 (29.00-45.00)	31.00 (22.00-36.00)	27.00 (19.00-38.00)	90.00 (77.00-147.00)	49.00 (40.00-53.00)	53.00 (29.00-79.00)	52.00 (26.00-62.00)
	Income is less than expenses	33.00 (25.00-40.00)	27.00 (23.00-45.00)	24.00 (15.00-41.00)	89.50 (72.00-151.00)	24.00 (14.00-45.00)	51.00 (41.00-71.00)	53.00 (41.00-74.00)
	Kruskal–Wallis test	KW:4.136, *P = 0.126*	KW:6.030, ***P = 0.049***	KW:3.615, *P = 0.164*	KW:11.769, ***P = 0.003***	KW:24.207, ***P = 0.000***	KW:0.724, *P = 0.696*	KW:3.530, *P = 0.171*
Employment status	Employed	33.50 (29.00-44.00)	30.00 (22.00-36.00)	30.00 (19.00-41.00)	93.00 (77.00-147.00)	34.50 (17.00-53.00)	52.00 (29.00-79.00)	52.00 (26.00-62.00)
	Unemployed	33.00 (25.00-45.00)	30.50 (22.00-45.00)	24.50 (15.00-39.00)	88.50 (72.00-151.00)	24.00 (14.00-45.00)	51.50 (42.00-71.00)	53.00 (37.00-74.00)
	Mann–Whitney U test	z:-1.388, *P = 0.165*	z:-0.609, *P = 0.543*	z:-1.536, *P = 0.125*	z:-2.322, ***P = 0.020***	z:-4.121, ***P = 0.000***	z:-0.673, *P = 0.501*	z:-0.801, *P = 0.423*

Table 3. Continued

Characteristic	Category	Relief Subscale, Median (Min–Max)	Ease Subscale, Median (Min–Max)	Transcendence Subscale, Median (Min–Max)	SGCQ Total Score, Median (Min–Max)	FS, Median (Min–Max)	SAI, Median (Min–Max)	TAI, Median (Min–Max)
Regular medication use	Yes	33.00 (25.00-45.00)	30.00 (22.00-45.00)	25.00 (15.00-41.00)	88.00 (72.00-151.00)	25.00 (14.00-53.00)	53.00 (29.00-71.00)	53.00 (26.00-74.00)
	No	37.00 (30.00-43.00)	29.00 (24.00-34.00)	33.00 (19.00-35.00)	97.00 (83.00-147.00)	35.00 (24.00-44.00)	49.00 (43.00-79.00)	46.00 (38.00-62.00)
	Mann–Whitney U test	z:-1.512, *P = 0.131*	z:-1.082, *P = 0.279*	z:-0.017, *P = 0.986*	z:-1.956, *P = 0.051*	z:-2.253, ***P = 0.024***	z:-0.250, *P = 0.803*	z:-1.372, *P = 0.170*
Cholesterol-lowering medication use	Yes	33.00 (25.00-43.00)	30.50 (23.00-36.00)	25.50 (15.00-41.00)	88.00 (72.00-150.00)	23.00 (14.00-53.00)	53.00 (29.00-71.00)	53.50 (36.00-62.00)
	No	34.00 (26.00-45.00)	30.00 (22.00-45.00)	28.00 (15.00-38.00)	91.50 (76.00-151.00)	28.50 (16.00-53.00)	51.00 (29.00-79.00)	52.00 (26.00-74.00)
	Mann–Whitney U test	z:-1.998, ***P = 0.046***	z:-1.471, *P = 0.141*	z: -1.098, *P = 0.272*	z:-2.928, ***P = 0.003***	z:-3.440, ***P = 0.001***	z:-0.445, *P = 0.656*	z:-1.322, *P = 0.186*
Oral antidiabetic medication or insulin use	Yes	32.50 (27.00-45.00)	31.00 (24.00-45.00)	24.00 (17.00-41.00)	87.00 (78.00-132.00)	23.00 (16.00-45.00)	56.50 (42.00-71.00)	54.00 (37.00-74.00)
	No	34.00 (25.00-44.00)	29.50 (22.00-38.00)	30.50 (15.00-39.00)	93.50 (72.00-151.00)	28.50 (14.00-53.00)	50.50 (29.00-79.00)	50.00 (26.00-62.00)
	Mann–Whitney U test	z:-1.801 *P = 0.072*	z:-0.939, *P = 0.348*	z:-1.782, *P = 0.075*	z:-1.819, *P = 0.069*	z:-2.231, ***P = 0.026***	z:-1.106, *P = 0.269*	z:-3.174, ***P = 0.002***
Antihypertensive medication use	Yes	33.00 (25.00-43.00)	30.00 (22.00-45.00)	25.00 (15.00-41.00)	88.00 (72.00-150.00)	25.00 (14.00-53.00)	53.50 (29.00-71.00)	53.00 (26.00-74.00)
	No	35.00 (27.00-45.00)	30.50 (22.00-38.00)	31.00 (18.00-38.00)	93.50 (77.00-151.00)	34.50 (21.00-53.00)	49.00 (38.00-79.00)	47.50 (37.00-62.00)
	Mann–Whitney U test	z:-1.312, *P = 0.190*	z:-0.344, *P = 0.731*	z:-0.174, *P = 0.861*	z:-1.005, *P = 0.315*	z:-3.603, ***P = 0.000***	z:-0.574, *P = 0.566*	z:-1.387, *P = 0.165*
Anticoagulant medication use	Yes	33.00 (25.00-43.00)	30.00 (22.00-45.00)	24.00 (15.00-41.00)	88.00 (72.00-151.00)	25.00 (14.00-53.00)	54.00 (29.00-71.00)	53.00 (26.00-74.00)
	No	35.00 (27.00-45.00)	28.00 (22.00-38.00)	32.00 (18.00-38.00)	95.00 (83.00-147.00)	34.00 (22.00-49.00)	49.00 (42.00-79.00)	47.00 (37.00-62.00)
	Mann–Whitney U test	z:-2.403, ***P = 0.016***	z:-2.218, ***P = 0.027***	z:-1.020, *P = 0.308*	z:-3.470, ***P = 0.001***	z:-3.441, ***P = 0.001***	z:-0.573, *P = 0.567*	z:-1.101, *P = 0.271*

FS, Flourishing Scale; SAI, State Anxiety Inventory; SGCQ, Shortened General Comfort Questionnaire; TAI, Trait Anxiety Inventory. **Statistical tests:** z, Mann–Whitney U test; KW, Kruskal–Wallis test.

Table 4. Correlations among SGCQ, FS, SAI, TAI, and age

Variables	SGCQ rho	P	FS rho	P	SAI rho	P	TAI rho	P	Age rho	P
SGCQ	–	–	0.447	**<0.001**	-0.145	**0.018**	-0.233	**<0.001**	-0.101	0.101
FS	0.447	**<0.001**	–	–	-0.387	**<0.001**	-0.347	**<0.001**	-0.300	**<0.001**
SAI	-0.145	**0.018**	-0.387	**<0.001**	–	–	0.666	**<0.001**	0.008	0.898
TAI	-0.233	**<0.001**	-0.347	**<0.001**	0.666	**<0.001**	–	–	-0.044	0.478
Age	-0.101	0.101	-0.300	**<0.001**	0.008	0.898	-0.044	0.478	–	–

rho, Spearman's rank correlation coefficient.

had a sedentary lifestyle. In addition, the majority of the patients (68.2%) were primary school graduates and were therefore considered to have limited awareness of the importance of physical activity. Another risk factor is poor nutrition. In the present study, 48.5% of the patients had an income lower than their expenses. This suggests that patients with low socioeconomic status may have limited access to a wide variety of foods and fewer nutritional options. Other risk factors include family history, diabetes, hypertension, and high cholesterol levels. In the present study, 42.8% of the patients had a family history of heart disease, and 80.3% were using medications regularly, including cholesterol-lowering medications (28.4%), oral antidiabetic medications or insulin (33.7%), antihypertensive medications (63.3%), and anticoagulants (61%). Overall, the study findings were consistent with established cardiovascular disease risk factors. In this context, interventions targeting modifiable risk factors such as smoking, insufficient physical activity, poor nutrition, and obesity may not only reduce the incidence of cardiovascular disease but also improve patients' well-being, comfort, and anxiety levels prior to invasive procedures such as angiography. These findings highlight the importance of patient education and nursing interventions focused on lifestyle modification and psychosocial support.

The mean total score on the SGCQ, which was used to measure patients' comfort levels in the present study, was 94.35±11.55. The mean scores for the relief, ease, and transcendence subscales were 33.95±3.96, 31.01±5.80, and 28.48±5.82, respectively. These findings indicate that the pre-angiography comfort level of patients with NSTEMI was moderate. Angiography is a procedure commonly performed for the diagnosis and treatment of patients with coronary artery disease. Despite its important role in the diagnosis of coronary heart disease, the procedure can cause physical and psychological problems, such as fear and anxiety, among patients.[18] One study found that the majority of patients who had experienced MI had moderate to severe levels of death anxiety.[3] In addition, factors such as possible complications during the procedure, immobilization due to sandbag placement after angiography, and uncertainty are considered to affect patient comfort.[11] The finding of a moderate level of comfort among patients with NSTEMI prior to angiography suggests that targeted nursing interventions are needed to enhance patients' physical and psychological comfort. Recent studies also emphasize that patient-centered care strategies, preprocedural education, and psychological support interventions may reduce anxiety and improve comfort levels in this patient population.[25-27]

The patients' mean FS score was 30.35±8.22, indicating a moderate level of perceived well-being. One study showed that most patients who had experienced MI reported severe stress and below-average levels of well-being and that those experiencing stress were predominantly younger individuals.[17] MI is a life-threatening condition that causes distress and may recur. Therefore, individuals may experience an intense fear of death, which can negatively affect their well-being.[3] These findings highlight the importance of integrating psychosocial care into routine nursing practice, as enhancing psychological well-being may positively influence patients' comfort and anxiety levels before angiography.

The patients' mean SAI score was 56.44±11.14, and their mean TAI score was 49.13±7.84, indicating severe levels of anxiety. In another study conducted using the same scale, the mean pre-angiography SAI and TAI scores were 50.59 and 39.61, respectively, and the patients' anxiety levels were reported to be severe and moderate, respectively.[28] Gökçe Eskin and colleagues examined the effect of social support on anxiety prior to angiography and reported similar findings regarding anxiety levels.[29] Many factors may affect patients' anxiety levels prior to coronary angiography, including age, gender, and education level.[28] In addition, high anxiety levels are expected following MI because it is a life-threatening condition. The finding of severe anxiety levels highlights the need for targeted interventions before angiography, such as structured patient education, counseling, and reassurance strategies, including providing clear information, answering patients' questions, and offering emotional support, which may help alleviate anxiety and improve overall patient outcomes.

In the present study, patients' sociodemographic characteristics were compared with their total scores on the SGCQ, FS, SAI, and TAI. Accordingly, male patients had significantly higher mean scores than female patients on the overall FS and the ease subscale of the SGCQ. In contrast, female patients had significantly higher mean total SAI and TAI scores than male patients. Based on these findings, female patients appeared to have lower levels of well-being and comfort but higher levels of anxiety prior to angiography than male patients. This may suggest that women experience greater anxiety, fear, and concern. In studies conducted by Türker and Bedük and by Yel and Ünsar, women had significantly higher anxiety levels than men, which is consistent with our findings.[28,30] The study data showed that well-being and comfort levels increased with education level, whereas anxiety levels decreased, although the

difference was not significant. In contrast, Yel and Ünsar reported that anxiety levels decreased significantly as education levels increased.[30] This may be explained by greater patient awareness and knowledge of disease-related processes with higher levels of education. Patients whose income was equal to their expenses had significantly higher levels of comfort and well-being than those whose income was lower than their expenses. Similarly, Yel and Ünsar reported that anxiety levels decreased as income levels increased.[30] MI is a life-threatening and recurrent condition that may result in changes in patients' lives and employment. Therefore, patients with limited financial resources may experience greater anxiety. The finding that employed patients had significantly higher levels of comfort and well-being than unemployed patients may also be related to their income levels. Patients who were not using regular medications were found to have significantly higher levels of comfort and well-being than those who were using regular medications. Patients who do not use regular medications may have higher levels of comfort and well-being than those who do because of factors such as the increasing prevalence of chronic diseases with age, the resulting use of multiple medications, medication side effects, drug interactions, and problems associated with irregular medication use. These findings suggest that individualized nursing interventions focusing on female patients, those with lower educational and financial status, and patients receiving regular medication regimens may be beneficial in improving comfort and well-being and reducing anxiety before angiography.

The relationships among the mean SGCQ, FS, SAI, and TAI scores were examined in the present study. The results showed a significant moderate positive correlation between the mean total SGCQ and FS scores. Accordingly, patients' comfort increased as their well-being increased, and their well-being increased as their comfort levels increased. Well-being and comfort are interrelated and closely associated concepts. Thus, a significant positive relationship between them was an expected finding. The mean SGCQ score had a significant weak negative correlation with both SAI and TAI scores. This finding indicates that patients' anxiety levels decrease as their comfort levels increase, whereas anxiety levels increase as comfort levels decrease. The mean total FS score also had a significant weak negative correlation with both SAI and TAI scores. Accordingly, patients' anxiety levels decrease as their well-being increases, whereas anxiety increases as well-being decreases. Finally, a significant moderate positive correlation was observed between the mean total SAI and TAI scores, indicating that patients' state anxiety levels increase in parallel with their trait anxiety levels. These correlations suggest that interventions aimed at improving patients' comfort and well-being may simultaneously help reduce their anxiety levels. Therefore, psychosocial and nursing interventions should be designed holistically to address comfort, well-being, and anxiety together rather than separately.

Myocardial infarction is a traumatic and stressful experience for both patients and their families.[27] Moreover, it is a life-threatening and unpredictable condition that exposes patients to critical stressors and psychosocial challenges, as well as physical distress. MI is among the diseases with the highest frequency of psychiatric complications.[27] Thus, patients who experience MI may develop fear and anxiety, which can increase their anxiety levels while adversely affecting their well-being and comfort. In patients who are able to cope effectively with the condition, however, anxiety levels may decrease as well-being and comfort levels increase. The findings of the present study emphasize the need for comprehensive nursing interventions that address both the physical and psychosocial needs of patients with MI. Supporting patients' well-being and comfort may be an effective strategy for reducing anxiety, particularly during the pre-angiography period.

Limitations

This study has several limitations. First, it was conducted at a single center with a relatively limited sample size, which restricts the generalizability of the findings to all patients with NSTEMI. Second, the cross-sectional design does not allow causal inferences to be drawn regarding comfort, well-being, and anxiety levels. Third, the data were collected using self-reported instruments, which may be subject to response and recall bias. Finally, the study focused only on patients' experiences prior to angiography; therefore, it does not provide information on long-term changes in comfort, well-being, or anxiety after the procedure. Future multicenter longitudinal studies with larger samples are recommended to confirm and extend these findings.

Conclusion

This study demonstrated that patients with NSTEMI experience moderate levels of comfort and psychological well-being, whereas their state and trait anxiety levels are considerably high. Sociodemographic and clinical factors, such as gender, education, income, employment, and medication use, were associated with these outcomes. The findings indicate that psychosocial factors are as important as clinical indicators in the care of patients with NSTEMI.

In light of these results, nursing care should prioritize interventions aimed at reducing anxiety and enhancing comfort and psychological well-being. Particular attention should be given to patients with lower education and income levels and those who are unemployed, as they may be at greater risk of reduced well-being. Nurses should also carefully assess patients' medication use and provide individualized counseling and support. Finally, future studies should evaluate the effectiveness of targeted nursing interventions in improving comfort and psychological well-being among patients with NSTEMI, preferably through multicenter studies to enhance the generalizability of the findings.

One of the most significant strengths of the present study is its sample size. The study included 264 patients with NSTEMI. In addition, no other study was identified that examined pre-angiography well-being, comfort, and anxiety levels together in patients with NSTEMI, as well as the correlations among these variables. The study is expected to contribute to the literature in this regard.

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The Relationship Between Healthy Lifestyle Behaviors and Health Literacy of Individuals Undergoing Coronary Artery Bypass Graft Surgery

Koroner Arter Bypass Greft Cerrahisi Geçirecek Bireylerde Sağlıklı Yaşam Biçimi Davranışları ile Sağlık Okuryazarlığı Arasındaki İlişki

ABSTRACT

Objective: This study aimed to examine the relationship between healthy lifestyle behaviors and health literacy among individuals scheduled for coronary artery bypass graft (CABG) surgery.

Method: This descriptive, cross-sectional study was conducted with 110 patients hospitalized in the cardiovascular surgery ward of a hospital in Türkiye who were undergoing open-heart surgery for the first time. Data were collected through face-to-face interviews using the Personal Information Form, the Healthy Lifestyle Behavior Scale II (HLBS-II), and the Turkish Health Literacy Scale (THLS). Statistical analyses included independent-samples t-tests, one-way analysis of variance (ANOVA), and Pearson correlation analysis.

Results: Among the participants, 60% were male, and the mean age was 63.08±7.12 years. A total of 78.2% had at least a secondary education, and 64.5% had comorbid chronic diseases. The mean total HLBS-II score was 114.30±23.47, and the mean health literacy score was 31,20±6,66. Among the healthy lifestyle behavior subdimensions, the lowest score was recorded for "Health Responsibility," whereas the highest scores were recorded for "Interpersonal Relationships" and "Spiritual Development." Regarding health literacy, the lowest score was recorded for the "Evaluating Information" process. A statistically significant, weak negative correlation was found between health literacy and healthy lifestyle behaviors (r = −0.189, P = 0.048).

Conclusion: Patients scheduled for CABG surgery demonstrated problematic/limited health literacy levels and insufficient engagement in healthy behaviors related to health responsibility. Improving health literacy alone may not be sufficient; thus, multidisciplinary educational interventions are essential to enhance both knowledge and behavioral change. Strengthening lifestyle habits during the perioperative period may contribute to better long-term health outcomes.

Keywords: Coronary artery bypass grafting surgery, health literacy, healthy lifestyle behaviors, nursing

ÖZET

Amaç: Bu çalışma, koroner arter bypass greft ameliyatı geçirecek bireylerde sağlıklı yaşam biçimi davranışları ile sağlık okuryazarlığı arasındaki ilişkiyi incelemek amacıyla yapılmıştır.

Yöntem: Bu tanımlayıcı ve kesitsel çalışma, Türkiye'de bir hastanenin kalp ve damar cerrahisi servisinde yatmakta olan ve ilk kez açık kalp cerrahisi geçirecek 110 hasta ile yürütülmüştür. Veriler, Kişisel Bilgi Formu, Sağlıklı Yaşam Biçimi Davranışları Ölçeği II (SYBD-II) ve Türkiye Sağlık Okuryazarlığı Ölçeği (TSOY-32) kullanılarak yüz yüze görüşmeler yoluyla toplanmıştır. İstatistiksel analizlerde bağımsız örneklem t-testi, tek yönlü varyans analizi (ANOVA) ve Pearson korelasyon analizi kullanılmıştır.

Bulgular: Çalışmaya katılan hastaların %60'ı erkek olup yaş ortalamaları 63,08±7.12 yıldır. Katılımcıların %78.2'si en az lise mezunudur ve %64.5'inde ek kronik hastalık bulunmaktadır. Hastaların SYBD-II toplam puanı 114,30±23,47, sağlık okuryazarlığı puanı ise 31,20±6,66 olarak bulunmuştur. Sağlıklı yaşam biçimi davranışlarında en düşük puan "Sağlık Sorumluluğu", en yüksek puanlar ise "Sosyal İlişkiler" ve "Spiritüel Gelişim" alt boyutlarında elde edilmiştir. Sağlık okuryazarlığında "Bilgiyi Değerlendirme" süreci en düşük puanı almıştır. Sağlık okuryazarlığı ile sağlıklı yaşam biçimi davranışları arasında negatif yönde, zayıf düzeyde ve istatistiksel olarak anlamlı bir ilişki saptanmıştır (r =−0,189; P = 0,048).

Sonuç: Bu çalışmada, koroner arter bypass greft ameliyatı geçirecek hastaların sağlık okuryazarlığı düzeylerinin sorunlu/sınırlı olduğu ve özellikle sağlık sorumluluğu alanında sağlıklı yaşam biçimi davranışlarının yetersiz olduğu görülmüştür. Sağlık okuryazarlığının artırılması tek başına yeterli olmayabileceğinden, çok disiplinli eğitim programlarıyla hem bilgi düzeyinin hem de davranış değişikliğinin desteklenmesi gereklidir. Hastaların perioperatif dönemde yaşam tarzı alışkanlıklarının geliştirilmesi, uzun vadeli sağlık sonuçlarının iyileştirilmesine katkı sağlayabilir.

Anahtar Kelimeler: Koroner arter bypass greft cerrahisi, sağlık okuryazarlığı, sağlıklı yaşam biçimi davranışları, hemşirelik

ORIGINAL ARTICLE
KLİNİK ÇALIŞMA

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Introduction

Cardiovascular diseases affect more than 120 million people worldwide and account for a substantial proportion—approximately 25.6%—of the overall disease burden.[1,2] These conditions pose a major public health challenge because of their high mortality rates, which may range from 25% to 45% among critically ill individuals.[1,3] Furthermore, the prevalence of cardiovascular disease reaches 29% in low- and middle-income countries, compared with approximately 13% in high-income regions.[4,5]

Promoting health-enhancing behaviors is essential for disease prevention and management. Adopting a healthy lifestyle requires individuals to actively make choices that may affect their well-being. This includes the intentional and routine practice of behaviors tailored to one's medical needs, with the ultimate goal of promoting overall health.[6,7] Core elements of a healthy lifestyle include spiritual growth, responsibility for personal health, regular physical activity, balanced nutrition, healthy interpersonal relationships, and effective stress management.[6,8]

Engaging in healthy lifestyle behaviors contributes approximately 30% to maintaining health. It also plays a crucial role in reducing future complications and preventing premature mortality.[7] However, individuals undergoing open-heart surgery often face multiple challenges. These challenges include difficulties performing daily activities, dependence on others for mobility, limitations in physical activity, nutritional problems, and frequent hospitalizations.[4,7] Such factors can hinder their ability to maintain healthy lifestyle behaviors.[1,4]

Therefore, assessing the healthy lifestyle behaviors of patients scheduled for cardiac surgery is essential. Patients need adequate knowledge of health-promoting practices appropriate to their condition. The internet is the most common source of health-related information.[1] In Türkiye, 69.6% of internet users seek health information online.[9] Treatment options and surgical procedures are among the most frequently searched topics.[10,11]

Health literacy plays a critical role in guiding patients' information-seeking behaviors.[1,12] Its importance is even greater when patients need to understand the risks and benefits of surgical procedures.[13,14] Health literacy is also crucial for making informed and complex healthcare decisions. A systematic review reported that patients with low health literacy are more likely to have a higher prevalence of comorbidities.[15,16]

Because coronary artery bypass grafting (CABG) requires prolonged and continuous treatment and care, patients must have adequate knowledge and maintain healthy lifestyle behaviors.[7] Insufficient health literacy can negatively affect these behaviors. Such deficiencies may result in poor disease management, an increased risk of complications, higher healthcare costs, and increased mortality and morbidity.[7,16]

Despite the critical importance of these factors, data on healthy lifestyle behaviors and health literacy among patients undergoing CABG remain limited.[14] Therefore, this study aimed to examine the relationship between healthy lifestyle behaviors and health literacy among patients scheduled for CABG surgery.

MAIN POINTS

- Health literacy and healthy lifestyle behaviors are critical for improving postoperative outcomes in patients undergoing coronary artery bypass graft surgery.
- Physical inactivity remains a major barrier to recovery, highlighting the need for targeted exercise interventions during the perioperative period.
- Educational programs should focus on improving both health literacy and practical health behaviors through multidisciplinary approaches.
- Future strategies should integrate psychosocial support and promote spiritual development to strengthen overall well-being.

Methods

Study Design

This study used a descriptive, cross-sectional design.

Study Population and Sample

This study was conducted in the cardiovascular surgery department of a hospital located in a region of Türkiye. A purposive sampling approach was used. The study included patients undergoing open-heart surgery for the first time in the cardiovascular surgery unit. Patients undergoing emergency surgical interventions or revision surgeries were excluded from the study.

The target population comprised patients scheduled to undergo coronary artery bypass graft procedures. The G*Power 3.0 software was used to calculate the sample size. Based on a significance level of 0.05, a two-tailed hypothesis, 80% statistical power, and a medium effect size, the minimum required sample size for correlation analysis was calculated as 100 participants. To enhance the reliability of the study and obtain a more comprehensive dataset, data were ultimately collected from 110 participants. Increasing the sample size contributed to greater internal validity and improved the generalizability of the study findings.

Data Collection Tools

Study data were collected through face-to-face interviews using three instruments: the Personal Information Form, the Healthy Lifestyle Behavior Scale II (HLBS-II), and the Turkish Health Literacy Scale (THLS).

Personal Information Form: This form was designed to collect demographic data (age, sex, marital status, educational level, etc.) and clinical data (surgical history, chronic conditions, and previous hospitalizations). Its content was developed based on previous literature to ensure validity.[17] The questions included demographic characteristics (age, sex, marital status, educational status, etc.) and clinical characteristics (previous surgery, presence of chronic diseases, duration of preoperative hospitalization, etc.).

Healthy Lifestyle Behavior Scale II (HLBS-II): Initially developed by Walker et al.[18] in 1987 and revised in 1996, this scale was adapted into Turkish by Bahar et al.[19] in 1993. The scale evaluates behaviors that promote a healthy lifestyle and includes six subdimensions and 52 items. It uses a 4-point

Likert-type scale, with total scores ranging from 52 to 208.[19] The subdimensions include spiritual growth, responsibility for personal health, physical activity, dietary habits, interpersonal relationships, and stress management. Higher scores indicate greater adoption of health-promoting behaviors. Cronbach's alpha reliability coefficient was 0.94 in the original version and 0.80 in the present study, indicating acceptable internal consistency.[18,19]

Turkish Health Literacy Scale (THLS): Developed by Abacigil et al.,[20] this scale was based on the conceptual model of the European Health Literacy Survey Consortium. It is intended for individuals aged 15 years and older who are able to read and write. Unlike the original three-dimensional structure, the THLS uses a revised 2×4 matrix covering two main domains—"Treatment and Service Use" and "Disease Prevention and Health Promotion"—and four cognitive stages: accessing, understanding, appraising, and applying health information. These categories yield eight distinct components. Cronbach's alpha coefficient for the Turkish version was 0.93, demonstrating strong reliability. Scores range from 0 to 50, with higher scores reflecting greater health literacy.[20] According to the cutoff values, scores of 0–25 indicate inadequate health literacy, scores of 25–33 indicate problematic or borderline health literacy, and scores above 42 indicate sufficient health literacy.[20]

Data Analysis

All statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS), version 27.0 (IBM Corp., Armonk, NY, USA). To determine whether continuous variables followed a normal distribution, skewness and kurtosis coefficients were examined. Values between −1.5 and +1.5 were considered indicative of normality. Categorical data were summarized using frequencies and percentages (n, %), whereas continuous variables were presented as means and standard deviations. Comparisons between two independent groups were performed using independent-samples t-tests, whereas comparisons involving more than two groups were performed using one-way analysis of variance (ANOVA).

Pearson correlation analysis was used to assess the relationship between two continuous variables. Multiple regression analysis was performed to investigate the effects of the independent variables on the dependent variable. Statistical significance was set at $P < 0.05$ with a 95% confidence level.

Ethical Approval

Ethical approval for this study was granted by İzmir Bakırçay University Non-Interventional Clinical Research Ethics Committee (Approval Number: 1418, Date: 17.01.2024). In addition, the necessary institutional permissions were obtained from the hospital where the study was conducted. All patients who agreed to participate in the study provided written informed consent. The study protocol adhered to the ethical principles outlined in the Declaration of Helsinki.

Results

Of the total participants, 60% were male (n=66), and the mean age was 63.08±7.12 years. Most participants (78.2%) had completed at least secondary education. More than half of the participants (55.5%) resided in urban areas, and 64.5% reported having at least one additional chronic disease. A small proportion (3.6%) had never been hospitalized, whereas 22.7% reported no previous surgical history (Table 1).

The mean total Healthy Lifestyle Behavior Scale II (HLBS-II) score was 114.30±23.47. Among the subdimensions, participants had the lowest score for "Health Responsibility" (11.02±3.84), whereas the highest scores were observed for "Interpersonal Relationships" (26.66±5.60) and "Spiritual Development" (26.56±4.96). The mean Turkish Health Literacy Scale-32 (TSOY-32) score was 28.21±3.24, indicating generally limited health literacy among the participants. Within the "Treatment and Service" domain, the highest mean score was observed for the "Applying Information" process (11.99±2.10), whereas the lowest was recorded for the "Evaluating Information" process (10.04±2.76). Similarly, within the "Disease Prevention/ Health Promotion" domain, the highest mean score was observed for the "Understanding Health-Related Information" process (11.15±2.36), whereas the lowest was recorded for the "Evaluating Health-Related Information" process (9.47±1.84).

No statistically significant differences were observed in the total HLBS-II or TSOY-32 scores according to sex, educational level, presence of chronic disease, residential setting, or surgical history ($P > 0.05$) (Table 2).

Regarding the TSOY-32 subdimensions, the highest mean score was again observed for the "Applying Health-Related Information" process (11.99±2.10), whereas the lowest was observed for the "Evaluating" process (10.04±2.76). In the "Disease Prevention/ Health Promotion" domain, participants had the highest score for "Understanding Health-Related Information" (11.15±2.36) and the lowest score for "Evaluating" (9.47±1.84) (Table 3).

A weak negative correlation was observed between the total HLBS-II and TSOY-32 scores ($r = −0.189$, $P = 0.048$) (Table 4).

Discussion

This study investigated the association between healthy lifestyle behaviors and health literacy among individuals undergoing coronary artery bypass graft (CABG) surgery. The findings revealed that the mean Healthy Lifestyle Behavior Scale (HLBS) score was moderate (114.30±23.47), consistent with the findings reported by Dirimeşe et al.,[21] who reported a similar score (123.56±24.54).

In another study assessing lifestyle habits among patients awaiting CABG, the preoperative HLBS score was reported as 120.0±21.1, further supporting the consistency of the present findings.[14] Engaging in healthy behaviors is considered an essential component of primary prevention for individuals with coronary artery disease.[21] However, some patients scheduled for CABG may not engage in health-promoting behaviors at levels sufficient to effectively reduce cardiovascular risk.

The mean health literacy score among patients scheduled for CABG was 28.21±3.24, indicating problematic/limited health literacy. In a study by Özyürek et al.[22] examining health literacy among patients undergoing elective surgery, patients' health literacy levels were generally inadequate. Similarly, İkışık et al.,[23]

Table 1. Distribution of mean total HLBS and THLS-32 scores according to patient characteristics

Variables	n (%)	HLBS ($\bar{x}$±SD)	Test value and p	THLS-32 ($\bar{x}$±SD)	Test value and p
Sex					
Female	44 (40.0)	124.59±15.44	t=0.581	28.19±3.13	t=−0.050
Male	66 (60.0)	122.83±15.60	P=0.628	28.22±3.34	P=0.793
Education level					
Primary school or below	24 (21.8)	120.75±14.13	Z=−1.202	28.00±3.02	Z=−1.487
Middle school or above	86 (78.2)	124.31±15.84	P=0.229	28.75±3.44	P=0.137
Presence of additional chronic disease					
Yes	71 (64.5)	123.20±14.81	t=0.308	28.17±3.45	t=0.168
No	39 (35.5)	124.15±16.84	P=0.306	28.28±2.88	P=0.562
Previous hospitalization status					
No	4 (3.6)	124.50±17.48	KW=0.742	28.90±2.56	KW=5.02
Once	49 (44.5)	125.35±16.26	P=0.863	27.55±2.64	P=0.170
Twice	43 (39.1)	122.02±15.04		28.62±3.81	
More than twice	14 (12.7)	121.57±14.52		29.09±3.29	
Previous surgery status					
No	25 (22.7)	119.48±15.76	KW=1.389	29.00±3.93	KW=1.709
Once	58 (52.7)	124.57±15.22	P=0.499	28.17±3.11	P=0.425
More than twice	27 (24.5)	125.07±15.77		27.56±2.74	
Mean age, years ($\bar{x}$±SD)	63.08±7.12				
ASA score ($\bar{x}$±SD)	2.45±0.659				
Preoperative hospital stay, days ($\bar{x}$±SD)	1.61±0.755				

ASA, American Society of Anesthesiologists; HLBS, Healthy Lifestyle Behaviors Scale; KW, Kruskal–Wallis test; SD, standard deviation; THLS-32, Turkish Health Literacy Scale-32. t, independent-samples t-test; Z, Mann–Whitney U test. Statistical significance was set at P < 0.05.

in their study of health literacy levels among patients presenting to a tertiary healthcare institution, found that health literacy was inadequate or problematic/limited in two out of every three individuals.

In another study evaluating health literacy among patients attending a cardiology outpatient clinic, 58.1% of patients were found to have inadequate or limited health literacy, corresponding to approximately three out of every five patients.[23] The low level of health literacy observed in these populations may be attributable to the predominance of middle-aged and older adults, whose use of digital technology may be more limited.

In our study, the "Health Responsibility" subdimension of the HLBS received the lowest score (11.02±3.84). Similarly, Dirimeşe et al.[21] demonstrated low levels of physical activity among patients awaiting CABG surgery, which negatively affected their quality of life. Preoperative physical inactivity has been associated with pain and restricted mobility.[21] Lack of physical activity may adversely affect the recovery process and increase the risk of disease recurrence. Therefore, educating patients about the critical role of physical activity during the perioperative period is essential.

Conversely, patients achieved the highest scores in the "Spiritual Development" (26.56±4.96) and "Interpersonal Relationships" (26.66±5.60) subdimensions. These findings suggest that patients effectively use social support mechanisms and that spiritual beliefs may play a significant role in managing the disease process. The literature similarly indicates that social support and spiritual development may enhance patients' ability to cope with stress and improve quality of life.[24] These results underscore the influential role of social support systems and belief structures within Turkish society.

Our study revealed a weak negative relationship between health literacy and healthy lifestyle behaviors. Although previous studies have reported positive associations between these variables, our findings suggest that the relationship may differ across patient populations. The literature presents mixed findings regarding this association. In the meta-analysis conducted by Elkin et al.,[25] a positive but weak correlation was reported between health literacy and healthy lifestyle behaviors (r=0.278).[26] This suggests that, although health literacy may theoretically facilitate behavioral change, this relationship does not consistently appear across different

Table 2. Mean subscale and total scale scores of the patients

Scale/Subscale	$\bar{x}$±SD	Min–Max	Score Range
HLBS subscales			
Physical Activity	18.55±3.63	11–28	9–36
Health Responsibility	11.02±3.84	8–26	8–32
Nutrition	20.15±4.23	11–31	9–36
Spiritual Development	26.56±4.96	12–35	9–36
Interpersonal Relationships	26.66±5.60	10–36	9–36
Stress Management	20.58±3.78	12–28	8–32
Total score	114.30±23.47		52–208
THLS-32 subscales			
Treatment and Service	44.55±4.67	27–50	0–50
Disease Prevention/Health Promotion	41.94±4.136	30–50	0–50
Total score	31.20±6.66		0–50

HLBS, Healthy Lifestyle Behaviors Scale; SD, standard deviation; THLS-32, Turkish Health Literacy Scale-32.

Table 3. Mean Scores for the THLS-32 Subscale Processes

Scale Subscale	Access to Health Information ($\bar{x}$±SD)	Understanding Health Information ($\bar{x}$±SD)	Evaluating Health Information ($\bar{x}$±SD)	Applying Health-Related Knowledge ($\bar{x}$±SD)
Treatment and Service	10.60±2.10	11.63±2.12	10.04±2.76	11.99±2.10
Disease Prevention/Health Promotion	11.03±1.88	11.15±2.36	9.47±1.84	10.26±1.74

SD, standard deviation; THLS-32, Turkish Health Literacy Scale-32.

Table 4. Relationship Between the Mean Total HLBS and THLS-32 Scores

Scale	Statistic	HLBS	THLS-32
HLBS	r	—	−0.189*
	P	—	0.048

HLBS, Healthy Lifestyle Behaviors Scale; THLS-32, Turkish Health Literacy Scale-32. * Pearson correlation.

studies. Our findings imply that health literacy alone may not be a decisive factor influencing individuals' adoption of healthy lifestyle behaviors.

Multiple factors are known to influence healthy lifestyle behaviors. Kris-Etherton et al.[7] emphasized the cardiovascular benefits of healthy behaviors, such as regular physical activity and a healthy diet, while also noting that individual and environmental factors play key roles in the adoption of such behaviors.

The low scores recorded for the "Physical Activity" subdimension in our study are consistent with barriers to physical activity frequently reported in the literature. In a prospective study by Lu et al.,[27] adopting a healthy lifestyle was reported to contribute substantially to the prevention of chronic diseases and the extension of life expectancy.[11]

In our study, a weak negative association was observed between health literacy and healthy lifestyle behaviors. This finding suggests that higher health literacy does not necessarily correspond to greater engagement in healthy lifestyle behaviors among patients scheduled for CABG surgery. This finding reinforces the notion that health literacy alone may not determine individuals' engagement in healthy behaviors. The literature reports varying relationships between health literacy and healthy behaviors; while some studies suggest that higher health literacy promotes healthier lifestyles, others indicate that the relationship is weak or nonsignificant. Uemura et al.[28] demonstrated that active learning programs could promote lifestyle changes, particularly among individuals with low health literacy. These findings suggest that enhancing individuals' ability to access, evaluate, and apply health-related information may promote healthier behaviors, particularly increased physical activity.

In this context, our findings suggest that interventions aimed at improving health literacy should not only enhance individuals' knowledge but also strengthen their ability to translate health information into sustainable health behaviors. In particular, multidisciplinary approaches are vital for increasing physical activity levels and supporting individuals in maintaining healthy lifestyle practices. Low health literacy may adversely affect health behaviors during the perioperative period by limiting patients' ability to understand and apply necessary health information. Our study

highlights the importance of educational programs designed to improve health literacy among patients undergoing CABG surgery. Such programs could enhance patients' health management skills and facilitate the adoption of healthier lifestyles.

Limitations

This study has several limitations. First, because of its cross-sectional design, causal relationships between the examined variables cannot be established. Second, the use of self-reported measures may have introduced potential bias because participants may have rated their health literacy levels more favorably than their actual levels. Finally, additional factors that could influence the outcomes, such as institutional regulations, individual perceptions of health literacy, and access to supportive resources, were not considered in this study.

Conclusion

This study examined the relationship between health literacy and healthy lifestyle behaviors among patients undergoing CABG surgery. The findings revealed that participants generally had limited health literacy and that a weak negative correlation existed between health literacy and healthy lifestyle behavior scores. The lowest scores were observed in the "Physical Activity" domain, whereas the highest scores were observed in the "Spiritual Development" and "Interpersonal Relationships" domains. In terms of health literacy, the weakest area was the "Evaluating Information" process, indicating a need for greater support in understanding and applying health information.

These results underscore the importance of interdisciplinary strategies to enhance health literacy and promote healthier behaviors. Perioperative education programs should focus on clarity and accessibility and should be supported by visual tools. Tailored interventions aimed at increasing physical activity and encouraging balanced nutrition are recommended.

Healthcare providers play a critical role in delivering structured education and facilitating access to reliable health information. Psychosocial support and group-based programs may also contribute to patients' overall well-being. Ultimately, empowering patients through targeted, multidisciplinary approaches may improve outcomes and ease the challenges associated with the surgical process.

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Modeling Hypertension Risk, Awareness, and Knowledge Levels in Rural Populations: A Binary Logistic Regression Approach

Kırsal Popülasyonda Hipertansiyon Riski, Farkındalık ve Bilgi Düzeylerinin Modellenmesi: İkili Lojistik Regresyon Yaklaşımı

ABSTRACT

Objective: This study aimed to assess hypertension knowledge, awareness, and individual risk profiles among people living in rural areas using self-reported and objective measures.

Method: This descriptive cross-sectional study was conducted among 289 individuals living in rural villages. Data were collected through face-to-face interviews using a Personal Information Form and the Hypertension Knowledge Level Scale (HK-LS). Blood pressure and body mass index (BMI) were measured, and the data were analyzed using SPSS version 25.0. The chi-square test, Mann–Whitney U test, and binary logistic regression analysis were used for statistical analyses.

Results: The participants' mean total score on the HK-LS was 15.86 ± 4.21. Age and BMI were significantly higher among participants diagnosed with hypertension ($P < 0.001$). Lifestyle knowledge was the strongest predictor of knowledge level. Participants with accurate lifestyle knowledge had approximately 9.7 times the odds of having a high knowledge level (odds ratio [OR] = 9.652, $P < 0.001$). Educational attainment and family history of hypertension were also significantly associated with knowledge level.

Conclusion: In rural areas, hypertension knowledge levels are significantly associated with individual characteristics. Lifestyle knowledge, educational attainment, and family history play important roles in determining knowledge levels. Data supported by objective measurements provide reliable results in health research and contribute to medical nursing practice.

Keywords: Hypertension knowledge level, individual risk profile, lifestyle awareness, logistic regression analysis, rural health

ÖZET

Amaç: Bu araştırma, kırsal kesimde yaşayan bireylerin hipertansiyona ilişkin bilgi düzeylerini, farkındalık durumlarını ve bireysel risk profillerini özbildirim ve objektif ölçümler aracılığıyla değerlendirmeyi amaçlamaktadır.

Yöntem: Tanımlayıcı ve kesitsel tasarıma sahip bu çalışma, kırsal köylerde yaşayan 289 bireyle yürütülmüştür. Veriler, Kişisel Bilgi Formu ve Hipertansiyon Bilgi Düzey Ölçeği kullanılarak yüz yüze görüşmeler yoluyla toplanmıştır. Kan basıncı ve beden kitle indeksi (BKİ) ölçümleri yapılmış, veriler SPSS 25.0 programı kullanılarak analiz edilmiştir. İstatistiksel analizlerde ki-kare testi, Mann–Whitney U testi ve ikili lojistik regresyon analizi kullanılmıştır.

Bulgular: Katılımcıların Hipertansiyon Bilgi Düzey Ölçeği toplam puan ortalaması 15,86 ± 4,21 olarak belirlenmiştir. Hipertansiyon tanısı olan bireylerin yaş ve BKİ değerleri anlamlı düzeyde daha yüksektir ($P < 0,001$). Hipertansiyona ilişkin bilgi düzeyinin en güçlü yordayıcısı yaşam tarzına ilişkin bilgi olmuştur. Bu alanda doğru bilgiye sahip bireylerin yüksek bilgi düzeyine sahip olma olasılık oranı yaklaşık 9,7 kat daha yüksektir (OR = 9,652; $P < 0,001$). Eğitim düzeyi ve ailede hipertansiyon öyküsü de bilgi düzeyiyle anlamlı biçimde ilişkili bulunmuştur.

Sonuç: Kırsal kesimde yaşayan bireylerin hipertansiyona ilişkin bilgi düzeyleri, bireysel özellikleriyle anlamlı biçimde ilişkilidir. Yaşam tarzına ilişkin bilgi, eğitim düzeyi ve ailede hipertansiyon öyküsü gibi faktörler bilgi düzeyinin belirlenmesinde önemli rol oynamaktadır. Objektif ölçümlerle desteklenen veriler, halk sağlığı araştırmalarında daha güvenilir değerlendirmeler yapılmasına olanak sağlamakta ve iç hastalıkları hemşireliği uygulamalarına katkıda bulunmaktadır.

Anahtar Kelimeler: Hipertansiyon bilgi düzeyi, bireysel risk profili, yaşam tarzı farkındalığı, lojistik regresyon analizi, kırsal sağlık

ORIGINAL ARTICLE
KLİNİK ÇALIŞMA

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Introduction

Hypertension is a preventable and manageable chronic disease characterized by persistently elevated blood pressure in the arterial walls resulting from the interaction between genetic predisposition and environmental factors. Its prevalence among adults worldwide ranges from 30% to 45%, and this rate continues to rise in older age groups due to age-related increases in atherosclerosis and vascular resistance.[1,2] Hypertension, which can lead to serious consequences such as cardiovascular disease, cerebrovascular events, renal failure, and death, is recognized as one of the most prevalent public health problems worldwide.[3-5]

Individuals' health literacy, risk perception, and awareness of protective behaviors play crucial roles in preventing chronic diseases. In the context of hypertension, behaviors such as healthy eating, regular physical activity, limiting alcohol and tobacco consumption, weight management, stress management, home blood pressure monitoring, and regular screening are important strategies for preventing and managing the disease.[6-8] The adoption of these behaviors is directly related to individuals' knowledge of and awareness of the disease.[9]

In particular, people living in rural areas face various disadvantages in accessing health services and information sources and in achieving adequate health literacy. These disadvantages can lead to delayed diagnosis, inappropriate treatment, and an increase in preventable health problems associated with conditions such as hypertension, which is often asymptomatic and carries a high risk of complications.[10,11] Indeed, the literature indicates that people living in rural areas have lower levels of hypertension awareness and knowledge than those living in urban areas, increasing the burden of the disease.[11-15] However, only a limited number of studies have focused on rural populations, and most have relied on self-reported data. This limits the objectivity of assessments of hypertension risk.

In this context, the present study aims to comprehensively assess hypertension risk, disease awareness, and knowledge levels among people living in rural areas. A distinctive feature of this study is that it assesses these factors using both self-reported data and objective measures, including anthropometric measurements and direct blood pressure measurements. This approach allows for more reliable assessments of individual risk and the development of more effective public health intervention strategies.

Based on the data obtained, strategies will be developed to increase public knowledge and awareness of hypertension, promote preventive health behaviors, and contribute to overall well-being. This study is expected to contribute to reducing health inequalities in rural areas and strengthening community-based preventive health policies.

MAIN POINTS

- Although awareness of hypertension in rural areas is moderate to high, significant knowledge gaps were identified across subdimensions.
- Knowledge of lifestyle factors is the strongest predictor of hypertension awareness, increasing the odds of awareness by 9.7-fold.
- Low educational attainment and a family history of high blood pressure are significantly associated with lower levels of knowledge.
- The binary logistic regression model (Nagelkerke R^2 = 0.761) confirms the predictive power of the knowledge subdimensions for hypertension awareness.
- Internal medicine nurses can strengthen public health in rural communities through risk-based, information-focused interventions.

Method

Study Design and Participants

This study employed a descriptive cross-sectional design. Its primary aim was to assess hypertension knowledge, awareness, and individual risk profiles among people living in rural areas. The study also aimed to contribute to the development of public health prevention strategies. It was conducted among individuals living in rural villages in the Mersin, southern Türkiye. The study population consisted of rural settlements identified through interviews with the Mersin Municipality.

Given the high prevalence of hypertension in Turkish society, the expected proportion of the event was set at P = 0.80 for sample size calculation. This estimate was consistent with national epidemiological studies and reflected the widespread nature of hypertension, particularly among adults. [16] Accordingly, the minimum sample size was calculated as 246, based on a 95% confidence level (t = 1.96), a margin of error of 5% (d = 0.05), and the probability of the event not occurring (q = 0.20).[17] During fieldwork, all eligible residents of the villages were invited to participate, and 289 volunteers who met the inclusion criteria were enrolled in the study. Thus, the calculated minimum sample size was exceeded, minimizing selection bias and ensuring the representation of a substantial proportion of the adult population in the villages. Between May 17 and June 17, 2023, individuals aged 18 years or older who voluntarily agreed to participate, had sufficient cognitive ability to communicate, and consented to blood pressure measurement were included, regardless of whether they had previously been diagnosed with hypertension.

Instruments

Personal Information Form: This structured form included participants' demographic characteristics (age, sex, educational attainment, marital status, income level, etc.), health history, and lifestyle habits.

Hypertension Knowledge Level Scale: The Hypertension Knowledge Level Scale (HK-LS) was developed by Erkoç et al.[18] and has undergone validity and reliability testing. The scale consists of 22 items across six subscales: Definition, Medical Treatment, Medication Adherence, Lifestyle, Diet, and Complications. Each item is answered with "true," "false," or "I don't know." Correct answers receive 1 point, whereas incorrect answers and "I don't know" responses receive 0 points. Total scores range from 0 to 22, with higher scores indicating greater knowledge of hypertension. The Cronbach's alpha coefficient reported for the scale was 0.82. In the present study, Cronbach's alpha was 0.795.

Data Collection Process

Data were collected by the researchers through face-to-face interviews, each lasting approximately 15–20 minutes. During the interviews, participants first completed the Personal Information Form and then the HK-LS. Blood pressure was measured after participants had rested in a seated position for at least 15 minutes. The right arm was positioned at heart level, and an aneroid sphygmomanometer (Erka) and a stethoscope (Erka) were used. Each participant's blood pressure was measured twice, at 15-minute intervals, and hypertension status was determined using the average of the two measurements. Hypertension was defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg. Individuals previously diagnosed with hypertension by a physician were also classified as hypertensive.

Hypertension awareness was defined as having previously received a diagnosis of hypertension from a healthcare professional. Individuals with elevated blood pressure who had not previously received such a diagnosis were classified as having low awareness. Body weight was measured using a calibrated electronic scale, and body mass index (BMI) was calculated by dividing weight in kilograms by the square of height in meters. BMI was classified according to the criteria of the World Health Organization. Following all measurements and assessments, participants were informed of their individual risk levels. Individuals identified as being at risk for hypertension were referred to appropriate healthcare facilities for further assessment and follow-up. This practice was intended to promote early diagnosis and preventive public health measures.

Ethical Approval

Before data collection, approval was obtained from Mersin University Social and Human Sciences Ethics Committee (Approval Number: 45, Date: 02.05.2023). Permission to use the scale was obtained from its developers. Participants received clear and understandable information about the purpose, scope, and data collection process of the study, and written and verbal informed consent was obtained from each participant before data collection. The study was conducted in accordance with the principles of respect for human rights and individual autonomy and the Declaration of Helsinki.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics included means ± standard deviations for continuous variables and frequencies and percentages for categorical variables. The chi-square test (χ^2) was used to assess the associations between hypertension status and sociodemographic and lifestyle characteristics. The Mann–Whitney U test was used to compare continuous variables according to hypertension status because the assumption of normality was not met. Specifically, age, BMI, and HK-LS scores were compared.

Binary logistic regression analysis was used to identify factors associated with hypertension knowledge levels. Participants with a total HK-LS score ≥17 were classified as having a "high knowledge level," whereas those with a score <17 were classified as having a "low to moderate knowledge level." The cutoff score was determined based on the median HK-LS scores of the participants, with previously published studies used as references.[19,20]

Results

This study investigated the relationships between participants' hypertension status and various sociodemographic and lifestyle variables. In addition, factors associated with hypertension knowledge levels were assessed using logistic regression analysis.

Chi-square analyses revealed statistically significant associations between hypertension status and several sociodemographic and behavioral variables. The prevalence of hypertension was significantly higher among married individuals (χ^2 = 11.899, P = 0.001) and those with less than a high school education (χ^2 = 10.157, P = 0.001). Among individuals with a family history of hypertension, the prevalence of hypertension was 77.5%, suggesting a strong association between hypertension and family history (χ^2 = 29.733, P < 0.001). Hypertension prevalence was also higher among individuals who knew their blood pressure values (χ^2 = 5.970, P = 0.015) and reached 63.4% among those who had a home blood pressure monitor (χ^2 = 9.932, P = 0.002). However, no statistically significant associations were found between hypertension status and sex, smoking, alcohol use, coffee consumption, physical activity, or previous blood pressure measurement (P > 0.05) (Table 1).

Table 2 shows differences in age, body mass index (BMI), and the subscales of the Hypertension Knowledge Level Scale (HK-LS) according to hypertension status. Participants diagnosed with hypertension were significantly older (P < 0.001) and had significantly higher BMI values (P < 0.001). No significant difference was found between the groups in total HK-LS scores (P = 0.100). Analysis of the subscales showed that participants diagnosed with hypertension had higher scores in the Definition (P = 0.005) and Lifestyle (P = 0.007) subscales. Participants without hypertension had significantly higher scores in the Medical Treatment subscale (P = 0.001). No significant differences were found in the Medication Adherence (P = 0.052), Diet (P = 0.299), or Complications (P = 0.914) subscales (Table 2).

Participants' ages ranged from 18 to 89 years, with a mean age of 48.36 ± 16.20 years. The mean BMI was 26.89 ± 5.21. Mean systolic and diastolic blood pressure values were 127.64 ± 16.78 and 79.15 ± 10.19 mmHg, respectively. Total scores on the HK-LS ranged from 3 to 22, with a mean score of 15.86 ± 4.21 (Table 3).

In the binary logistic regression analysis examining factors associated with hypertension knowledge levels, the model demonstrated high explanatory power (Nagelkerke R^2 = 0.761). Educational attainment, family history of hypertension, and the HK-LS subscales were identified as significant predictors (Table 4).

Specifically, participants with lower educational attainment had significantly lower odds of having a high level of hypertension knowledge than those with higher educational attainment (OR = 0.333, P = 0.041). Participants with lower educational attainment had approximately one-third the odds of having a high knowledge

Table 1. Relationship between participants' sociodemographic characteristics, health behaviors, and hypertension status

Variables	No hypertension (n = 147), n (%)	Hypertension (n = 142), n (%)	Total (n = 289), n (%)	χ^2	*P*
Sex				1.205	0.272
Female	84 (57.1)	72 (50.7)	156 (54.0)		
Male	63 (42.9)	70 (49.3)	133 (46.0)		
Marital status				11.899	**0.001**
Married	96 (65.3)	118 (83.1)	214 (74.0)		
Single	51 (34.7)	24 (16.9)	75 (26.0)		
Educational attainment				10.157	**0.001**
Less than high school	70 (47.6)	94 (66.2)	164 (56.7)		
High school or higher	77 (52.4)	48 (33.8)	125 (43.3)		
Smoking				0.020	0.887
Yes	64 (43.5)	63 (44.4)	127 (43.9)		
No	83 (56.5)	79 (55.6)	162 (56.1)		
Alcohol consumption				0.100	0.751
Yes	28 (19.0)	25 (17.6)	53 (18.3)		
No	119 (81.0)	117 (82.4)	236 (81.7)		
Daily coffee consumption				1.160	0.281
Yes	108 (73.5)	112 (78.9)	220 (76.1)		
No	39 (26.5)	30 (21.1)	69 (23.9)		
Daily tea consumption				4.176	**0.041**
Yes	130 (88.4)	135 (95.1)	265 (91.7)		
No	17 (11.6)	7 (4.9)	24 (8.3)		
Regular physical activity				0.139	0.710
Yes	61 (41.5)	62 (43.7)	123 (42.6)		
No	86 (58.5)	80 (56.3)	166 (57.4)		
Family history of hypertension				29.733	**<0.001**
Yes	68 (46.3)	110 (77.5)	178 (61.6)		
No	79 (53.7)	32 (22.5)	111 (38.4)		
Physician-diagnosed hypertension				186.565	**<0.001**
Yes	0 (0.0)	111 (78.2)	111 (38.4)		
No	147 (100.0)	31 (21.8)	178 (61.6)		
Previous blood pressure measurement				1.949	0.163
Yes	101 (68.7)	108 (76.1)	209 (72.3)		
No	46 (31.3)	34 (23.9)	80 (27.7)		
Knowledge of blood pressure values				5.970	**0.015**
Yes	69 (46.9)	87 (61.3)	156 (54.0)		
No	78 (53.1)	55 (38.7)	133 (46.0)		

Table 1. Continued

Variables	No hypertension (n = 147), n (%)	Hypertension (n = 142), n (%)	Total (n = 289), n (%)	χ^2	*P*
Availability of a blood pressure monitor at home				9.932	**0.002**
Yes	66 (44.9)	90 (63.4)	156 (54.0)		
No	81 (55.1)	52 (36.6)	133 (46.0)		

BMI, body mass index; χ^2, chi-square statistic.

level. Those with a family history of hypertension had 4.4 times the odds of having a high knowledge level compared with those without such a history (OR = 4.441, *P* = 0.002). Participants who correctly identified the definition of hypertension had 3.7 times the odds of having a high knowledge level (OR = 3.694, *P* < 0.001). Similarly, participants with knowledge of medical treatment for hypertension had approximately three times the odds of having a high knowledge level (OR = 3.011, *P* < 0.001). Knowledge of lifestyle factors was the strongest predictor. Participants with accurate knowledge of lifestyle factors related to hypertension had approximately 9.7 times the odds of having a high knowledge level (OR = 9.652, *P* < 0.001). Age, marital status, physician-diagnosed hypertension, knowledge of blood pressure values, availability of a home blood pressure monitor, and BMI were not significantly associated with hypertension knowledge levels (*P* > 0.05) (Table 4).

Discussion

This study aimed to assess hypertension knowledge and individual risk profiles among people living in rural areas using multiple approaches. The combined use of self-reported data and direct physiological measurements represents a comprehensive approach that is rarely adopted in public health research. This methodological choice contributes not only to epidemiological surveillance but also to the development of person-centered care plans in internal medicine nursing. The findings highlight the importance of structuring nursing interventions around knowledge and risk assessment in the management of chronic diseases. Thus, the study provides a link between public health and clinical nursing practice.

The participants' mean score on the HK-LS was 15.86 ± 4.21, corresponding to approximately 72% of the maximum possible

Table 2. Comparison of age, body mass index, and hypertension knowledge level scale scores according to hypertension status

Variables	Hypertension status	N	Mean rank	Z	*P*
Age, years	No	147	107.92	−7.676	<0.001
	Yes	142	183.38		
Body mass index	No	147	114.74	−6.262	<0.001
	Yes	142	176.32		
HK-LS total score	No	147	137.07	−1.647	0.100
	Yes	142	153.21		
HK-LS—Definition	No	147	132.64	−2.833	0.005
	Yes	142	157.80		
HK-LS—Medical Treatment	No	147	160.49	−3.350	0.001
	Yes	142	128.96		
HK-LS—Medication Adherence	No	147	136.05	−1.941	0.052
	Yes	142	154.26		
HK-LS—Lifestyle	No	147	132.49	−2.675	0.007
	Yes	142	157.95		
HK-LS—Diet	No	147	149.22	−1.038	0.299
	Yes	142	140.63		
HK-LS—Complications	No	147	144.53	−0.108	0.914
	Yes	142	145.49		

HK-LS, Hypertension Knowledge Level Scale; BMI, body mass index; *Z*, Mann–Whitney U test standardized statistic.

Table 3. Distribution of participants' health-related characteristics and mean hypertension knowledge level scale scores

Variables	Minimum	Maximum	$\bar{x}$ ± SD
HK-LS total score	3.00	22.00	15.86 ± 4.21
HK-LS—Definition	0.00	2.00	1.26 ± 0.85
HK-LS—Medical Treatment	0.00	4.00	2.77 ± 1.28
HK-LS—Medication Adherence	0.00	4.00	2.87 ± 1.10
HK-LS—Lifestyle	0.00	5.00	3.59 ± 1.18
HK-LS—Diet	0.00	2.00	1.56 ± 0.64
HK-LS—Complications	0.00	5.00	3.78 ± 1.76
Age (years)	18.00	89.00	48.36 ± 16.20
Body mass index (kg/m²)	15.06	46.16	26.89 ± 5.21
Systolic blood pressure (mmHg)	90.00	200.00	127.64 ± 16.78
Diastolic blood pressure (mmHg)	43.00	110.00	79.15 ± 10.19

HK-LS, Hypertension Knowledge Level Scale; SD, standard deviation.

Table 4. Logistic regression analysis of factors associated with a high level of hypertension knowledge

Variable (Enter method)	B	*P*	OR	95% CI Lower	95% CI Upper
Age, years	−0.006	0.759	0.994	0.956	1.033
Marital status (married)	0.595	0.339	1.813	0.535	6.138
Educational attainment (less than high school)	−1.100	**0.041**	0.333	0.116	0.956
Daily tea consumption (yes)	−1.147	0.227	0.317	0.049	2.039
Family history of hypertension (yes)	1.491	**0.002**	4.441	1.749	11.276
Physician-diagnosed hypertension (yes)	−0.468	0.381	0.626	0.220	1.784
Knowledge of blood pressure values (yes)	0.623	0.184	1.865	0.744	4.678
Availability of a blood pressure monitor at home (yes)	−0.466	0.336	0.627	0.243	1.620
Body mass index	0.003	0.950	1.003	0.915	1.099
HK-LS—Definition	1.307	**<0.001**	3.694	2.173	6.280
HK-LS—Medical Treatment	1.102	**<0.001**	3.011	1.979	4.581
HK-LS—Lifestyle	2.267	**<0.001**	9.652	5.263	17.700

Model information: Dependent variable: hypertension knowledge level (score <17 = low to moderate knowledge; score ≥17 = high knowledge). Nagelkerke R^2 = 0.761; Cox-Snell R^2 = 0.570; Hosmer–Lemeshow test, **P** = 0.231. B, regression coefficient; CI, confidence interval; HK-LS, Hypertension Knowledge Level Scale; OR, odds ratio.

score. This score indicates a moderate to high level of general knowledge. Previous studies have also reported hypertension knowledge levels consistent with our findings.[21-23] However, the significant differences between the subscales in our study indicate that knowledge levels vary across content areas. The higher scores among individuals diagnosed with hypertension, particularly in the Definition and Lifestyle subscales, suggest that experience with the disease may play an important role in knowledge acquisition. This finding is also supported by a study conducted in Indonesia by Sofyan et al.,[24] which reported that hypertension knowledge and treatment adherence significantly influenced disease management and quality of life. Conversely, the higher scores of individuals without hypertension on the Medical Treatment subscale suggest that treatment-related knowledge is not limited to individuals with the disease and that the dissemination of health information within the community may also be effective.

The logistic regression analysis showed that factors associated with hypertension knowledge levels were explained by a model with high explanatory power (Nagelkerke R^2 = 0.761). Educational attainment, family history of hypertension, and the knowledge subscales were significant predictors. In particular, knowledge of lifestyle factors was the strongest predictor of a high knowledge level. Participants with greater knowledge in this area had approximately 9.7 times the odds of having a high knowledge level. This finding is consistent with the study by Lu

et al.,[25] which reported that comprehensive health management significantly improved participants' lifestyle practices and knowledge levels. Similarly, Ojangba et al.[7] reported that lifestyle modification is crucial for controlling hypertension and that individuals with higher levels of knowledge are more likely to adopt these behaviors. Educational attainment was also an important factor in our study. Individuals with less than a high school education had approximately one-third the odds of having a high knowledge level compared with those with higher educational attainment. The literature also emphasizes that educational attainment is an important determinant of hypertension knowledge and treatment adherence.[26,27] These findings suggest that interventions to improve health literacy in rural areas should focus on education.

National studies conducted in Türkiye have shown that hypertension prevalence increases significantly with age and that knowledge levels vary across the population. Findings in the literature are consistent with our results, indicating that participants' hypertension knowledge is closely associated with characteristics such as lifestyle, family history of hypertension, and educational attainment.[16,28-30] In this regard, Çın et al.[29] reported that adults had low levels of hypertension knowledge but above-average preventive attitudes, with educational attainment and socioeconomic factors being significant determinants. Similarly, Atila et al.[30] emphasized that patients with hypertension had limited disease-related knowledge and awareness, highlighting the need for structured educational interventions. Our findings are consistent with these results. By combining self-reported data with objective measurements, this study also contributes to nursing practice, particularly in rural settings.

In this context, one of the main contributions of the study is the use of data based not only on self-reports but also on objective health indicators. Specifically, participants' individual risk profiles were assessed using systolic and diastolic blood pressure measurements and body mass index (BMI). This approach enabled the identification of individuals with previously undiagnosed hypertension and the assessment of the relationship between their knowledge levels and physiological risk factors. The mean BMI of 26.89 ± 5.21 indicates that participants were generally overweight. This suggests that metabolic risk factors associated with hypertension are also prevalent in rural areas.

The use of anthropometric data offers a scientific advantage in developing public health intervention strategies. Unlike studies based solely on self-reported data, this study considered individuals' actual physiological status, providing a more comprehensive assessment of their health risks. This approach may facilitate the early detection of asymptomatic diseases in rural areas and more accurate risk stratification. In addition, informing participants of their results after measurement and referring those identified as being at risk to healthcare facilities strengthens the practical contribution of the study.

Limitations

This study has several limitations. First, it was conducted in only two rural villages, which limits the generalizability of the findings to other regions. Furthermore, the cross-sectional design precludes the establishment of causal relationships between the variables. The Personal Information Form and Hypertension Knowledge Level Scale used for data collection relied on self-reported information. Such data are susceptible to systematic errors, including social desirability and recall bias. Although the scale is suitable for assessing general knowledge, it does not directly measure health literacy or the ability to change behavior.

In this study, blood pressure and BMI were measured at a single time point. This may have introduced measurement errors due to transient physiological changes and may not fully reflect individuals' long-term hypertension status. Single measurements are particularly susceptible to short-term influences such as stress, fatigue, diet, and daily activities. Therefore, the data provide only a limited representation of participants' chronic risk profiles.

Because only volunteers and individuals with sufficient communication skills were included, the sample may not adequately represent the broader population, particularly individuals with poorer health or communication difficulties. In view of these limitations, future studies should include larger and more diverse samples, use longitudinal designs, and employ comprehensive measurement instruments. These approaches would enable a more thorough and reliable assessment of hypertension knowledge in rural areas.

Conclusion

This study showed that hypertension knowledge among people living in rural areas is significantly associated with individual characteristics. It also demonstrated that incorporating objective measurements alongside self-reported data can help address an important gap in public health research. Factors such as educational attainment, family history of hypertension, and lifestyle knowledge are significantly associated with hypertension knowledge. Individuals with lower educational attainment and those without a family history of hypertension may be disadvantaged in terms of their knowledge levels, highlighting the importance of targeted information and educational campaigns.

The findings indicate that increasing access to information about lifestyle modifications may be an effective strategy for preventing and managing hypertension. In this context, applying person-centered, knowledge-based, and risk-informed approaches in internal medicine nursing practice may improve individual health outcomes and strengthen community-based preventive health policies.

Ethics Committee Approval: Ethics committee approval was obtained from Mersin University Social and Human Sciences Ethics Committee (Approval Number: 45, Date: 02.05.2023).

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The Effect of Discharge Education Tailored to Learning Needs on Quality of Life in Patients With Myocardial Infarction

Miyokard İnfarktüsü Geçiren Hastalarda Öğrenim Gereksinimlerine Uygun Verilen Taburculuk Eğitiminin Yaşam Kalitesine Etkisi

ABSTRACT

Objective: This study aimed to assess the effect of discharge education tailored to learning needs on quality of life in patients who had experienced myocardial infarction (MI).

Method: This quasi-experimental study included 60 patients with MI (30 in the education group and 30 in the control group) treated in the cardiology department of a city hospital in Istanbul between March 2024 and May 2025. Data were collected using a patient identification form, the Patient Learning Needs Scale, and the Myocardial Infarction Dimensional Assessment Scale. The control group received routine nurse-led discharge education, whereas the education group received additional instruction tailored to their identified learning needs. Follow-up visits for all patients were conducted during the fourth week after discharge.

Results: At the initial visit, patients in the education group had learning needs, particularly regarding skin care, emotions related to their condition, community resources, and follow-up. At the final visit, their learning needs had significantly decreased across all subdimensions. Furthermore, quality of life had significantly improved in the education group ($P < 0.01$) and declined in the control group ($P < 0.001$).

Conclusion: Discharge education tailored to patients' learning needs improved their quality of life.

Keywords: Discharge education, learning needs, myocardial infarction, nurse, quality of life

ÖZET

Amaç: Bu çalışma, miyokard infarktüsü (MI) geçiren hastalarda öğrenim gereksinimleri doğrultusunda verilen taburculuk eğitiminin yaşam kalitesine etkisini belirlemek amacıyla yapılmıştır.

Yöntem: Yarı deneysel olarak gerçekleştirilen çalışmaya, Mart 2024 ile Mayıs 2025 tarihleri arasında İstanbul'da bir şehir hastanesinin kardiyoloji servisinde tedavi gören 60 MI hastası (30 eğitim, 30 kontrol) dahil edilmiştir. Veriler, hasta tanımlama formu, Hasta Öğrenim Gereksinimleri Ölçeği ve Miyokard İnfarktüsü Boyutsal Değerlendirme Ölçeği kullanılarak toplanmıştır. Kontrol grubuna hemşire tarafından rutin taburculuk eğitimi verilirken eğitim grubuna rutin eğitime ek olarak belirlenen öğrenim gereksinimlerine göre uyarlanmış eğitim verilmiştir. Tüm hastaların son izlemleri taburculuktan sonraki dördüncü haftada yapılmıştır.

Bulgular: Eğitim grubundaki hastaların ilk görüşmede özellikle cilt bakımı, duruma ilişkin duygular, toplum ve izlem konularında öğrenim gereksinimleri olduğu belirlenmiştir. Son görüşmede, eğitim grubundaki hastaların tüm alt boyutlardaki öğrenim gereksinimlerinin azaldığı görülmüştür. Ayrıca son görüşmede yaşam kalitesinin eğitim grubunda anlamlı düzeyde arttığı ($P < 0.01$), kontrol grubunda ise azaldığı ($P < 0.01$) belirlenmiştir.

Sonuç: Hastaların öğrenim gereksinimleri doğrultusunda verilen taburculuk eğitiminin yaşam kalitesinin iyileştirilmesine katkı sağladığı görülmüştür.

Anahtar Kelimeler: Taburculuk eğitimi, öğrenim gereksinimleri, miyokard infarktüsü, hemşire, yaşam kalitesi

ORIGINAL ARTICLE
KLİNİK ÇALIŞMA

This study is derived from a master's thesis titled " The Effect of Discharge Education Given in Accordance with Learning Needs on Quality of Life in Patients with Myocardial Infarction".

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Introduction

Myocardial infarction (MI) is the most common acute manifestation of cardiovascular disease and results from reduced coronary blood flow caused by atherosclerosis or thrombosis.[1] The high mortality rate, serious complications, and recurrent nature of MI make it a major public health problem.[2] MI is also one of the most common diseases in Türkiye. According to 2024 data from the Turkish Statistical Institute, cardiovascular diseases accounted for 36% of all reported deaths, and ischemic heart disease, particularly MI, accounted for 42.9% of these deaths.[3]

Following MI, individuals' quality of life (QoL) can be adversely affected by limited physical capacity, anxiety about recurrent MI, social isolation, fatigue, and sleep difficulties.[4,5] QoL encompasses an individual's perceived satisfaction and overall well-being.[6] Improving QoL after MI, facilitating treatment, and ensuring patients' active participation in their care require identifying and managing factors that contribute to reduced QoL.[7] Educating patients and their families is a key recommended approach to achieving these goals.[7,8]

Providing tailored discharge education to patients following MI requires an initial assessment of their learning needs.[9] A learning need is defined as the gap between an individual's current knowledge and the knowledge they need to acquire.[10] Assessing patients' learning needs requires a comprehensive evaluation of their readiness and capacity to learn, available resources, the suitability of the learning environment, and the effectiveness of teaching materials. Individualized education programs play a critical role in helping patients adjust to their diagnosis and treatment, reducing hospital visits, and facilitating adaptation to a new lifestyle.[11] The learning needs of patients who have experienced MI encompass psychological and lifestyle factors, appropriate medication use, proper nutrition, strategies to increase physical activity, lifestyle changes, and symptom management.[12,13] The literature emphasizes that education tailored to patients' needs reduces hospital readmissions and improves QoL.[14]

When caring for and treating patients with MI, nurses are expected to provide individualized education aligned with patients' learning needs from admission through discharge.[15] However, studies show that nurses primarily focus on specific topics and do not consistently tailor education to patients' learning needs.[15,16] Furthermore, the literature highlights a lack of individualized education tailored to these needs. The limited number of studies assessing patients' learning needs before discharge and evaluating the effects of tailored discharge education on QoL after MI underscores the need for this study.

Methods

Study Purpose and Design

This quasi-experimental study examined the effect of discharge education tailored to learning needs on the QoL of patients who had experienced MI. The following hypotheses were proposed:

H1: Discharge education tailored to the learning needs of patients who have experienced MI reduces their learning needs.

H2: Discharge education tailored to the learning needs of patients who have experienced MI improves their QoL.

MAIN POINTS

- Discharge education tailored to the learning needs of patients who have experienced myocardial infarction improves their quality of life.
- Identifying patients' discharge education needs and tailoring education accordingly supports individualized patient care.
- Cardiology nurses should assess patients' learning needs before discharge and provide education tailored to those needs.

Study Population and Sample

The study population comprised patients treated for MI in the cardiology inpatient wards of a public hospital in Istanbul between March 2024 and March 2025. G*Power software (version 3.1.9.2) was used to determine the sample size based on Uysal's study, with α=0.05, an effect size of d=0.80, and 80% power.[17] Based on these parameters, the minimum required sample size was calculated as 52 patients (26 in the education group and 26 in the control group). However, to account for potential attrition and maintain statistical power, the sample size for each group was increased by 15%. Consequently, 30 patients were assigned to each group, and the study was completed with 60 patients who met the inclusion criteria.

The hospital where the study was conducted has three separate cardiology clinics (Cardiology 1, Cardiology 2, and Cardiology 3). These clinics occupy separate locations and have independent staff. The clinics from which patients would be recruited for the education and control groups were selected by a lottery conducted by an independent researcher at the beginning of the study. Based on the lottery results, patients treated in the Cardiology 1 and Cardiology 3 clinics constituted the education group, whereas those treated in the Cardiology 2 clinic constituted the control group. This approach was intended to reduce the risk of contamination between the education and control groups.

The inclusion criteria were age≥18 years; receiving treatment for MI; being conscious, oriented, cooperative, and communicative; being able to read, write, understand, and communicate in Turkish; and voluntarily agreeing to participate in the study.

The exclusion criteria were failure to attend the final follow-up visit after discharge and hospital readmission within four weeks after discharge.

Data Collection Tools

Data were collected using the Patient Assessment Form, the Patient Learning Needs Scale (PLNS), and the Myocardial Infarction Dimensional Assessment Scale (MIDAS).

Patient Assessment Form: Developed by the researchers based on a literature review, this form consists of 16 questions addressing patient characteristics, including age, height, weight, gender, chronic diseases, and the ability to perform daily activities independently.[13,18]

Patient Learning Needs Scale: This scale identifies patients' information needs before discharge and the importance they assign to that information. The scale was developed by Bubela et al.,[19] and its validity and reliability in Turkish were evaluated by Çatal and Dicle.[20] It consists of 50 items across seven subscales.

These subscales are activities of daily living, medications, community and follow-up, treatment and complications, feelings about the situation, QoL, and skin care. Items are rated on a five-point Likert scale from 1 to 5. Mean scores are calculated by dividing the scores obtained by the number of items, yielding importance ratings ranging from 1 to 5. A higher mean score indicates greater learning needs. Cronbach's alpha was 0.95 in the Turkish adaptation and 0.90 in the current study.[20]

Myocardial Infarction Dimensional Assessment Scale: Developed by Thompson et al.,[21] this scale measures disease-specific QoL and health status in patients who have experienced MI, as well as the effects of treatment on their functioning and well-being. Yılmaz et al.[22] adapted the scale for use among Turkish patients who had experienced MI. The scale comprises 35 items assessing health status after MI across seven subscales. These subscales are physical activity, insecurity, emotional response, dependence, diet, concerns about medication, and medication side effects. Items are rated on a five-point Likert scale from 0 to 4, and each subscale score is converted to a score out of 100 by dividing it by the maximum possible score for that subscale and multiplying by 100. The maximum total scale score is therefore 100, with higher scores indicating poorer perceived QoL. In the Turkish adaptation, Cronbach's alpha coefficients for the subscales ranged from 0.79 to 0.90.[22] In the present study, Cronbach's alpha coefficients ranged from 0.78 to 0.98.

Data Collection

The study was conducted in two phases, with patients' QoL assessed twice: before discharge and during the fourth week after discharge. Although the literature does not specify when the effectiveness of discharge education should be evaluated, it suggests that evaluation can occur during patient follow-up.[23] Accordingly, the second assessment was conducted during the fourth week after discharge to coincide with patients' routine one-month follow-up appointments.

In addition to standard discharge education, the education group received an educational program developed by the researcher based on the relevant literature and tailored to the learning needs identified using the PLNS.[9,12,24] The primary goal of this program was to identify patients' information needs before discharge and equip them with the knowledge and skills needed to address those needs. The educational content covered activities of daily living (daily activities, movement, exercise and mobility, rest and sleep patterns, and dietary habits); health management (proper medication use, potential side effects, understanding the treatment process, recognizing and monitoring disease symptoms, and hygiene and personal care practices); psychosocial adaptation (coping with stress, anxiety, and other mental health conditions, identifying psychosocial support resources, and communicating effectively with family and social networks); use of community resources (learning about healthcare institutions, social services, and support groups and accessing these resources when needed); treatment adherence (hospital care and post-discharge requirements, keeping appointments, following the treatment plan, and adopting behaviors to prevent complications); safety (maintaining safety at home and in the hospital, reducing fall risk, preventing infections, and responding to emergencies); and coping with sensory changes (recognizing changes in vision, hearing, and pain perception and developing strategies to manage them). Feedback on the appropriateness of the educational content was obtained from five experts in internal medicine nursing. The education session was tailored to patients' learning needs and lasted approximately 45–60 minutes. During the session, general discharge information and individualized content were presented using verbal and visual materials. Before the face-to-face interview concluded, participants provided a telephone number at which they could be reached for the fourth-week assessment. During the fourth week after discharge, the researcher contacted each participant by telephone and administered the MIDAS to complete the final assessment. The telephone interviews lasted an average of 15 minutes.

Patients in the control group did not complete the PLNS and received routine discharge education provided in the cardiology clinics. Routine discharge education covered lifestyle changes to maintain heart health (balanced nutrition, smoking cessation, and regular physical activity), proper and regular medication use, potential side effects, and post-discharge health checks. No educational materials were used during this process. As in the education group, the final follow-up assessment was conducted by telephone.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 29.0 (IBM Corp., Armonk, NY, USA). Normality was assessed using skewness and kurtosis coefficients, which indicated that the data were approximately normally distributed and suitable for parametric testing. Descriptive statistics included means, standard deviations, frequencies, and percentages, and categorical variables were compared between independent groups using Pearson's chi-square test. A paired-samples t-test was used to assess changes within each group. Student's t-test was used to assess differences between independent groups. Statistical significance was set at $P < 0.05$.

Ethical Considerations

Approval was obtained from the İstanbul Sabahattin Zaim University Ethics Committee (Approval Number: 2024/02, Date: 25.03.2024). Participants were informed about the study's purpose, and informed consent was obtained from all volunteers. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Results

In the education group, 60% of patients were older than 55 years, compared with 66.7% in the control group. Male patients accounted for 83.3% of the education group and 76.7% of the control group. Except for body mass index (BMI), patient characteristics did not differ significantly between the groups ($P > 0.05$) (Table 1).

At the initial visit, patients in the education group had learning needs, particularly regarding skin care, feelings about the situation, and community and follow-up. At the final visit, the education provided in addition to routine discharge education was associated with significant reductions in learning needs across all subscales in the education group ($P < 0.05$) (Table 2).

Table 1. Comparison of Clinical and Lifestyle Characteristics Between the Education and Control Groups

Characteristics	Education Group (n=30)		Control Group (n=30)		Test	
	n	%	n	%	χ^2	P
BMI (kg/m²)						
18.5-24.9 (Normal)	5	16.7	11	36.7	7.523	**0.023***
25-29.9 (Overweight)	9	30.0	13	43.3		
≥ 30 (Obese)	16	53.3	6	20.0		
Smoking status						
Yes	17	56.7	17	56.7	2.476	0.290
Quit smoking	9	30.0	5	16.7		
Never smoked	4	13.3	8	26.7		
Alcohol consumption status						
Yes	5	16.7	7	23.3	4.817	0.900
Quit drinking	10	33.3	3	10.0		
Never drank	15	50.0	20	66.7		
Regular activity/exercise status						
Yes	13	43.3	12	40.0	0.069	0.793
No	17	56.7	18	60.0		
Paying attention to nutrition						
Yes	17	56.7	13	43.3	1.067	0.302
No	13	43.3	17	56.7		
Presence of a heart patient in the immediate vicinity						
Yes	12	40.0	19	63.3	3.270	0.071
No	18	60.0	11	36.7		
Presence of chronic disease						
Yes	21	70	19	63.33	0.300	0.584
No	9	30	11	36.67		
Ability to perform daily activities independently						
Yes	29	96.7	29	96.7	2.000	0.368
With assistance	1	3.3	0	0.0		
No	0	0.0	1	3.3		

BMI, Body mass index; n, number of patients; χ^2, Pearson's chi-square statistic. *P < 0.05.

Table 2. Comparison of Mean Overall and Subscale Scores on the Patient Learning Needs Scale in the Education Group at the Initial and Final Interviews

Scale/subscale	Initial interview, $\bar{x}$±SD	Final interview, $\bar{x}$±SD	t	P
Activities of daily living	2.43±0.56	1.65±0.47	10.349	**0.000****
Medications	2.74±0.72	1.76±0.51	8.110	**0.000****
Community and follow-up	2.22±0.46	1.55±0.39	10.511	**0.000****
Treatment and complications	2.87±0.70	1.83±0.49	8.981	**0.000****
Feelings about the situation	1.88±0.51	1.36±0.46	7.121	**0.000****
Quality of life	2.29±0.59	1.78±0.53	4.746	**0.000****
Skin care	1,40±0.52	1.23±0.27	2.196	**0.036***
Overall	2.42±0.49	1.66±0.39	10.601	**0.000****

SD, standard deviation; t, paired-samples t-test statistic. *P < 0.05; **P < 0.01.

Table 3. Comparison of Mean Overall and Subscale MIDAS Scores Between the Education and Control Groups at the Initial Interview

Scale/subscale	Education group, $\bar{x}$±SD	Control group, $\bar{x}$±SD	t	P
Physical activity	32.08±16.99	44.09±23.47	-2.271	**0.027***
Insecurity	31.01±15.96	39.53±13.50	-2.231	**0.030***
Emotional response	38.33±15.72	41.87±15.84	-0.869	0.388
Dependence	41,94±16.15	50.00±14.01	-2.063	**0.044***
Diet	45.55±28.59	30.27±22.58	2.297	**0.025***
Concerns about medication	16.66±28.49	24.16±29.53	-1.001	0.321
Medication side effects	17.50±23.11	21.66±22.96	0.952	0.486
Overall	32.80±11.69	39.57±10.35	-2.371	**0.021***

MIDAS, Myocardial Infarction Dimensional Assessment Scale; SD, standard deviation; t, Student's t-test statistic. *P < 0.05.

Table 4. Comparison of mean overall and subscale MIDAS scores between the education and control groups at the final ınterview

Scale/subscale	Education group, $\bar{x}$±SD	Control group, $\bar{x}$±SD	t	P
Physical activity	14.09±9.93	68.40±15.91	-15.855	**0.000***
Insecurity	10.83±10.95	65.55±14.49	-16.502	**0.000***
Emotional response	12.29±9.77	63.12±15.25	-15.368	**0.000***
Dependence	17.50±15.83	63.33±18,25	-10.388	**0.000***
Diet	13.88±19.36	53.88±25.40	-6.858	**0.000***
Concerns about medication	6.66±9.70	58.33±26.32	-10.085	**0.000***
Medication side effects	6.25±9.13	47.08±26.60	-7.951	**0.000***
Overall	12.45±8.25	63.59±12.67	-18.517	**0.000***

MIDAS, Myocardial Infarction Dimensional Assessment Scale; SD, standard deviation; t, Student's t-test statistic. *P < 0.01.

The education and control groups differed significantly in their mean overall MIDAS scores and their physical activity, insecurity, dependence, and diet subscale scores (P < 0.05). The control group had higher overall MIDAS, physical activity, insecurity, and dependence scores and lower diet scores than the education group (Table 3).

At the final assessment, the overall MIDAS score and all subscale scores differed significantly between the education and control groups (P < 0.01). An improvement in QoL was observed in the education group at this assessment (Table 4).

Within-group comparisons revealed significant decreases in the overall MIDAS score and all subscale scores from baseline to the final interview in the education group (P < 0.01), whereas the control group showed significant increases in these scores (P < 0.01) (Table 5).

Discussion

The learning needs of patients who have experienced MI have been examined across the continuum of care, from the acute phase through discharge and home care. The literature emphasizes that these needs are particularly high before discharge. For example, Sarıoğlu and Gök reported high overall educational needs among patients who had experienced MI, while a systematic review by Hansen and Sampognaro found that patients most needed information about wound care, medications, and complications and symptoms.[13,25] Consistent with the literature, the initial interviews in this study identified substantial learning needs regarding activities of daily living, medications, community and follow-up, treatment and complications, and QoL. Meeting patients' learning needs has been reported to increase their confidence and help them manage their health more effectively after discharge.[26] Structured discharge education is therefore considered an effective means of addressing these needs.[13,18]

In this study, the mean PLNS score in the education group decreased significantly from 2.42±0.49 at the initial visit to 1.66±0.39 at the final visit. According to Çatal and Dicle, higher PLNS scores indicate greater educational needs; therefore, the significant decrease suggests that the structured discharge education program effectively reduced patients' educational needs and improved their knowledge.[20] This finding supports the hypothesis that discharge education tailored to the learning needs of patients who have experienced MI reduces those needs. Similar findings have been reported in the literature. For example, Tuna and Pakyüz divided 100 patients with acute MI into control and education groups.[18] Four weeks after the education group received planned discharge education, an assessment revealed significantly greater knowledge of cardiovascular disease risk

Table 5. Within-Group Comparisons of Mean Overall and Subscale MIDAS Scores Between the Initial and Final Interviews

Scale/subscale	Education group: initial interview, $\bar{x}$±SD	Education group: final interview, $\bar{x}$±SD	t	P	Control group: initial interview, $\bar{x}$±SD	Control group: final interview, $\bar{x}$±SD	t	P
Physical activity	32.08±16.99	14.09±9.93	6.718	**0.000****	44.09±23.47	68.40±15.91	-8.761	**0.000***
Insecurity	31.01±15.96	10.83±10.95	7.495	**0.000****	39.53±13.50	65.55±14.49	-8.830	**0.000***
Emotional response	38.33±15.72	12.29±9.77	9.963	**0.000****	41.87±15.84	63.12±15.25	-6.934	**0.000***
Dependence	41.94±16.15	17.50±15.83	7.903	**0.000****	50.00±14.01	63.33±18.25	-4.287	**0.000***
Diet	45.55±28.59	13.88±19,36	6.200	**0.000****	30.27±22.58	53.88±25.40	-4.572	**0.000***
Concerns about medication	32.80±11.69	12.45±8.25	2.112	**0.043***	24.16±29,53	58.33±26.32	-5.882	**0.000***
Medication side effects	17.50±23.11	6.25±9.13	2.955	**0.006***	21.66±22.96	47.08±26.60	-5.201	**0.000***
Overall	32.80±11.69	12.45±8.25	9.827	**0.000****	39.57±10.35	63.59±12.67	-10.843	**0.000***

MIDAS, Myocardial Infarction Dimensional Assessment Scale; SD, standard deviation; t, paired-samples t-test statistic.

factors, better medication and dietary adherence, and stronger beliefs and greater knowledge regarding self-monitoring than in the control group.[18] Additionally, Hussein and Mohammed reported that health education plays an important role in meeting the perceived learning needs of patients who have experienced MI.[27] Studies show that planned, structured education tailored to patients' learning needs increases motivation. In a study by Doležel and Jarošová, nurses provided structured education to 165 patients with acute MI (education group, n=68; control group, n=97).[28] The education group demonstrated greater knowledge and more consistent medication adherence than the control group. In a study by Abu Shuaib et al.,[29] assessments before and after an educational program for patients with MI revealed statistically significant improvements in knowledge of the nature, causes, symptoms, complications, and pharmacological treatment of MI. Consistent with these national and international findings, structured discharge education for patients who have experienced MI has been shown to significantly reduce learning needs.

Systematic assessment of QoL in patients with MI during the discharge process is essential for understanding patients' needs and improving the effectiveness of rehabilitation and support strategies.[30] In this study examining the effect of discharge education tailored to patients' learning needs on QoL, the mean MIDAS score in the education group decreased from 32.80±11.69 at the initial interview to 12.45±8.25 at the final interview. Because lower MIDAS scores indicate better QoL, this statistically significant decrease indicated an improvement in QoL. Additionally, within-group analyses revealed a significant improvement in QoL in the education group from baseline to the final visit, whereas QoL declined in the control group. This finding supports the hypothesis that discharge education tailored to the learning needs of patients who have experienced MI improves their QoL. No studies in the literature have evaluated the effect of discharge education tailored to learning needs on QoL using intervention and control groups. However, in a randomized controlled trial, Uysal and Özcan found that individualized education before discharge, followed by three months of telephone follow-up, significantly increased patients' knowledge and physical activity levels, positively affecting QoL.[31] In a randomized controlled trial by Mazloum et al.,[24] individualized discharge education and three months of regular telephone support significantly improved the energy–fatigue and physical pain subscale scores of patients with ischemic heart disease, thereby improving physical QoL. Assareh et al.[32] examined the effects of discharge education on QoL and hospital readmission rates in patients with congestive heart failure. Readmission rates were lower in the education group than in the control group after the educational program. These findings support discharge education tailored to learning needs as an effective approach to improving QoL in patients who have experienced MI. By tailoring discharge education to patients' learning needs, nurses can help meet those needs and contribute to improved QoL.

Limitations

This study has several limitations. First, the sample consisted exclusively of patients hospitalized in the cardiology departments of a city hospital in Istanbul, limiting the study's external validity and the generalizability of its findings to broader populations. Furthermore, because the education and control groups were treated in the same hospital, potential information sharing and other external influences could have confounded the results. In addition, the effect of education tailored to learning needs on QoL was assessed after four weeks, leaving its long-term effects unknown. Finally, the largely self-reported data may have been subject to inaccuracies and response bias.

Conclusion

In this study examining the effect of discharge education tailored to the learning needs of patients who had experienced MI on QoL, the education group showed decreases in the mean overall PLNS score and all subscale scores, along with a significant improvement in QoL, from the initial to the final interview. Based on these findings, it is recommended that patients' individual learning needs be assessed and addressed through tailored

discharge education programs; these programs be implemented in all healthcare institutions providing inpatient care; patients be monitored after discharge and receive periodic education tailored to their learning needs to assess the sustained effectiveness of discharge education and promote lasting behavioral changes; and similar studies be conducted with larger samples to improve the generalizability of the findings.

Ethics Committee Approval: Ethics committee approval was obtained from İstanbul Sabahattin Zaim University Ethics Committee (Approval Number: 2024/02, Date: 25.03.2024).

Informed Consent: Written informed consent was obtained from all participants.

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Effectiveness of Clinical Simulation in Cardiac Auscultation Education for Nursing Students: A Systematic Review

Hemşirelik Öğrencilerine Yönelik Kardiyak Oskültasyon Eğitiminde Klinik Simülasyonun Etkinliği: Sistematik Derleme

ABSTRACT

Objective: Cardiac auscultation is an essential skill that enables nursing students to accurately recognize heart sounds and identify conditions requiring early intervention. Evidence on the effectiveness of simulation-based education in teaching this skill remains limited. This systematic review aimed to synthesize current evidence on the effects of simulation-based education on nursing students' knowledge and skills in cardiac auscultation.

Method: This systematic review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive search was conducted in PubMed, Scopus, Web of Science, and ScienceDirect. Seven studies that met the inclusion criteria were analyzed. Methodological quality was assessed using the Joanna Briggs Institute critical appraisal tools, and the findings were synthesized narratively.

Results: The review included seven randomized controlled trials involving 477 nursing students. Simulation-based education significantly improved both theoretical knowledge and practical auscultation skills. High-fidelity simulations were generally more effective than low-fidelity methods.

Conclusion: The evidence indicates that simulation-based education enhances cardiac auscultation training for nursing students. Further high-quality studies are needed to clarify the optimal design, implementation, and sustainability of simulation interventions.

Keywords: Cardiac auscultation, education, knowledge, nursing student, simulation, skills.

ÖZET

Amaç: Kardiyak oskültasyon, hemşirelik öğrencilerinin kalp seslerini doğru tanıması ve erken müdahale gerektiren durumları belirlemesi için temel bir beceridir. Bu becerinin öğretiminde simülasyon temelli eğitimin etkililiğine ilişkin kanıtlar sınırlıdır. Bu sistematik derleme, simülasyon temelli eğitimin hemşirelik öğrencilerinin kardiyak oskültasyona yönelik bilgi ve becerileri üzerindeki etkilerine ilişkin güncel kanıtları sentezlemeyi amaçlamıştır.

Yöntem: Bu sistematik derleme, Sistematik Derlemeler ve Meta-Analizler için Tercih Edilen Raporlama Öğeleri (PRISMA) kılavuzu doğrultusunda yürütülmüş ve raporlanmıştır. PubMed, Scopus, Web of Science ve ScienceDirect veri tabanlarında kapsamlı bir tarama yapılmıştır. Dahil edilme ölçütlerini karşılayan yedi çalışma analiz edilmiştir. Metodolojik kalite, Joanna Briggs Enstitüsü eleştirel değerlendirme araçları kullanılarak değerlendirilmiş ve bulgular anlatısal olarak sentezlenmiştir.

Bulgular: Derlemeye, toplam 477 hemşirelik öğrencisini kapsayan yedi randomize kontrollü çalışma dahil edilmiştir. Simülasyon temelli eğitimin hem teorik bilgiyi hem de uygulamalı oskültasyon becerilerini anlamlı düzeyde geliştirdiği bulunmuştur. Yüksek gerçeklikli simülasyonların, düşük gerçeklikli yöntemlere göre genellikle daha etkili olduğu görülmüştür.

Sonuç: Kanıtlar, simülasyon temelli eğitimin hemşirelik öğrencilerine yönelik kardiyak oskültasyon eğitimini geliştirdiğini göstermektedir. Simülasyon müdahalelerinin en uygun tasarımını, uygulanmasını ve sürdürülebilirliğini netleştirmek için yüksek kaliteli ek çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Kardiyak oskültasyon, eğitim, bilgi, hemşirelik öğrencisi, simülasyon, beceri

ORIGINAL ARTICLE
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Introduction

Physical examination helps nurses collect objective patient data, establish accurate nursing diagnoses, and improve the quality of care. Auscultation, an essential component of physical examination, is a fundamental clinical skill taught early in nursing education programs.[1] Cardiac auscultation is a vital clinical skill for healthcare professionals, particularly nursing students preparing for professional practice. This skill is crucial for detecting potentially fatal cardiac conditions before they progress.[2,3] Basic physical examination skills, such as auscultation of heart sounds, involve more than technical proficiency and play a critical role in nurses' clinical decision-making.[4] Therefore, essential skills such as cardiac auscultation should be taught early in nursing education and reinforced through innovative teaching methods. However, clinical practice and current research indicate that nursing students' competence in this area is often inadequate.[5] One major reason for this deficiency is that cardiac auscultation education relies primarily on theoretical instruction and ineffective teaching methods. Instruction in traditional bedside or classroom settings often fails to provide students with realistic, structured learning experiences.[3] Current evidence therefore highlights the need to revise cardiac auscultation training for nursing students to improve its effectiveness. In particular, simulation has considerable potential to improve students' ability to accurately recognize heart sounds and plan appropriate nursing interventions.[6]

Simulation is defined as a process designed to achieve outcomes that closely reflect clinical practice. It is a guided, interactive teaching technique that closely replicates reality and can replace or complement real-life experiences. It allows students to experience their future professional roles realistically through specific scenarios. In this way, simulation helps students enter the healthcare workforce with greater competence and preparedness.[7] Simulation-based training enables students to recognize correct and incorrect practices by performing procedures themselves, thereby promoting active participation in experiential learning.[8] This approach increases students' self-confidence and motivation, reduces anxiety, and supports the development of cognitive, affective, and psychomotor skills.[9] Innovative simulation techniques developed in recent years offer considerable potential to enhance nursing students' clinical competence.[10,11] Virtual patient simulations have been shown to improve nursing students' health assessment competence, clinical reasoning, and integrative thinking skills.[10] Similarly, high-fidelity simulations have demonstrated substantial educational benefits in nursing education, enhancing students' knowledge, professional skills, and clinical competence, particularly in critical thinking, communication, and clinical decision-making.[11]

The current literature includes systematic reviews examining the effects of simulation on education in cardiovascular physical examination; however, these reviews generally cover multiple health disciplines, and none has focused exclusively on cardiac auscultation among nursing students.[12,13] A systematic review by Andrade et al.[12] examined the effectiveness of clinical simulation in cardiovascular physical examination education among nursing students. However, that review had a broad scope and did not focus on a specific skill, such as the assessment of heart sounds. Cardiac auscultation plays a critical role in early diagnosis and patient safety in nursing and is an area of clinical competence that warrants separate consideration. This systematic review aims to address this gap in the literature by examining simulation-based training focused exclusively on cardiac auscultation. Furthermore, its inclusion of more recent studies than previous reviews allows it to reflect recent technological advances and innovative teaching strategies in nursing education. In their systematic review and meta-analysis, McKinney et al.[13] evaluated the effects of simulation-based training on cardiac auscultation skills. However, that review included nursing students and other healthcare learners and professionals, such as medical students and physicians, and its findings reflected this diverse participant population. In contrast, the present systematic review focuses exclusively on nursing students, offering a more targeted, practice-oriented contribution to the literature by assessing the effects of simulation-based education within this specific learner group. Overall, this study aims to strengthen the evidence on the effects of simulation-based training on nursing students' cardiac auscultation skills and guide the integration of technology into nursing education and related policies.

MAIN POINTS

- Seven studies involving 477 nursing students showed that simulation-based education improved cardiac auscultation knowledge and skills.
- High-fidelity simulation generally produced greater improvements than low-fidelity simulation or traditional teaching methods.
- Differences in study methods and moderate methodological quality limit the strength and generalizability of the findings.
- Further research should assess long-term skill retention, transfer to clinical practice, and cost-effectiveness.

Aim

This systematic review aims to evaluate the effectiveness of simulation-based educational practices in enhancing nursing students' cardiac auscultation knowledge and skills. Specifically, it seeks to address the following research questions:

How effective are simulation-based educational practices in helping nursing students acquire cardiac auscultation knowledge and skills?

Do different types of simulation vary in their effectiveness in developing nursing students' cardiac auscultation knowledge and skills?

Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to address the research questions systematically and transparently.[14] To support methodological rigor and transparency, the detailed protocol, prepared in accordance with the PRISMA Protocols (PRISMA-P) statement, was registered in the International Prospective Register of Systematic Reviews (PROSPERO; registration number: CRD420251111467). PRISMA provides a standardized framework for reporting systematic reviews. The main steps followed in this study were as follows:

A comprehensive literature search was conducted using predefined inclusion and exclusion criteria.

A two-stage screening process, consisting of title and abstract screening followed by full-text screening, was used to assess the eligibility of the identified studies.

Key information from eligible studies was systematically extracted and tabulated using standardized data extraction forms.

The extracted data were analyzed descriptively to address the research questions.

The final report was structured in accordance with the PRISMA guidelines.

Search Strategy

A comprehensive literature search was conducted in the PubMed, Web of Science, ScienceDirect, and Scopus databases from their inception through the last week of July 2025. The search used the keywords "nursing students," "auscultation," and "simulation," combined with Boolean operators (AND and OR). Two independent researchers (A.A. and M.A.) conducted the literature search, limiting eligibility to studies published in English. The reference lists of relevant systematic reviews and meta-analyses were also manually screened to identify potentially eligible studies.

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were predefined using the Participants, Intervention, Comparison, Outcomes, and Study Design (PICOS) framework (Table 1).[15]

Selection Process and Data Extraction

Two reviewers (A.A. and M.A.) independently conducted the literature review. Screening was performed manually with careful attention to detail. In the first stage, duplicate records were identified by examining titles and author names. Titles and abstracts were then screened, followed by full-text reviews of potentially eligible studies. Two reviewers independently assessed study eligibility, and disagreements were resolved through consensus informed by the literature.

The authors developed a standardized data extraction form to facilitate data summarization. Two researchers independently extracted data from the included studies using this form. The form captured author names, publication year, country, study design, sample size, participant characteristics, comparison groups, intervention types, and study outcomes.

Quality Assessment

The methodological quality of studies examining the effects of simulation-based education on nursing students' cardiac auscultation knowledge and skills was rigorously evaluated. This evaluation is essential for assessing the reliability of the findings and the strength of the evidence regarding the effectiveness of simulation-based training. Two researchers independently assessed methodological quality using the Joanna Briggs Institute (JBI) Critical Appraisal Tool for Randomized Controlled Trials. Although the authors of one study described it as a mixed-methods study, its quantitative component used a randomized controlled trial design, with participants randomly allocated to intervention groups. It therefore met the eligibility criteria for this review and was appraised using the same JBI checklist for randomized controlled trials. Each item was rated as "Yes," "No," "Unclear," or "Not applicable." The JBI checklist for randomized controlled trials comprises 13 items addressing key methodological aspects, including randomization methods, group comparability, blinding procedures, the validity of outcome measures, and statistical analysis.[16] This tool supports the systematic identification of potential sources of bias, contributing to

Table 1. Inclusion and exclusion criteria

Component	Inclusion criteria	Exclusion criteria
P	Undergraduate nursing students	Individuals other than undergraduate nursing students, including postgraduate (master's or doctoral) nursing students
I	Simulation-based educational methods for teaching adult cardiac auscultation (e.g., high-fidelity simulation, low-fidelity simulation, standardized patients, or virtual simulation)	Studies involving pediatric cardiac auscultation training or interventions without simulation (e.g., lectures alone, video-based instruction, or case discussions)
C	Traditional teaching methods without simulation (e.g., lectures or video-based instruction) or comparisons between different simulation types (e.g., high- versus low-fidelity simulation)	Studies that do not compare simulation with another educational method or compare different simulation types
O	Outcomes related to cardiac auscultation, including knowledge, skills, or performance	Studies that do not report outcomes related to cardiac auscultation (e.g., knowledge, skills, or performance)
S	Randomized controlled trials, quasi-experimental studies, and mixed-methods studies with a randomized quantitative component	Descriptive or qualitative studies, systematic reviews, meta-analyses, case reports, and editorials

P, population; I, intervention; C, comparison; O, outcomes; S, study design.

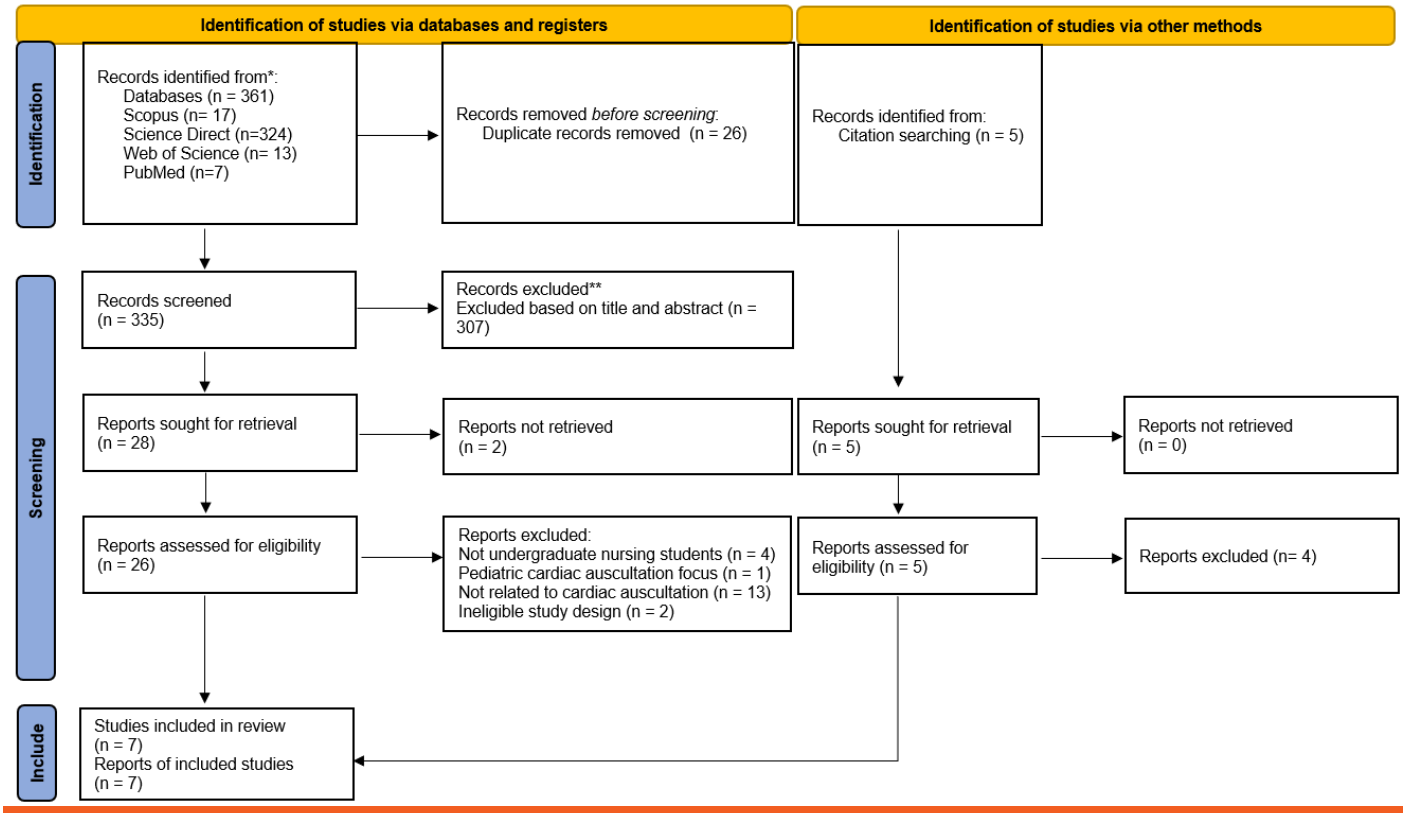


Figure 1. PRISMA 2020 flow diagram for new systematic reviews, which included searches of databases, registers and other sources.

more robust conclusions about the validity and effectiveness of simulation-based training in nursing education.

Data Synthesis

A meta-analysis was not performed because of substantial clinical and methodological heterogeneity among the included studies. Differences in simulation modalities (e.g., high-fidelity simulation, standardized patients, virtual auscultation, and augmented reality), intervention characteristics, outcome measures, assessment instruments, and follow-up periods precluded quantitative pooling of the results. The findings were therefore synthesized narratively in accordance with established guidance for narrative synthesis in systematic reviews. The results were organized under thematic headings according to the type of educational intervention, simulation fidelity level (low, medium, or high), and educational outcomes, including knowledge acquisition and practical auscultation skills.

Ethical Considerations

Ethical approval was not required because this study is a systematic review of previously published studies. All included articles were appropriately cited.

Results

Search Results

A total of 361 records were identified through database searches. After 26 duplicate records were removed, 335 records remained for title and abstract screening. During screening, 307 records were excluded based on the predefined exclusion criteria. The remaining 28 reports were sought for retrieval. Of these, two could not be retrieved, leaving 26 reports for full-text eligibility assessment by two independent researchers. Following this assessment, seven studies met the inclusion criteria and were included in the review (Figure 1). The remaining studies were excluded because they did not involve undergraduate nursing students, focused on pediatric cardiac auscultation, were unrelated to cardiac auscultation, or did not meet the required study design criteria.

Characteristics of Included Studies

Seven studies published between 2016 and 2025 were included in this systematic review. All studies used a randomized controlled trial (RCT) design, including the quantitative component of one mixed-methods study. Most studies were conducted in Türkiye (n=5), with one conducted in the United States and one in Canada. Sample sizes ranged from 17 to 127 participants. The primary aim of the included studies was to evaluate the effectiveness of various clinical simulation interventions, particularly high-fidelity simulation (HFS), standardized patients (SPs), low-fidelity simulation (LFS), and virtual auscultation (VA), in improving nursing students' cardiac auscultation skills (Table 2).

Participant Characteristics

All participants were undergraduate nursing students in their first, second, third, or fourth year. Students were comparable in age and academic year, and their baseline knowledge of

Table 2. Summary of included studies evaluating clinical simulation for cardiac auscultation education in nursing students

Author (year), country	Study design	Participants	Sample size	Interventions: IG	Interventions: CG	Interventions: C	Outcomes	Quality score
Vural Doğru[20] Türkiye	RCT	First-year nursing students	72	HFS	—	Traditional practical training using a static manikin	The simulation group showed statistically significant improvements in cardiac auscultation knowledge and skill scores from pretest to posttest, with posttest scores significantly higher than those of the control group. **Knowledge—median (minimum–maximum)** Pretest: HFS, 64 (8–100); control, 69 (28–92) Posttest: HFS, 92 (62–100); control, 83 (36–100) P value: HFS, <0.001; control, <0.001 **Skills—median (minimum–maximum)** Pretest: HFS, 14 (0–18); control, 13.5 (5–32) Posttest: HFS, 25 (22–27); control, 17 (9–24) P value: HFS, <0.001; control, <0.001	9
Eyüboğlu[17] Türkiye	RCT	Second-year nursing students	52	HFS	PL	Traditional training using a live model	Significant short-term improvements were observed in the HFS and PL groups. **Skills—$\bar{x}$±SD** Pretest: HFS, 21.17±7.37; PL, 23.33±6.71; control, 21.17±6.29 Posttest: HFS, 40.00±6.64; PL, 50.00±5.65; control, 42.35±5.91 P value: HFS, 0.009; PL, 0.000; control, 0.184	9
Goldsworthy[22] Canada	RCT	Second-year nursing students	127	VA	—	Mechanical simulator–based training combined with classroom instruction	Virtual auscultation training significantly improved nursing students' ability to recognize cardiac murmurs compared with traditional education (P = 0.019).	7
Menon[23] USA	RCT	Second-year nursing students	17	AR simulation overlay on a manikin	—	Standard manikin practice	Augmented reality–based simulation improved nursing students' cardiac auscultation assessment skills compared with training without augmented reality.	7

Table 2. Continued

Author (year), country	Study design		Sample size	Interventions: IG	Interventions: CG	Interventions: C	Outcomes	Quality score
Mutlu[18] Türkiye	RCT	Third- and fourth-year nursing students	71	HFS	—	LFS with synthetic auscultation sounds	Knowledge scores for heart sounds increased significantly after training in the HFS group but not in the LFS group. **Knowledge—$\bar{x}$±SD** Pretest: HFS, 38.89±26.35; LFS, 42.14±31.95 Posttest: HFS, 56.25±36.04; LFS, 42.86±38.62 P value: HFS, 0.29; LFS, 0.852	8
Sarıtaş[19] Türkiye	RCT	Second-year nursing students	86	SP	HFS	TE using a live model for auscultation	Cardiac auscultation skill scores were significantly higher in the HFS group than in the other groups. **Skills—$\bar{x}$±SD** Pretest: SP, —; HFS, —; control, — Posttest: SP, 10.18±3.84; HFS, 13.90±1.89; control, 12.63±2.81 P value: <0.001	8
Tüzer[21] Türkiye	Mixed-methods study	Fourth-year nursing students	52	HFS	—	SP	Knowledge and skill scores increased in both groups, with the SP group showing greater improvement in knowledge than the HFS group; however, the groups did not differ significantly in skill development. **Knowledge—$\bar{x}$±SD** Pretest: HFS, 43.75±11.66; SP, 36.63±13.25 Posttest: HFS, 72.79±9.13; SP, 73.80±11.28 P value (between-group difference): 0.024 **Skills—$\bar{x}$±SD** Pretest: HFS, 63.38±14.44; SP, 65.46±13.02 Posttest: HFS, 90.23±9.02; SP, 90.08±8.63 P value (between-group difference): 0.374	8

AR, augmented reality; C, control group; CG, comparison group; HFS, high-fidelity simulation; IG, intervention group; LFS, low-fidelity simulation; PL, psychoacoustic learning; RCT, randomized controlled trial; SD, standard deviation; SP, simulated patient; TE, traditional education; USA, United States of America; VA, virtual auscultation.

cardiac auscultation was limited. Inclusion criteria included no previous similar training and voluntary participation. In some studies, power analyses informed sample size determination, and participants were subsequently assigned to groups.[17-19]

Simulation Interventions

Various simulation methods were used in the included studies. Students practiced listening to heart sounds on physically realistic models using high-fidelity simulators.[17-21] The VA method used by Goldsworthy et al.[22] provided auscultation training in a virtual environment. SPs allowed students to practice with individuals portraying real patients. Mutlu et al.[18] used low-fidelity simulators for short-term, less interactive training involving computer-based heart and lung sounds played through speakers. Menon et al.[23] also used augmented reality (AR) images to demonstrate cardiac auscultation sites in three dimensions on a manikin. These interventions were generally delivered in laboratory settings through student-centered, one-on-one practice sessions that focused on developing practical skills after theoretical instruction.

Comparison Groups

The comparison groups generally received traditional training or other forms of simulation. For example, Eyüboğlu et al.[17] included a psychoacoustic learning group and a control group that received traditional training using a live model. Goldsworthy et al.[22] provided training using a mechanical simulator with synthetic auscultation sounds. Mutlu et al.[18] provided less interactive, computer-based training with sounds played through loudspeakers in the LFS group. Sarıtaş et al.[19] provided traditional training using a classmate as the model in the control group. Tüzer et al.[21] used SPs in the comparison group, allowing participants to practice with individuals portraying real patients. In the study by Menon et al.,[23] the control group received only traditional practice on a manikin without AR. Vural Doğru and Zengin Aydın[20] provided traditional auscultation training using a static manikin. These educational approaches were compared in terms of their effectiveness in improving nursing students' auscultation skills.

Outcomes

All included studies indicated that simulation-based training effectively improved cardiac auscultation skills. Studies using high-fidelity simulators, in particular, reported significant improvements in both knowledge and practical skills.[17-21] VA and AR simulation methods were also found to be effective.[22,23] Most included studies demonstrated that HFS produced better outcomes than LFS or traditional training approaches.[17,18,20]

Quality Assessment

The methodological quality scores of the included studies ranged from 7 to 9 out of 13 on the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Randomized Controlled Trials. Two studies scored 9/13, three scored 8/13, and two scored 7/13. All studies reported randomization, consistent outcome measurement, appropriate statistical analysis, and suitable trial designs. However, allocation concealment was unclear in all studies, and neither participants nor intervention providers were blinded. Blinding of outcome assessors and baseline group comparability were inconsistently reported. Overall, the included studies demonstrated moderate methodological quality, with some risk of bias primarily related to blinding and allocation procedures (Table 3).

Discussion

Accurate cardiac auscultation is a fundamental nursing competency that supports the early recognition of cardiovascular abnormalities, timely clinical decision-making, and improved patient safety. Enhancing nursing students' ability to accurately identify and interpret heart sounds is therefore essential to preparing them for clinical practice. The findings of this systematic review suggest that simulation-based education may be an effective strategy for improving nursing students' cardiac auscultation knowledge and skills. By synthesizing evidence focused specifically on undergraduate nursing students, this review provides insights that may inform the design and integration of simulation-based cardiac auscultation training into nursing curricula. Although previous research has demonstrated that simulation supports the acquisition of general clinical skills, evidence regarding simulation-based cardiac auscultation education among undergraduate nursing students remains limited.[11,24] This review analyzed seven studies published between 2016 and 2025 that met the specified inclusion criteria. However, the included studies varied in sample size, simulation duration and content, assessment tools, and outcome measures. These methodological differences limit the comparability of the findings and may affect their generalizability. For example, some studies used high-fidelity simulation manikins, whereas others used low-fidelity simulation techniques. Assessment timing, ranging from immediately after training to later follow-up, and measurement tools also varied. This variation makes direct comparisons of effect sizes difficult. In addition, insufficient reporting of methodological details, such as blinding methods, randomization procedures, and follow-up periods, limited the assessment of the risk of bias. These reporting gaps represent a potential methodological limitation that may affect confidence in the validity and reliability of the results. Therefore, the findings should be interpreted cautiously, considering methodological differences and potential sources of bias across studies.

The findings of this systematic review indicate that simulation-based education is an effective method for improving nursing students' cardiac auscultation knowledge and skills. The included studies demonstrated significant improvements in students' ability to distinguish heart sounds, recognize normal and abnormal sounds, and make informed clinical decisions. These findings are consistent with previous research.[12,13,25,26] For example, a meta-analysis by Osborne et al.[25] reported that simulation-based training was an effective method for teaching cardiac auscultation to various groups of health sciences students. Similarly, a systematic review by Andrade et al.[12] showed that simulation-based training enhanced nursing students' cardiovascular physical examination skills and self-confidence. Another systematic review and meta-analysis concluded that simulation-based training is an effective educational strategy for teaching cardiac auscultation.[13] Overall, simulation-based training provides a safe, structured learning environment that supports cognitive and psychomotor development. These

Table 3. Quality assessment of randomized controlled trials

Assessment item	Doğru[20]	Eyüboğlu[17]	Goldsworthy[22]	Mutlu[18]	Sarıtaş[19]	Tüzer[21]	Menon[23]
1. Was true randomization used to assign participants to treatment groups?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Was allocation to treatment groups concealed?	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
3. Were the treatment groups similar at baseline?	Yes	Yes	Unclear	Yes	Yes	Unclear	Unclear
4. Were participants blinded to treatment assignment?	No	No	No	No	No	No	No
5. Were those delivering the treatment blinded to treatment assignment?	No	No	No	No	No	No	No
6. Were the treatment groups treated identically apart from the intervention of interest?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7. Were outcome assessors blinded to treatment assignment?	Yes	Yes	Unclear	Unclear	No	Unclear	Unclear
8. Were outcomes measured in the same way across treatment groups?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9. Were outcomes measured reliably?	Yes	Yes	Yes	Yes	Yes	Yes	No
10. Was follow-up complete, and, if not, were between-group differences in follow-up adequately described and analyzed?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11. Were participants analyzed in the groups to which they were randomized?	Unclear	Unclear	Unclear	No	Unclear	Yes	Yes
12. Was appropriate statistical analysis used?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13. Was the trial design appropriate, and were any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Total score	**9**	**9**	**7**	**8**	**8**	**8**	**7**

RCT, randomized controlled trial.

findings reinforce the educational value and effectiveness of simulation in teaching essential clinical skills, such as cardiac auscultation, in nursing education. Therefore, broader and more systematic integration of simulation-based education into nursing curricula represents an important step toward improving students' clinical competence.

Comparisons of simulation types in this review indicated that high-fidelity simulation was more effective than low-fidelity simulation in improving cardiac auscultation knowledge and skills. This finding is consistent with previous studies evaluating the effects of high-fidelity simulation on nursing students' acquisition and retention of clinical competencies.[27,28] A randomized controlled trial by Chabrera et al.[27] reported that only the high-fidelity simulation group showed significant improvements in critical thinking, clinical skills, communication, and ethics and maintained these competencies for 12 months. Similarly, a study comparing high- and low-fidelity simulations among nursing students found comparable self-confidence in both groups but higher achievement in the high-fidelity simulation group.[28] These positive findings suggest that the

systematic integration of high-fidelity simulation into nursing education can better prepare students for safe clinical practice. However, important structural and economic barriers limit its implementation. High costs, limited laboratory capacity, and insufficient instructional and technical staff relative to student numbers are among the main implementation challenges.[29] Conversely, some studies have reported no significant advantage of high-fidelity over low-fidelity simulation, with some reporting similar or lower knowledge scores and undesirable effects such as overconfidence.[25,30] For example, a meta-analysis by Osborne et al.[25] found no statistically significant difference between the two simulation types in cardiac auscultation knowledge and skills among healthcare students. Similarly, a randomized controlled study by Massoth et al.[30] comparing high- and low-fidelity advanced life support training found significant increases in knowledge in both groups, although the low-fidelity group achieved higher performance scores in some domains. Students in the high-fidelity group also perceived themselves as having an advantage solely because of their group assignment and substantially overestimated their individual performance. These conflicting findings warrant closer examination of the contextual, educational, and structural factors that influence the effectiveness of simulation.

This review demonstrates that simulation-based education is an effective strategy for improving nursing students' cardiac auscultation knowledge and skills. By enhancing students' ability to identify normal and abnormal heart sounds, simulation-based training contributes to clinical competence and promotes patient safety. The evidence supports integrating simulation, particularly high-fidelity approaches, into nursing curricula to bridge the gap between theory and practice. These findings have important implications for nursing educators and institutions seeking to design evidence-informed, technology-enhanced learning environments that prepare students for clinical challenges.

Implications for Nursing Education and Future Research

Although simulation-based learning appears effective in promoting knowledge and skill acquisition, the extent to which these gains are sustained over time remains unclear. Future studies should investigate how long knowledge and skills are retained after simulation-based training and identify factors that influence retention. Simulation interventions vary substantially in duration, frequency, and delivery methods. Therefore, comparative studies are needed to determine which simulation types (e.g., high-fidelity simulation, virtual simulation, and role-playing) are most effective under specific conditions. The effects of different simulation modalities on cardiac auscultation training, particularly knowledge retention, self-confidence, and clinical competence, should be compared, and the extent to which these skills transfer to clinical practice should be evaluated. Multicenter international studies examining the effects of simulation-based training on patient safety and clinical outcomes, particularly in low- and middle-income countries, are needed to clarify its applicability across diverse contexts. Studies assessing the cost-effectiveness of simulation compared with traditional methods are also needed. Barriers to and facilitators of simulation adoption should be systematically explored. Academic institutions should support the integration of simulation into nursing education and prioritize investments in faculty training, access to equipment, and technological infrastructure. Curriculum integration should align with available resources, educational objectives, and students' individual learning needs. Standardized training protocols are also needed. To ensure the effective and sustainable use of simulation in nursing education, teaching strategies should be organized within a unified framework.

Limitations

This study has several limitations. Most studies included in this systematic review were conducted in Türkiye, limiting the generalizability of the findings to other cultural and educational contexts. Intervention protocols varied considerably in duration, frequency, delivery methods, and timing (e.g., single versus multiple sessions and immediate versus delayed assessment), making it challenging to standardize practices and compare findings. The tools used to assess learning outcomes also differed across studies, and most were developed by the study authors based on the existing literature. This variation in measurement methods may have contributed to the heterogeneity of the findings. Furthermore, only simulation-based interventions involving adult cardiac auscultation training were included, whereas studies involving pediatric training were excluded. The findings therefore apply only to training in adult cardiac auscultation. The evidence included in this review is also limited by variations in study quality, the frequent absence of blinding, and generally small sample sizes, which may reduce the reliability and generalizability of the results. Methodologically, the review was limited to studies published in English, which may have introduced language bias and reduced the comprehensiveness of the evidence base.

Conclusion

Most studies included in this systematic review indicate that simulation-based education effectively improves nursing students' cardiac auscultation knowledge and skills. Simulation-based training significantly enhances students' fundamental clinical competencies, including accurately recognizing and interpreting heart sounds and planning appropriate nursing interventions. Comparisons across simulation types indicated that high-fidelity simulation, in particular, produced greater improvements in students' cognitive and psychomotor skills. These findings support expanding simulation-based training to develop cardiac auscultation skills in nursing education. Enhancing educational content, particularly through high-fidelity simulation techniques, may be especially effective in improving students' clinical competence.

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Koroner Anjiyografi Uygulanan Bireylerde Belirsizliğe Tahammülsüzlük ile Anksiyete ve Depresyon Arasındaki İlişki

The Relationship Between Intolerance of Uncertainty, Anxiety, and Depression in Adults Undergoing Coronary Angiography

ÖZET

Amaç: Bu çalışma, koroner anjiyografi uygulanan bireylerde belirsizliğe tahammülsüzlük düzeyi ile anksiyete ve depresyon arasındaki ilişkiyi incelemek amacıyla yapıldı.

Yöntem: Tanımlayıcı ve kesitsel nitelikteki bu araştırma, Kasım 2024-Mayıs 2025 tarihleri arasında Türkiye'nin batısında bulunan bir eğitim ve araştırma hastanesinin kardiyoloji kliniğinde yürütüldü. Çalışmaya, dahil edilme kriterlerini karşılayan 160 birey katıldı. Veriler; Birey Tanılama Formu, Belirsizliğe Tahammülsüzlük Ölçeği (BTÖ-12) ve Hastane Anksiyete ve Depresyon Skalası (HADS) kullanılarak toplandı. Verilerin analizinde tanımlayıcı istatistikler ve lojistik regresyon analizi kullanıldı.

Bulgular: Katılımcıların yaş ortalaması 62,33 ± 11,01 olup, %51,2'si kadın ve %71,9'u evlidir. Bireylerin BTÖ-12 puan ortalaması 43,10 ± 8,63 olup yüksek düzeyde belirsizliğe tahammülsüzlük göstermektedir. Katılımcıların %44,4'ünde anksiyete, %60'ında depresyon varlığı saptandı. Lojistik regresyon analizine göre yaşlı yaş grubunda olmak [anksiyete için β = 1,706; %95 güven aralığı (GA) = 2,19-13,87; depresyon için β = 1,131; %95 GA = 1,38-6,98] ve BTÖ-12 toplam puanının artması (anksiyete için β = 0,175; %95 GA = 1,11-1,28; depresyon için β = 0,071; %95 GA = 1,03-1,12) anksiyete ve depresyon varlığını anlamlı biçimde yordamaktadır (P < 0,05).

Sonuç: Koroner anjiyografi uygulanan bireylerde belirsizliğe tahammülsüzlük düzeyi yüksek bulunmuş ve bu durumun anksiyete ile depresyon üzerinde anlamlı bir etkisi olduğu belirlenmiştir. Belirsizliğe tahammülsüzlük düzeyinin artması, bireylerde emosyonel sıkıntı riskini yükseltmektedir. Bu nedenle hemşirelik bakımında belirsizlikle baş etme becerilerini güçlendirmeye, psikolojik destek sağlamaya ve emosyonel iyilik halini artırmaya yönelik bütüncül yaklaşımların uygulanması önerilmektedir.

Anahtar Kelimeler: Anksiyete, belirsizliğe tahammülsüzlük, depresyon, hemşirelik bakımı, koroner anjiyografi

ABSTRACT

Objective: This study aimed to examine the relationship between intolerance of uncertainty, anxiety, and depression in adults undergoing coronary angiography.

Method: This descriptive, cross-sectional study was conducted between November 2024 and May 2025 in the cardiology clinic of a training and research hospital in western Türkiye. The study included 160 individuals who met the inclusion criteria. Data were collected using the Individual Identification Form, the Intolerance of Uncertainty Scale-12 (IUS-12), and the Hospital Anxiety and Depression Scale (HADS). Descriptive statistics and logistic regression analysis were used to analyze the data.

Results: The mean age of the participants was 62.33±11.01 years; 51.2% were female, and 71.9% were married. The mean IUS-12 score was 43.10±8.63, indicating a high level of intolerance of uncertainty. Anxiety was present in 44.4% of participants, and depression was present in 60%. Logistic regression analysis showed that older age (for anxiety: β=1.706; 95% CI=2.19–13.87; for depression: β=1.131; 95% CI=1.38–6.98) and a higher total BHS-12 score (for anxiety: β=0.175; 95% CI=1.11–1.28; for depression: β=0.071; 95% CI=1.03–1.12) significantly predicted the presence of anxiety and depression (P < 0.01).

Conclusion: Individuals undergoing coronary angiography exhibited a high level of intolerance of uncertainty, which was significantly associated with anxiety and depression. Greater intolerance of uncertainty was associated with a higher risk of emotional distress. Therefore, holistic nursing care approaches that strengthen skills for coping with uncertainty, provide psychological support, and enhance emotional well-being are recommended.

Keywords: Anxiety, intolerance of uncertainty, depression, nursing care, coronary angiography

KLİNİK ÇALIŞMA
ORIGINAL ARTICLE

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Giriş

Koroner arter hastalığı (KAH), dünya genelinde mortalite ve morbiditenin en yaygın nedenlerinden biri olarak önemli bir halk sağlığı sorunu olmaya devam etmektedir. Dünya Sağlık Örgütü verilerine göre kalp ve damar hastalıkları, dünya genelindeki tüm ölümlerin yaklaşık üçte birinden sorumludur ve en sık görülen hastalıkların başında gelmektedir.[1] Bu durum da KAH'ı hem klinik hem de toplumsal düzeyde öncelikli bir sağlık sorunu haline getirmektedir. Bu bağlamda en sık kullanılan tanı ve tedavi yöntemlerinden biri olan koroner anjiyografi, koroner arterlerin anatomik yapısını doğrudan görüntüleyerek darlık ve tıkanıklık derecelerini belirlemeyi sağlayan, bu yönüyle "altın standart" kabul edilen invaziv bir tanı yöntemidir.[2,3] Bu işlem, tanı doğruluğunu artırmakla birlikte birçok hastada kaygı, korku ve depresyon gibi duygusal tepkilere neden olabilmektedir. Özellikle anjiyografi öncesi dönemde hastalar, işlem sonuçlarına, olası stent yerleştirilmesine veya cerrahi müdahale ihtimaline ilişkin belirsizliklerle karşı karşıya kalmaktadır. Bu belirsizlik durumu, bireylerde yoğun bir bilişsel stres yaratmakta ve anksiyete düzeylerinin artmasına yol açmaktadır.[4] Öyle ki Karaman Özlü ve arkadaşları[5] çalışmalarında, koroner anjiyografi uygulanan bireylerin büyük çoğunluğunda orta ve yüksek düzeyde anksiyete bulunduğunu, bu durumun işlem sürecine ilişkin bilgi eksikliği ve belirsizlikle ilişkili olduğunu bildirmiştir.[5]

Koroner anjiyografi süreci tıbbi ve psikolojik açıdan yüksek belirsizlik içeren bir dönemdir. Mishel'in Hastalıkta Belirsizlik Kuramı'na göre, birey hastalığına ilişkin anlamlı bir bilişsel çerçeve oluşturamadığında belirsizlik artmakta ve bu durum psikolojik stres, kaygı ve depresyon gibi olumsuz emosyonel tepkilere yol açmaktadır.[6] Son yıllarda öne çıkan önemli bir kavram olarak belirsizliğe tahammülsüzlük, bireyin belirsiz durumlara karşı olumsuz duygusal tepkiler geliştirme eğilimini, belirsizliği tehdit olarak algılamasını ve bu tür durumları tolere edememesini ifade etmektedir.[7,8] Carleton ve arkadaşları,[8] belirsizliğe tahammülsüzlüğü "bilgi eksikliğinin yarattığı duygusal rahatsızlığa karşı düşük tolerans" olarak tanımlamış ve bu özelliğin anksiyete ve depresyon gibi birçok psikopatolojide transdiyagnostik bir rol oynadığını belirtmiştir. Literatürdeki yapılmış çalışmalar da yetişkin bireylerde belirsizliğe tahammülsüzlük düzeyinin arttıkça anksiyete ve depresyon belirtilerinin de anlamlı şekilde yükseldiğini bildirmiştir.[9-11] Koroner anjiyografi uygulanan bireylerde anksiyete ve depresyonun yüksek olduğu yapılmış çalışmalarla da ortaya konulduğundan genel popülasyonda anlamlı bulunan bu ilişkinin, koroner anjiyografi gibi sonuçları öngörülemeyen ve bilişsel kontrolün sınırlı olduğu durumlarda da ortaya çıkacağı düşünülmektedir.[5,12]

Literatürde benzer bir çalışmaya rastlanmaması nedeniyle bu çalışma, koroner anjiyografi uygulanan bireylerin belirsizliğe tahammülsüzlük düzeylerini belirlemek, anksiyete ve depresyon ile olan ilişkisini incelemek ve belirsizliğe tahammülsüzlüğün anksiyete ve depresyon için bir yordayıcı olup olmadığını ortaya koymak amacıyla gerçekleştirildi. Elde edilen bulguların hemşirelik bakımında belirsizlikle başa çıkma becerilerini güçlendirmeye yönelik müdahalelerin geliştirilmesine, emosyonel iyilik halinin desteklenmesine ve bireylerin yaşam kalitesinin artırılmasına rehberlik etmesi beklenmektedir.

ANA NOKTALAR

- Koroner anjiyografi uygulanan bireylerde belirsizliğe tahammülsüzlük düzeyi yüksek olup BTÖ-12 puan ortalaması 43,10±8,63'tür.
- Çalışmada kullanılan HADS eşik değerlerine göre katılımcıların %44,4'ünde anksiyete, %60'ında depresyon belirtileri saptanmıştır.
- BTÖ-12 puanındaki her bir puanlık artış, anksiyete (OR=1,192) ve depresyon (OR=1,074) görülme odds'unda artışla ilişkili bulunmuştur.
- İleri yaş hem anksiyete hem de depresyonla bağımsız olarak ilişkiliyken erkek cinsiyet daha düşük anksiyete odds'u ile ilişkili bulunmuştur.
- Bulgular, koroner anjiyografi uygulanan bireylerin hemşirelik bakımında belirsizliğe tahammülsüzlüğün ve psikolojik sıkıntının değerlendirilmesini desteklemektedir.

Araştırma Soruları

1. Koroner anjiyografi uygulanan bireylerin belirsizliğe tahammülsüzlük düzeyi nasıldır?
2. Koroner anjiyografi uygulanan bireylerin anksiyete düzeyi nasıldır?
3. Koroner anjiyografi uygulanan bireylerin depresyon düzeyi nasıldır?
4. Koroner anjiyografi uygulanan bireylerin belirsizliğe tahammülsüzlük düzeyi anksiyeteyi anlamlı şekilde yordamakta mıdır?
5. Koroner anjiyografi uygulanan bireylerin belirsizliğe tahammülsüzlük düzeyi depresyonu anlamlı şekilde yordamakta mıdır?

Gereç ve Yöntem

Araştırmanın Tasarımı

Bu araştırma, tanımlayıcı ve kesitsel olarak Kasım 2024-Mayıs 2025 tarihleri arasında Türkiye'nin batısındaki bir eğitim ve araştırma hastanesinde koroner anjiyografi uygulanan ve kardiyoloji kliniğinde yatan bireyler üzerinde gerçekleştirildi.

Evren ve Örneklem

Araştırmanın evrenini, ilgili hastanede koroner anjiyografi uygulanan ve kardiyoloji kliniğinde yatan bireyler oluşturdu. Çalışmada, dahil edilme kriterlerini karşılayan ve veri toplama döneminde araştırmaya katılmayı kabul eden uygun bireylerin ardışık olarak seçilmesi nedeniyle kolayda örnekleme yöntemi kullanıldı. Bu kapsamda Kasım 2024-Mayıs 2025 tarihleri arasında ulaşılan 215 bireyden, dahil edilme ve hariç tutulma kriterlerine uyan 160 birey araştırmaya dahil edildi.

Dahil edilme kriterleri; (a) 18 yaş ve üzeri olmak, (b) bilincinin açık olması ve (c) Türkçe sözel iletişim kurabilmek şeklinde belirlendi. Dışlanma kriterleri ise; (e) tanı almış psikiyatrik hastalığının bulunması ve (f) çalışmaya katılmayı kabul etmemek olarak tanımlandı.

Çalışmanın örneklem büyüklüğünün yeterliliği için post-hoc güç analizi yapıldı. Anksiyete varlığı bağımlı değişken olarak ele alındı

ve yapılan lojistik regresyon analizinde modelin Nagelkerke R^2 değeri 0,426 olarak hesaplandı. Cohen'in etki büyüklüğüne göre (yaklaşık $f^2 = 0,74$), n = 160 ve $\alpha = 0,05$ için yapılan post-hoc güç analizinde G*Power 3.1.9.2 programı kullanılarak istatistiksel gücün (1−β) %99'un üzerinde olduğu belirlendi.

Veri Toplama Araçları

Birey Tanılama Formu: Araştırmacılar tarafından literatür doğrultusunda oluşturuldu. Sosyodemografik özellikleri (yaş, cinsiyet, eğitim durumu, medeni durum, çalışma durumu, algılanan gelir durumu) kapsayan altı; sağlık/hastalık durumuna ilişkin özellikleri (sigara alışkanlığı, anjiyografi geçirme durumu, anjiyografi sayısı, hastaneye başvuru şekli, anjiyografi hakkında bilgi alma durumu, ailede KAH tanısı almış birey durumu) kapsayan sekiz soru olmak üzere toplam 14 sorudan oluşmaktadır.

Belirsizliğe Tahammülsüzlük Ölçeği (BTÖ-12): BTÖ-12, Buhr ve Dugas[7] tarafından 27 maddelik bir ölçek olarak geliştirilmiş olup Carleton ve arkadaşları[13] tarafından 12 maddelik kısa forma dönüştürülmüştür. Ölçeğin Türkçe geçerlilik ve güvenilirliği Sarıçam ve arkadaşları[14] tarafından yapıldı. Ölçek beşli likert tipi olup iki alt boyutu bulunmaktadır. Ölçekten alınabilecek en düşük puan 12, en yüksek puan 60'tır. Puanın yüksek olması belirsizliğe tahammülsüzlük düzeyinin "yüksek" olduğunu göstermektedir. Ölçeğin Cronbach alfa değeri 0,88'dir.[14] Bu çalışmada ise Cronbach alfa değeri 0,860 olarak bulundu.

Hastane Anksiyete ve Depresyon Skalası (HADS): Hastada anksiyete ve depresyon yönünden riski belirlemek, düzeyini ve şiddet değişimini ölçmek amacıyla Zigmond ve Snaith (1983) tarafından geliştirilen, dörtlü likert tipi bir ölçektir.[15] Formun Türkçe geçerlilik ve güvenilirliği Aydemir ve arkadaşları[16] tarafından yapılmış, ölçeğin bedensel hastalığı olanlarda depresyon ve anksiyete belirtilerini tarama açısından güvenli olduğu belirlenmiştir. Anksiyete (HADS-A) ve depresyon (HADS-D) olmak üzere iki alt ölçekten oluşmaktadır. Türkiye'de yapılan geçerlilik ve güvenilirlik çalışmasında anksiyete alt ölçeği için kesme puanı 10/11, depresyon alt ölçeği için ise 7/8 bulunmuştur.[16] Buna göre bu puanların üzerinde alanlar risk altında olarak değerlendirilir. Hastaların her iki alt ölçekten alabilecekleri en düşük puan 0, en yüksek puan 21'dir.[16] Ölçeğin geçerlilik ve güvenilirlik çalışmasında Cronbach alfa değeri anksiyete alt boyutu için 0,852, depresyon alt boyutu için 0,778 olarak bildirilirken bu çalışmada Cronbach alfa değeri anksiyete alt boyutu için 0,796, depresyon alt boyutu için 0,766 olarak bulundu.[16]

Veri Toplama Süreci

Veriler, katılımcılardan koroner anjiyografi işlemi uygulandıktan sonra, gün içinde (kendini iyi hissettikten sonra) yardımcı araştırmacılar tarafından yüz yüze görüşme yöntemiyle toplandı. Her bir görüşme yaklaşık 10-15 dakika sürdü ve sessiz, uygun bir ortamda gerçekleştirildi. Katılımcıların gizliliği korundu, veriler yalnızca araştırma amacıyla kullanıldı.

Etik İlkeler

Araştırma için Bandırma Onyedi Eylül Üniversitesi Sağlık Bilimleri Girişimsel Olmayan Araştırmalar Etik Kurulu'ndan etik kurul onayı alınmıştır (Onay Numarası: 835, Tarih: 13.06.2024). Etik kurul onayının ardından Balıkesir İl Sağlık Müdürlüğü Bandırma Eğitim ve Araştırma Hastanesi Eğitim ve Planlama Kurulu'ndan alınmıştır (Evrak Sayısı: E-44767171-770-254958970, Tarih: 26.09.2024). Katılımcılara araştırmanın amacı hakkında bilgi verildi, gönüllü olduklarını belirten yazılı onamları alındı. Çalışma Helsinki Bildirgesi ilkelerine uygun olarak yürütüldü.

Verilerin Analizi

Verilerin analizi IBM SPSS 23 (IBM Corp., Armonk, New York, USA) kullanılarak yapıldı. Tanımlayıcı istatistikler sayı, yüzde, ortalama ve standart sapma değerleri verildi. Sürekli değişkenlerin normal dağılıma uygunluğu çarpıklık (skewness) ve basıklık (kurtosis) değerleri incelenerek değerlendirildi; bu değerlerin −1,500 ile +1,500 aralığında olması normal dağılım varsayımını sağladığı kabul edildi. Ayrıca normal dağılım varsayımı analitik yöntemlerle Kolmogorov-Smirnov ve Shapiro-Wilk testleri kullanılarak da kontrol edildi.

Anksiyete ve depresyon varlığı (var/yok) bağımlı değişken olarak ele alındı. Çalışmada regresyon öncesinde tek değişkenli analizler ile değişken elemesi yapılmadı; olası karıştırıcı etkilerin kontrol edilebilmesi ve değişkenlerin bağımsız katkılarının aynı model içerisinde değerlendirilebilmesi amacıyla katılımcıların sosyodemografik ve sağlığa/hastalığa ilişkin özellikleri ile BTÖ-12 puanları lojistik regresyon modeline birlikte dahil edildi. Modelin uyumu Hosmer-Lemeshow testi, açıklayıcılık düzeyi Nagelkerke R^2 ve etki büyüklüğü Odds Ratio (OR) ve %95 güven aralığı (GA) değerleriyle değerlendirildi. İstatistiksel anlamlılık düzeyi $P < 0,05$ olarak kabul edildi.

Bulgular

Katılımcıların tanıtıcı özellikleri

Katılımcıların yaş ortalaması 62,33 ± 11,01 olup yaş aralığı 35 ila 88 arasında değişmektedir. Bireylerin %56,9'u 65 yaşın altında, %51,2'si kadın, %76,9'u ilköğretim mezunu, %71,9'u evli, %43,1'i emekliyken %72,5'i gelirinin giderine eşit olduğunu bildirdi (Tablo 1).

Katılımcıların sağlık/hastalık durumuna ilişkin özellikleri incelendiğinde %49,4'ünün sigara kullanmadığı, %78,1'inin kronik hastalığa sahip olduğu, %56,3'ünün kardiyovasküler bir hastalığa sahip olduğu bulundu. Bireylerin %57,5'ine daha önce anjiyografi uygulandığı, %23,8'inin daha önce bir kez anjiyografi geçirdiği, %73,1'inin hastaneye poliklinikten başvurduğu, %73,8'inin anjiyografi hakkında bilgi sahibi olduğu ve %68,8'inin ailesinde KAH öyküsü bulunduğu belirlendi (Tablo 2).

Katılımcıların belirsizliğe tahammülsüzlük, anksiyete ve depresyon puanlarının dağılımı

Katılımcıların BTÖ-12 ölçeğinden aldıkları puan ortalaması 43,10 ± 8,63 olup 16 ile 60 arasında değişmektedir. Bireylerin HADS-A alt boyutundan aldıkları puan ortalaması 8,98 ± 4,34 iken %44,4'ünde anksiyete varlığı; HADS-D alt boyutundan aldıkları puan ortalaması 7,60 ± 3,34 iken %60'ında depresyon varlığı saptandı (Tablo 3).

Katılımcıların anksiyete varlığını yordayan faktörler

Yapılan lojistik regresyon analizine göre yaş grubu, cinsiyet ve BTÖ-12 toplam puanı anksiyete varlığının anlamlı yordayıcılarıdır ($P < 0,05$). Yaşlı bireylerde anksiyete görülme olasılığı gençlere

Tablo 1. Katılımcıların sosyodemografik özellikleri (n = 160)

Değişkenler	n	%
Yaş, x̄±SD(Min-Maks)	62,33 ± 11,01 (35-88)	
< 65 yaş		
≥ 65 yaş		56,9
91		43,1
69		
Cinsiyet		
Kadın	82	51,2
Erkek	78	48,8
Eğitim düzeyi		
Okuryazar	0	0,0
İlköğretim	123	76,9
Lise	37	23,1
Üniversite ve üzeri	0	0,0
Medeni durum		
Evli	115	71,9
Bekar	45	28,1
Çalışma durumu		
Çalışıyor	27	16,9
Çalışmıyor	64	40,0
Emekli	69	43,1
Gelir düzeyi		
Gelir giderden fazla	17	10,6
Gelir gidere eşit	116	72,5
Gelir giderden düşük	27	16,9
Toplam	160	100,0

Tablo 2. Katılımcıların sağlık/hastalık durumuna ilişkin özellikleri (n = 160)

Değişkenler	n	%
Sigara alışkanlığı		
Kullanıyor	53	33,1
Kullanmıyor	79	49,4
Bırakmış	28	17,5
Kronik hastalık varlığı		
Var	125	78,1
Yok	35	21,9
Sahip olunan kronik hastalıklar* (n = 125)		
Kardiyovasküler hastalık	90	56,3
Diyabet	61	38,1
Solunum hastalığı	37	23,1
Nörolojik hastalık	13	8,1
Böbrek yetmezliği	3	1,9
Diğer	5	3,1
Geçirilmiş anjiyografi varlığı		
Yok	68	42,5
Var	92	57,5
Geçirilmiş anjiyografi sayısı (n = 92)		
Bir kez	38	23,8
İki kez	32	20,0
Üç kez	15	9,4
Dört kez	6	3,8
Beş kez	1	0,6
Hastaneye başvuru şekli		
Poliklinik	117	73,1
Acil	43	26,9
Anjiyografi hakkında bilgi sahibi olma		
Evet	118	73,8
Hayır	42	26,2
Ailede KAH öyküsü varlığı		
Var	110	68,8
Yok	50	31,2
Toplam	160	100,0

KAH, Koroner arter hastalığı.

göre daha yüksektir (OR = 5,508; %95 GA = 2,187-13,872). Erkek cinsiyet, anksiyete varlığı ile negatif yönde ilişkili bulundu (OR =0 ,320; %95 GA = 0,130-0,792). BTÖ-12 toplam puanındaki her bir birimlik artış, anksiyete varlığı olasılığını artırmaktadır (OR = 1,192; %95 GA = 1,113-1,277). Modelin veriye uyumunun iyi olduğu ve anksiyete varlığını açıklamada anlamlı olduğu belirlendi (Hosmer-Lemeshow P = 0,758; Nagelkerke R^2 = 0,426) (Tablo 4).

Katılımcıların depresyon varlığını yordayan faktörler

Yapılan lojistik regresyon analizine göre yaş grubu ve BTÖ-12 toplam puanı depresyon varlığının anlamlı yordayıcılarıdır (P < 0,05). Yaşlı bireylerde depresyon görülme olasılığı gençlere göre daha yüksektir (OR = 3,100; %95 GA = 1,376-6,981). Ayrıca BTÖ-12 toplam puanındaki her bir birimlik artış, depresyon varlığı olasılığını artırmaktadır (OR = 1,074; %95 GA = 1,025-1,124). Modelin veriye uyumunun iyi olduğu ve depresyon varlığını açıklamada anlamlı olduğu belirlendi (Hosmer-Lemeshow P = 0,449; Nagelkerke R^2 = 0,185) (Tablo 5).

Tartışma

Bu çalışma, koroner anjiyografi uygulanan bireylerde belirsizliğe tahammülsüzlük düzeyi ile anksiyete ve depresyon arasındaki ilişkiyi incelemek amacıyla yapıldı. Çalışmayı oluşturan bireylerin genel olarak sosyodemografik açıdan benzer özellikler gösterdiği ve kronik hastalık yüklerinin fazla olduğu görüldü. Katılımcıların eğitim düzeylerinin çoğunlukla ilköğretim olması, büyük bölümünün evli ve emekli bireylerden oluşması ve yaygın biçimde kronik hastalığa sahip olmaları, koroner anjiyografi uygulanan hasta profiline ilişkin olarak daha önce ülkemizde yapılan çalışmalarla benzerlik göstermektedir ve literatürü desteklemektedir.[5,12,17]

Koroner anjiyografi, koroner arterlerin anatomik yapısını ve darlık derecelerini doğrudan görüntülemeyi sağlayan, KAH'ın tanı ve tedavi planlamasında altın standart olarak kabul edilen invaziv bir girişimdir.[2,3] Bu çalışma kapsamında elde edilen bulgulara göre katılımcıların yarısından fazlasına daha önce anjiyografi

Tablo 3. Katılımcıların Belirsizliğe Tahammülsüzlük Ölçeği ile Hastane Anksiyete ve Depresyon Skalasından aldıkları puanların dağılımı

Ölçekler	X̄ ±SD(En düşük-En yüksek)
BTÖ-12	43,10±8,63 (16-60)
HADS-A	8,98±4,34 (0-20)
Anksiyete riski, n (%)	
Var (≥ 10 p)	71 (44,4)
Yok (< 10 p)	89 (55,6)
HADS-D	7,60±3,34 (1-18)
Depresyon riski, n (%)	
Var (≥ 7 p)	96 (60,0)
Yok (< 7 p)	64 (40,0)

SS, Standart sapma; BTÖ-12, Belirsizliğe Tahammülsüzlük Ölçeği; HADS-A, Hastane Anksiyete ve Depresyon Skalası-Anksiyete; HADS-D, Hastane Anksiyete ve Depresyon Skalası-Depresyon.

uygulanmış, çoğunluğunun hastaneye poliklinikten başvurduğu ve anjiyografi hakkında bilgi sahibi olduğu belirlenmiştir. Ayrıca bireylerin önemli bir kısmının ailesinde KAH öyküsünün bulunması, kardiyak risk farkındalığının yüksek olabileceğini ancak buna rağmen belirsizlik ve kaygı düzeylerinin devam ettiğini düşündürmektedir. Bu bağlamda bu çalışmada katılımcıların BTÖ-12 puan ortalamasının yüksek düzeyde bulunması, belirsizliğe tahammülsüzlük düzeyinin koroner anjiyografi uygulanan bireylerde belirgin olduğunu göstermektedir. Literatürde koroner anjiyografi uygulanan bireylerin belirsizliğe tahammülsüzlük düzeyini inceleyen başka bir çalışmaya rastlanmamasına karşın Ozan ve arkadaşlarının[18] çalışmasında ağırlıklı olarak hipertansiyon tanısı olan kronik hastalığa sahip bireylerden oluşan grupta BTÖ-12 puan ortalaması 37,25; komorbiditesi bulunan yaşlı bireylerde yapılmış başka bir çalışmada (2025) ise BTÖ-12 puan ortalaması 35,58 olarak bildirilmiştir.[19] Bu bağlamda özellikle tanı ve tedavi planlamasında altın standart olarak kabul edilen invaziv bir girişim olan koroner anjiyografinin uygulandığı bireylerde belirsizliğe tahammülsüzlük düzeyinin

Tablo 4. Katılımcıların anksiyete varlığını yordayan faktörler

Değişken	B	Exp(B)	%95 GA	SH	Wald	P
Yaş grubu (ref. genç)						
Yaşlı	1,706	5,508	2,187, 13,872	0,471	13,108	***< 0,001***
Cinsiyet (ref. kadın)						
Erkek	-1,138	0,320	0,130, 0,792	0,461	6,083	***0,014***
Eğitim düzeyi (ref. ilköğretim)						
Lise	0,765	2,150	0,724, 6,386	0,556	1,897	0,168
Medeni durum (ref. evli)						
Bekar	-0,345	0,708	0,283, 1,770	0,467	0,545	0,461
Çalışma durumu (ref. emekli)						
Çalışıyor	-0,165	0,848	0,246, 2,924	0,631	0,068	0,794
Çalışmıyor	-0,456	0,634	0,249, 1,614	0,477	0,915	0,339
Algılanan gelir düzeyi (ref. kötü)						
İyi	-0,032	0,968	0,182, 5,138	0,852	0,001	0,970
Orta	-0,467	0,627	0,187, 2,107	0,618	0,569	0,450
Sigara alışkanlığı (ref. kullanmıyor)						
Kullanıyor	-0,382	0,683	0,196, 2,374	0,636	0,361	0,548
Bırakmış	-0,034	0,967	0,298, 3,135	0,600	0,003	0,955
Kronik hastalık (ref. yok)						
Var	0,650	1,916	0,651, 5,639	0,551	1,393	0,238
Anjiyografi sayısı	0,054	0,948	0,649, 1,383	0,193	0,078	0,780
Başvuru şekli (ref. acil)						
Poliklinik	0,096	1,101	0,425, 2,853	0,486	0,039	0,844
Anjiyo bilgisi (ref. yok)						
Var	0,145	1,156	0,453, 2,952	0,478	0,092	0,762
Ailede KAH tanısı (ref. yok)						
Var	0,056	1,058	0,413, 2,710	0,480	0,014	0,907
BTÖ-12	0,175	1,192	1,113, 1,277	0,035	25,021	***< 0,001***
Sabit	-8,185	0,000		1,855	19,472	***< 0,001***
Hosmer-Lemeshow χ^2 = 4,995; sd = 8; P = 0,758; Cox & Snell R^2 = 0,318; Nagelkerke R^2 = 0,426; −2 Log Likelihood = 158,477						

BTÖ-12, Belirsizliğe Tahammülsüzlük Ölçeği; KAH, Koroner arter hastalığı; B, Bağımsız değişkenin katsayısı; GA, Güven aralığı; SH, Standart hata; Wald, Değişkenin modele katkısının anlamlılığını test eden istatistik değeri; Exp(B), Katsayının olasılık oranı.

Tablo 5. Katılımcıların depresyon varlığını yordayan faktörler

Değişken	B	Exp(B)	%95 GA	SH	Wald	P
Yaş grubu (ref. genç)						
Yaşlı	1,131	3,100	1,376, 6,981	0,414	7,460	***0,006***
Cinsiyet (ref. kadın)						
Erkek	0,017	1,017	0,463, 2,235	0,402	0,002	0,967
Eğitim düzeyi (ref. ilköğretim)						
Lise	0,100	1,105	0,436, 2,802	0,475	0,044	0,833
Medeni durum (ref. evli)						
Bekar	-0,725	0,484	0,213, 1,099	0,418	3,007	0,083
Çalışma durumu (ref. emekli)						
Çalışıyor	0,687	1,987	0,675, 5,850	0,551	1,553	0,213
Çalışmıyor	0,721	2,057	0,888, 4,765	0,429	2,828	0,093
Algılanan gelir düzeyi (ref. kötü)						
İyi	-0,632	0,531	0,128, 2,212	0,728	0,755	0,385
Orta	0,145	1,156	0,431, 3,103	0,504	0,083	0,774
Sigara alışkanlığı (ref. kullanmıyor)						
Kullanıyor	-0,184	0,832	0,263, 2,629	0,587	0,098	0,754
Bırakmış	-0,281	0,755	0,255, 2,237	0,554	0,257	0,612
Kronik hastalık (ref. yok)						
Var	-0,139	0,870	0,342, 2,215	0,477	0,085	0,771
Anjiyografi sayısı	-0,178	0,837	0,596, 1,176	0,174	1,049	0,306
Başvuru şekli (ref. acil)						
Poliklinik	-0,151	0,859	0,373, 1,982	0,426	0,126	0,722
Anjiyo bilgisi (ref. yok)						
Var	0,043	1,044	0,458, 2,381	0,421	0,010	0,919
Ailede KAH tanısı (ref. yok)						
Var	-0,251	0,778	0,337, 1,794	0,426	0,347	0,556
BTÖ-12	0,071	1,074	1,025, 1,124	0,024	9,108	***0,003***
Sabit	-2,602	0,074		1,297	4,021	***0,045***
Hosmer-Lemeshow χ^2 = 7,842; sd = 8; P = 0,449, Cox & Snell R^2 = 0,137; Nagelkerke R^2 = 0,185; −2 Log Likelihood = 191,797						

BTÖ-12, Belirsizliğe Tahammülsüzlük Ölçeği; KAH, Koroner arter hastalığı; B, Bağımsız değişkenin katsayısı; GA, Güven aralığı; SH, Standart hata; Wald, Değişkenin modele katkısının anlamlılığını test eden istatistik değeri; Exp(B), Katsayının olasılık oranı.

yüksek olması beklenen bir durumdur. Koroner anjiyografi sırasında girişimin sonucuna ilişkin belirsizlik ve olası tanı ve tedavi kararlarının (stent takılması, ilaç tedavisi ya da cerrahi önerisi gibi) öngörülemezliğiyle karşı karşıya kalınması bireylerde kontrol kaybı hissini artırmış ve geleceğe yönelik tehdit algısını güçlendirmiş olabilir.[4] Ayrıca bu bulgular, işlemin doğası gereği, koroner anjiyografinin bireylerde hem fiziksel hem de psikolojik stres yaratmasıyla açıklanabilir.

Çalışmaya katılan bireylerin HADS-A alt boyutundan aldıkları puan ortalamasının 8,98 ± 4,34 olması ve katılımcıların yaklaşık yarısında anksiyete varlığının saptanması, koroner anjiyografi uygulanan bireylerde psikolojik stresin oldukça yaygın olduğunu göstermektedir. Benzer şekilde depresyon alt boyutundan elde edilen 7,60 ± 3,34 puan ortalaması ve katılımcıların yarısından fazlasında depresyon varlığı tespit edilmesi, bu bireylerde depresif belirtilerin de önemli bir klinik sorun olduğunu ortaya koymaktadır. Bu bulgular, KAH sürecinde psikolojik yükün yüksek olduğunu ve özellikle tanı ve tedavi dönemlerinde duygusal tepkilerin yoğunlaştığını göstermektedir. Gu ve arkadaşları[20] kardiyovasküler hastalarda anksiyete ve depresyon oranlarının yüksek olduğunu, bu durumun tedaviye uyumu ve yaşam kalitesini olumsuz etkilediğini bildirmiştir.[20] Polikandrioti ve Olympios[21] ise koroner anjiyografi öncesi dönemde hastaların yarısından fazlasında klinik düzeyde anksiyete saptandığını, işlemin invaziv doğası ve sonuçlara ilişkin belirsizliğin bu durumu tetiklediğini belirtmiştir. Palandacic ve arkadaşları[2] da benzer biçimde, koroner anjiyografinin tanısal önemine karşın sonuçlarının öngörülemezliği nedeniyle bireylerde yoğun emosyonel stres yarattığını ifade etmiştir. Bu bulgular, bu çalışmada gözlenen yüksek anksiyete oranlarıyla paralellik göstermektedir. Ayrıca katılımcıların depresyon düzeylerinin yüksek bulunması da literatürle uyumludur.[3,22] Marin ve arkadaşları,[22] KAH tanısı alan bireylerde depresyonun

sık görüldüğünü ve bu durumun hastalığın prognozunun yanı sıra tedaviye uyumu olumsuz etkilediğini vurgulamıştır. Benzer biçimde Gallagher ve arkadaşları,[3] koroner arter hastalarında belirsizlik ve kontrol kaybı hissinin depresif belirtilerin artmasında önemli bir etken olduğunu bildirmiştir. Bu çalışmada depresyonun anksiyeteden daha yaygın görülmesi, bireylerin yalnızca işlem süreciyle ilgili kısa süreli kaygı değil, aynı zamanda hastalığın sonuçlarına ve yaşam biçimi değişikliklerine ilişkin daha derin bir duygusal yük yaşadıklarını düşündürmektedir.

Bu çalışmanın temel amacı göz önüne alındığında koroner anjiyografi uygulanan bireylerde belirsizliğe tahammülsüzlük puanlarının hem anksiyete hem de depresyon varlığının pozitif bir yordayıcısı olduğu görülmüş ve anksiyete ve depresyon varlığı bulunan bireylerin belirsizliğe tahammülsüzlük düzeylerinin anlamlı şekilde daha yüksek olduğu tespit edilmiştir. Aşut ve arkadaşlarının[23] 113 kanser hastasını dahil ettikleri ve aynı değerlendirme araçlarını kullandıkları çalışmada da BTÖ-12 ile anksiyete arasında orta, depresyon ile arasında düşük düzeyde pozitif ilişki olduğu; BTÖ-12 puanındaki her bir birimlik artışın anksiyete gelişme riskini yaklaşık %8,7, depresyon gelişme riskini ise %5,5 artırdığı bildirilmiştir. Bu çalışmada ise BTÖ-12 toplam puanındaki her bir birim artışın anksiyete olasılığını yaklaşık %19, depresyon olasılığını ise %7 artırdığı bulunmuştur. Her iki değişken için pozitif bir yordayıcı olan belirsizliğe tahammülsüzlüğün depresyona nazaran anksiyetede daha çok etkisi olduğu dikkat çekmektedir. Kuramsal açıdan incelendiğinde belirsizliğe tahammülsüzlük, bireyin geleceğe yönelik öngörülemez durumları tehdit edici algılaması ve bu durumlara karşı aşırı bilişsel ve duygusal tepki vermesiyle ilişkilidir ve anksiyetenin temel bileşenleri olan endişe, tetikte olma ve sürekli olumsuz beklenti ile doğrudan örtüşmektedir. Buna karşın depresyon daha çok çaresizlik, umutsuzluk ve geri çekilme gibi süreçlerle ilişkili olup, belirsizlik algısından ziyade uzun süreli duygusal yüklenmelerle şekillenmektedir.[8,9]

Bu çalışmada sonucunda koroner anjiyografi uygulanan bireylerden elde edilen bu sonucun Mishel'in Hastalıkta Belirsizlik Kuramı açısından da anlamlı olduğu söylenebilir. Öyle ki kurama göre bireyler, hastalık sürecinde yeterli bilgiye sahip olmadıklarında ve geleceğe ilişkin öngörü geliştiremediklerinde yüksek düzeyde belirsizlik yaşamakta ve bu durum bilişsel kararsızlık ve emosyonel sıkıntıyla sonuçlanmaktadır.[6] Koroner anjiyografi süreci, tanısal ve prognostik açıdan önemli olmakla birlikte, sonuçlarının öngörülemezliği nedeniyle bireyde kontrol kaybı hissi yaratabilmektedir. Bu nedenle bu çalışmadaki belirsizliğe tahammülsüzlüğün yüksek olduğu bireylerde anksiyete ve depresyon düzeylerinin de artması hem kuramsal hem de klinik olarak beklenen bir bulgudur. Gu ve arkadaşları, [20] kardiyovasküler hastalarda yüksek belirsizlik algısının tedaviye uyumu azalttığını ve psikolojik iyilik halini olumsuz etkilediğini belirtmiştir. Gallagher ve arkadaşları[3] tarafından yapılan araştırma, kardiyak hastalarda belirsizliğin yalnızca psikolojik değil, aynı zamanda fizyolojik sonuçları da olduğu; yüksek belirsizlik algısının tedaviye uyumu düşürdüğü ve yaşam kalitesini olumsuz etkilediği belirtilmiştir. Polikandrioti ve Olympios[21] ise kardiyak girişim öncesi dönemde hastaların belirsizlikle ilişkili stres yaşadıklarını, bu durumun kalp hızı, kan basıncı ve kortizol düzeyleri üzerinde doğrudan etkili olduğunu bildirmiştir.

Belirsizliğe tahammülsüzlüğün yanı sıra koroner anjiyografi uygulanan bireylerde anksiyete ve depresyon varlığını yordayan diğer önemli değişkenin yaş olduğu görülmüştür. Bulgulara göre, yaşlı bireylerde anksiyete görülme olasılığı genç bireylere göre 5,5 kat, depresyon görülme olasılığı ise yaklaşık 3,1 kat daha fazladır. Bu sonuç, yaşın koroner anjiyografi sürecinde psikolojik tepkiler üzerinde belirleyici bir rol oynadığını göstermektedir. Yaşlı bireylerin anksiyete ve depresyona daha yatkın olmasının birçok olası nedeni bulunmaktadır. Öncelikle yaş ilerledikçe bireylerin biyopsikososyal dayanıklılığı azalmakta, fiziksel hastalıkların eşlik etmesiyle birlikte stresle baş etme becerileri zayıflamaktadır.[18,20] Bu durum, koroner anjiyografi gibi yaşamı doğrudan ilgilendiren tıbbi girişimlerde belirsizlik ve kaygı düzeylerini artırabilmektedir. Gallagher ve arkadaşları,[3] yaşlı kardiyak hastalarda geleceğe dair kontrol algısının daha düşük, kaygı ve umutsuzluk duygularının ise daha yüksek olduğunu belirtmiştir. Benzer şekilde Polikandrioti ve Olympios,[21] ileri yaş grubundaki hastalarda koroner girişim öncesi dönemde anlamlı düzeyde anksiyete ve depresyon görüldüğünü bildirmiştir.[21] Ayrıca yaşlı bireylerde belirsizlik toleransının azalması, anksiyete ve depresyonu güçlendiren bir başka faktör olabilir. Deschênes ve arkadaşları[24] ile Yığman ve Fidan,[11] yaşın ilerlemesiyle birlikte bireylerin belirsizliğe karşı daha az tolerans gösterdiğini, bunun da sağlıkla ilişkili tehditleri daha yoğun algılamalarına neden olduğunu vurgulamışlardır. Ayrıca bu bulgular Mishel'in Hastalıkta Belirsizlik Kuramı açısından da anlamlıdır. Kurama göre yaş, bireyin bilgi işleme kapasitesini ve belirsizliği yeniden anlamlandırma becerisini etkileyen önemli bir faktördür.[6] Yaşlı bireyler genellikle bilişsel esnekliklerinin azaldığı, hastalığa ilişkin deneyimlerinin geçmiş olumsuz yaşantılarla şekillendiği bir dönemdedir ve bu durum, belirsizliğe yönelik tehdit algısını artırarak emosyonel sıkıntıyı derinleştirebilir. Ayrıca Karakuşlu ve Öztürk[12] ve Holdgaard,[25] kardiyak hastalarda yaşlı bireylerin belirsizlikle baş etmede daha fazla desteğe gereksinim duyduklarını, bilgilendirme ve psikososyal destek sağlanmadığında anksiyete ve depresyon düzeylerinin yükseldiğini bildirmiştir. Bu bağlamda bu çalışmadan elde edilen bulgular, yaşlı hastalarda psikososyal bakımın önceliklendirilmesi gerektiğini göstermektedir.

Bu çalışmada ayrıca cinsiyet değişkeni incelendiğinde erkeklerin anksiyete yaşama olasılığının kadınlara göre yaklaşık %68 daha düşük olduğu, ancak depresyon açısından anlamlı bir fark bulunmadığı belirlenmiştir. Bu sonuç, koroner anjiyografi uygulanan bireylerde cinsiyetin özellikle anksiyete düzeyi üzerinde belirleyici bir etken olduğunu göstermektedir. Literatür incelendiğinde bu çalışmanın sonuçlarıyla paralel olarak Polikandrioti ve Olympios,[21] kadın hastaların kardiyak girişim öncesi dönemde daha yoğun anksiyete yaşadıklarını, bu durumun özellikle hastalık ve girişimle ilgili belirsizlik, kontrol kaybı hissi ve ağrı beklentisiyle ilişkili olduğunu belirtmişlerdir.[21] Benzer biçimde Gu ve arkadaşları,[20] kadın kardiyak hastaların erkeklere oranla hem emosyonel hem de bilişsel stres belirtilerini daha yüksek düzeyde bildirdiğini göstermiştir.[20] Gallagher ve arkadaşları[3] da kadınların kalp hastalığını erkeklere göre daha tehdit edici algıladıklarını ve bu nedenle kaygı düzeylerinin daha yüksek olduğunu bildirmiştir.[3]

Bu çalışmadan elde edilen bulgular doğrultusunda koroner anjiyografi uygulanan bireylerin hemşirelik bakım sürecinde belirsizliğe tahammülsüzlük düzeylerinin değerlendirilmesi ve belirsizlikle başa çıkma becerilerinin güçlendirilmesine

yönelik girişimlerin planlanması, bireylerin emosyonel iyilik halinin artırılmasına önemli katkı sağlayabilir. Belirsizliğe tahammülsüzlük düzeyinin yüksek olduğu durumlarda hastaların anksiyete ve depresyon düzeylerinin de artması, bireylerin tedaviye uyum ve iyileşme sürecini olumsuz yönde etkileyebilir. Bu kapsamda hemşirelik uygulamalarında bireylerin bilişsel ve emosyonel gereksinimlerini dikkate alan, psikososyal ve destekleyici müdahalelerin kullanılması önerilmektedir. Nitekim Yıldırım ve Oğuz,[26] perkütan koroner girişim uygulanan bireylerde gerçekleştirilen müzik terapisi müdahalesinin anksiyete düzeylerini anlamlı biçimde azalttığını bildirmiştir. Hemodiyaliz ve multipl skleroz hastalarına uygulanan konfor teorisi temelli hemşirelik bakımının da belirsizliğe tahammülsüzlük düzeylerini azalttığı ve konfor düzeylerini artırdığı bildirilmiştir.[27,28] Benzer şekilde Rahimi ve arkadaşları,[29] belirsizliğe tahammülsüzlüğe odaklanan grup müdahalesinin, multipl skleroz hastalarında psikolojik sıkıntı ve yaşam kalitesi üzerinde, bilişsel davranışçı terapi ve rutin bakımdan anlamlı şekilde daha etkili olduğunu bildirmiştir. Ayrıca genel anksiyete bozukluğu olan yetişkin bireylere uygulanan belirsizliğe tahammülsüzlük terapisinin de anksiyete ve depresyon düzeylerini anlamlı şekilde azaltırken yaşam kalitesinde fark olmadığını ortaya koymuştur.[30] Bu bilgiler ışığında belirsizliğe tahammülsüzlük terapisi, belirsizliğe tahammülsüzlüğe odaklanan grup müdahalesi ve konfor teorisi temelli hemşirelik bakımı gibi uygulamaların, koroner girişim sürecinde de emosyonel stresin ve belirsizliğe tahammülsüzlük düzeylerinin azaltılmasına yönelik etkisi olabileceği düşünülmektedir.

Bu bağlamda bu çalışmanın sonuçları, başta hemşireler olmak üzere tüm sağlık profesyonelleri için belirsizliğe tahammülsüzlüğü azaltmaya yönelik yapılandırılmış müdahalelerin klinik bakımın bir parçası haline getirilmesi gerektiğini ortaya koymaktadır. Böylece bireylerin yalnızca fiziksel değil, psikososyal gereksinimlerinin de karşılanması, koroner anjiyografi sürecinde emosyonel uyumun güçlendirilmesini ve yaşam kalitesinin artırılmasını destekleyebilir.

Araştırmanın Sınırlılıkları

Bu çalışmanın tek bir merkezde ve belirli bir zaman aralığında yürütülmüş olması nedeniyle sonuçların genellenebilirliği sınırlıdır. Ayrıca araştırmanın yalnızca koroner anjiyografi uygulanmış bireyler ile yapılması ve anjiyografi öncesi dönemdeki bireyleri kapsamaması, belirsizliğe tahammülsüzlük ile anksiyete ve depresyon arasındaki ilişkinin farklı klinik evrelerde değerlendirilmesine olanak sağlamamıştır.

Sonuç

Bu çalışma, koroner anjiyografi uygulanan bireylerde belirsizliğe tahammülsüzlük düzeyi ile anksiyete ve depresyon arasındaki ilişkiyi belirlemek amacıyla yürütülmüştür. Bulgular, bu bireylerin belirsizliğe tahammülsüzlük düzeylerinin yüksek, anksiyete ve depresyon oranlarının ise dikkat çekici düzeyde olduğunu göstermiştir. Lojistik regresyon analizi sonuçlarına göre, belirsizliğe tahammülsüzlük düzeyi hem anksiyete hem de depresyonun anlamlı bir yordayıcısıdır. Ayrıca yaş değişkeninin de her iki psikolojik belirti üzerinde etkili olduğu, yaşlı bireylerde anksiyete ve depresyon görülme olasılığının gençlere göre daha yüksek olduğu belirlenmiştir.

Bulgular, koroner anjiyografi sürecinin yalnızca biyolojik değil, aynı zamanda psikolojik belirsizlik ve stres unsurları içerdiğini ortaya koymaktadır. Belirsizliğe tahammülsüzlüğün yüksek olduğu bireylerde emosyonel sıkıntı düzeyinin artması, hemşirelik bakımında bu kavramın dikkate alınması gerektiğini göstermektedir ki koroner anjiyografi uygulanan bireylerde belirsizliğe tahammülsüzlüğün anksiyete ve depresyon üzerinde belirleyici bir rol oynadığı görülmüştür. Bu bağlamda hemşirelerin koroner anjiyografi öncesi dönemde bireylerin bilgi gereksinimlerini karşılayarak belirsizliği azaltacak iletişim ve eğitim stratejileri geliştirmeleri, psikososyal destek sağlamaları ve kaygı düzeyini azaltıcı girişimler planlamaları önerilmektedir. Belirsizlik yönetimine odaklanan, bireyin emosyonel iyilik halini destekleyen bütüncül hemşirelik bakım uygulamaları, bu bireylerde psikolojik uyumu ve genel yaşam kalitesini artırmada etkili olabilir.

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Whatsapp-Based Sleep Intervention for Patients with Heart Failure: Study Protocol For a Randomized Controlled Trial Based on the Transtheoretical Model

Kalp Yetersizliği Olan Hastalarda Whatsapp Tabanlı Uyku Müdahalesi: Transteoretik Model'e Dayalı Randomize Kontrollü Bir Çalışmanın Protokolü

ABSTRACT

Objective: Poor sleep quality is a prevalent yet often overlooked problem among patients with heart failure that negatively affects quality of life, symptom management, and overall health outcomes. Nursing interventions grounded in the Transtheoretical Model and delivered through accessible mobile messaging platforms such as WhatsApp may effectively support long-term behavioral change. This study aims to describe the rationale and methodology of the WhatSleeP-heart failure trial, which evaluates the effectiveness of a Transtheoretical Model–guided, WhatsApp-supported sleep intervention in improving sleep quality, sleep hygiene behaviors, and quality of life in patients with heart failure.

Method: This study is designed as a single-blind, two-arm randomized controlled trial. Eligible patients with heart failure will be randomly assigned to either an intervention group receiving a six-month, nurse-led, Transtheoretical Model–guided WhatsApp sleep program or a control group receiving usual care. The primary outcome is subjective sleep quality. Secondary outcomes include sleep hygiene and quality of life.

Results: Participant recruitment is ongoing, and data collection has not yet been completed. The intervention is expected to significantly improve sleep quality, sleep hygiene behaviors, and quality of life compared with usual care.

Conclusion: The WhatSleeP-heart failure protocol integrates behavioral theory with digital nursing practice and has the potential to provide a scalable, cost-effective approach to improving sleep-related outcomes and self-management in patients with heart failure.

Keywords: Heart failure, sleep quality, text messaging, transtheoretical model

ÖZET

Amaç: Kötü uyku kalitesi, kalp yetersizliği olan hastalarda yaşam kalitesini, semptom yönetimini ve genel sağlık sonuçlarını olumsuz etkileyen, yaygın ancak sıklıkla göz ardı edilen bir sorundur. Transteoretik Model'e dayanan ve WhatsApp gibi erişilebilir mobil mesajlaşma platformları aracılığıyla sunulan hemşirelik müdahaleleri, uzun vadeli davranış değişikliğini etkili bir şekilde destekleyebilir. Bu çalışma, kalp yetersizliği olan hastalarda uyku kalitesini, uyku hijyeni davranışlarını ve yaşam kalitesini iyileştirmede Transteoretik Model rehberliğinde yürütülen WhatsApp destekli bir uyku müdahalesinin etkinliğini değerlendiren WhatSleeP-heart failure çalışmasının gerekçesini ve yöntemini açıklamayı amaçlamaktadır.

Yöntem: Bu çalışma, tek kör, iki kollu, randomize kontrollü bir araştırma olarak tasarlanmıştır. Uygunluk kriterlerini karşılayan kalp yetersizliği hastaları, altı ay süren, hemşire liderliğinde ve Transteoretik Model rehberliğinde yürütülen WhatsApp uyku programını alacak müdahale grubuna veya rutin bakım alacak kontrol grubuna rastgele atanacaktır. Birincil sonuç ölçütü öznel uyku kalitesidir. İkincil sonuç ölçütleri uyku hijyeni ve yaşam kalitesidir.

Bulgular: Katılımcı alımı devam etmekte olup veri toplama süreci henüz tamamlanmamıştır. Müdahalenin rutin bakıma kıyasla uyku kalitesini, uyku hijyeni davranışlarını ve yaşam kalitesini anlamlı düzeyde iyileştirmesi beklenmektedir.

Sonuç: WhatSleeP-heart failure protokolü, davranış kuramını dijital hemşirelik uygulamalarıyla bütünleştirmekte ve kalp yetersizliği olan hastalarda uykuyla ilişkili sonuçları ve öz yönetimi iyileştirmek için ölçeklenebilir, maliyet etkin bir yaklaşım sunma potansiyeli taşımaktadır.

Anahtar Kelimeler: Kalp yetersizliği, uyku kalitesi, metin mesajlaşması, transteoretik model

ORIGINAL ARTICLE
KLİNİK ÇALIŞMA

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Introduction

Heart failure (HF) is a chronic condition characterized by the heart's inability to pump sufficient blood, resulting in physical symptoms and psychological burdens that reduce patients' quality of life.[1] Among the common problems affecting individuals with HF, poor sleep quality is one of the most overlooked yet consequential.[2,3] Although sleep hygiene behaviors are known to improve sleep quality, long-term adherence among patients with HF remains challenging because of lifestyle constraints and insufficient behavioral support.[2,4]

Sleep hygiene encompasses a range of behavioral and environmental practices that promote healthy sleep, including maintaining a regular sleep–wake schedule, limiting caffeine intake, reducing screen exposure before bedtime, creating a comfortable sleep environment, and following consistent bedtime routines.[5,6] These behaviors may be particularly relevant for patients with HF, whose sleep can be disrupted by disease-related symptoms and lifestyle factors.[7] Adopting and maintaining healthy sleep hygiene behaviors may improve sleep quality by reducing behavioral and environmental factors that interfere with sleep. Evidence from patients with HF suggests that nursing interventions incorporating sleep hygiene education and supportive care can improve sleep quality and reduce daytime sleepiness.[8] Poor sleep quality in patients with HF is also associated with impaired functioning and lower quality of life, suggesting that improved sleep may contribute to better overall well-being and quality of life.[7] Evidence-based, nurse-led self-care interventions have likewise been shown to improve quality of life and reduce symptom burden in this population.[9]

The Transtheoretical Model (TTM) provides a structured framework that conceptualizes behavior change as a progressive process comprising the stages of precontemplation, contemplation, preparation, action, and maintenance.[10] For nurses, the TTM offers an evidence-based framework for assessing patients' readiness for change and tailoring interventions accordingly. However, the application of the TTM to behavior change interventions among patients with HF remains limited.[11] Sleep hygiene may be particularly suitable for a stage-based approach because it encompasses multiple modifiable behavioral and environmental practices that individuals may adopt and maintain to varying degrees.[5] Individuals may therefore differ in their readiness to adopt and maintain recommended sleep hygiene behaviors, making stage-matched behavioral support particularly relevant.[10] In the present intervention, individualized education increases awareness and readiness for behavior change, participants who reach the preparation stage transition to the WhatsApp-based telehealth intervention, and messages and video content delivered progressively support their movement through the action and maintenance stages. Thus, the TTM aligns behavioral support with participants' readiness for change rather than delivering the same intervention uniformly across stages.

Digital health tools, particularly mobile messaging applications such as WhatsApp, offer a practical approach to delivering behavioral interventions.[12] With its widespread use, low cost, and capacity for direct communication, WhatsApp can facilitate the delivery of health education to large populations and serve as a platform for patient follow-up.[13] Several studies have demonstrated that WhatsApp-based interventions can support self-management in patients with HF and improve adherence to lifestyle recommendations.[14,15]

MAIN POINTS

- WhatSleeP-HF is a randomized controlled trial evaluating a nurse-led, WhatsApp-based sleep intervention for patients with heart failure.
- The intervention uses the Transtheoretical Model to tailor education and behavioral support to participants' readiness for change.
- The six-month program combines educational sessions, sleep hygiene messages, and video content to support sustained behavioral change.
- The primary outcome is subjective sleep quality; secondary outcomes are sleep hygiene and quality of life.
- Recruitment is ongoing; the trial will assess whether this approach can improve sleep-related outcomes compared with usual care.

In response to the need for accessible, theory-driven interventions, this study introduces WhatSleeP-HF, a TTM-based sleep intervention delivered via WhatsApp for patients with HF. The study aims to evaluate the effectiveness of a TTM-guided, WhatsApp-supported intervention in improving sleep hygiene behaviors. The program incorporates stage-matched messages, educational materials, motivational content, and behavioral reminders tailored to participants' stages of change, with WhatsApp serving as the primary communication channel. Accordingly, this study represents the first intervention to integrate a behavior change model with mobile messaging to promote sleep hygiene in HF care. Using familiar technology and an established theoretical framework, the WhatSleeP-HF study seeks to provide evidence to support scalable, nurse-led digital interventions that promote patient self-care and improve health outcomes. The primary aim of this study is to develop and evaluate a social media–based intervention protocol designed to improve sleep quality in patients with HF. Accordingly, the study aims to enhance both subjective and objective sleep quality through a WhatsApp-based program structured according to the TTM. Based on this framework, the study proposes the following hypotheses regarding participation in the TTM-based WhatsApp sleep health promotion program:

H1. The WhatsApp-based, TTM-guided sleep health program will significantly improve subjective sleep quality in patients with HF.

H2. The WhatsApp-based, TTM-guided sleep health program will significantly improve sleep hygiene in patients with HF.

H3. The WhatsApp-based, TTM-guided sleep health program will significantly improve quality of life in patients with HF.

Methods

Study Design and Setting

This study is designed as a single-blind, two-arm, parallel-group randomized controlled trial. Eligible participants will be assigned in a 1:1 ratio to either the intervention group receiving

the WhatSleeP-HF program or the control group receiving usual care. The trial will take place at a collaborating hospital in Bolu, Türkiye. The study framework has been developed in accordance with the Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT) 2025 guidelines, and intervention details will be reported in accordance with the Consolidated Standards of Reporting Trials (CONSORT). A visual overview of the trial phases is provided in Figure 1.

Study Sample

In this trial, potential participants will be screened retrospectively using data from the hospital information system. Individuals who meet the preliminary criteria will be contacted by telephone for an initial discussion and invited to attend an in-person assessment. During this visit, nurse researchers will explain the study objectives, procedures, and participants' rights in detail. A physician will then review each patient's medical history to verify eligibility according to the study's inclusion and exclusion criteria.

An a priori power analysis was performed using G*Power (version 3.1.9.7) for a repeated-measures analysis of variance (ANOVA) with a within–between interaction, involving two groups and three measurement time points. In the absence of a directly comparable study reporting an effect size for the group × time interaction, a medium effect size (Cohen's f=0.25) was assumed based on Cohen's conventional benchmarks.[16] This assumption was considered reasonable in light of previous randomized research in patients with HF demonstrating significant group × time effects on sleep quality following a nurse-led intervention incorporating sleep hygiene education and supportive care.[8] The analysis used α=0.05, a statistical power of 80%, a correlation of 0.50 among repeated measures, and a nonsphericity correction of ε=1. Based on these parameters, the minimum required sample size was calculated as 28 participants (14 per group), corresponding to an actual power of 81.2%. To account for an anticipated attrition rate of 20%, the target sample size was increased to 34 participants (17 per group).

Randomization and Blinding

Participants will be randomly allocated to the intervention and control groups in a 1:1 ratio without stratification. The random

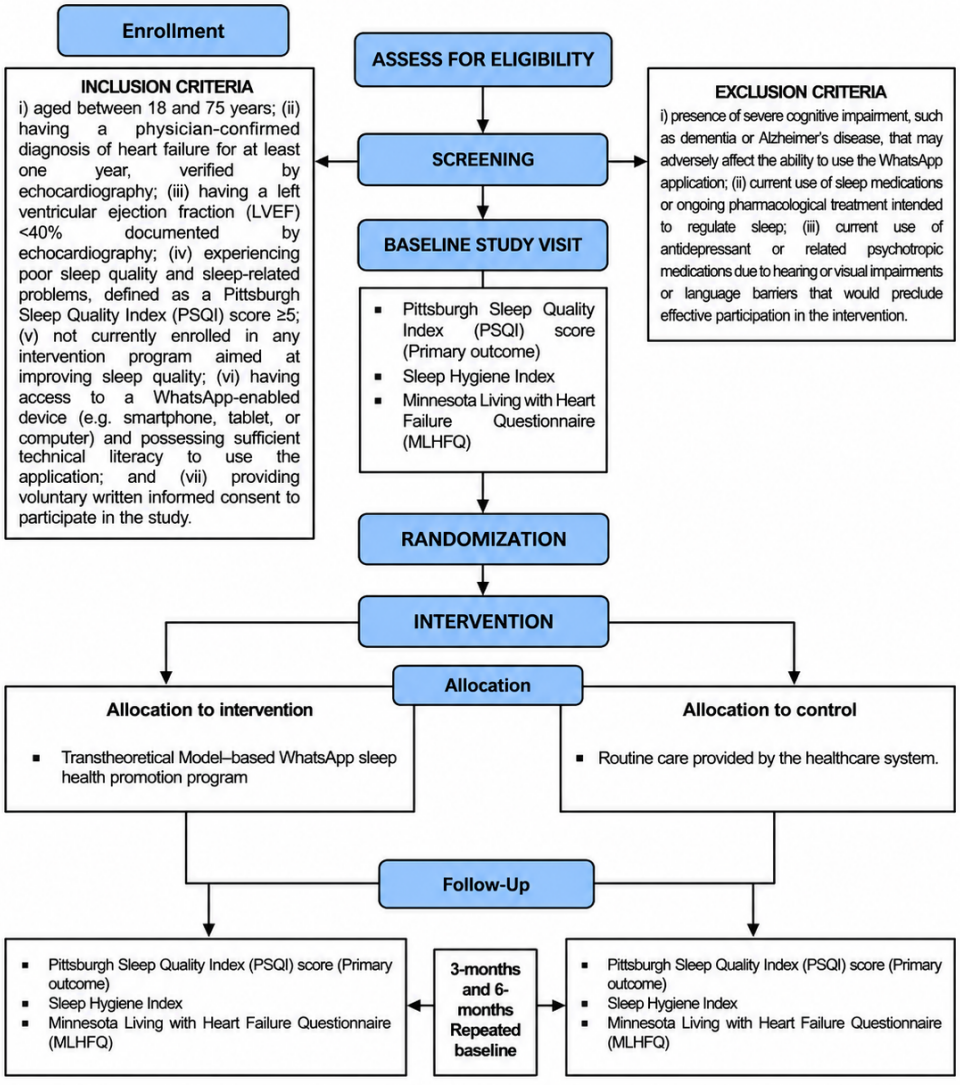


Figure 1. Consolidated Standards of Reporting Trials (CONSORT) flow diagram.

allocation sequence will be generated in advance using an online randomization program by a third researcher who is independent of participant recruitment, data collection, and intervention delivery.[17] This researcher will not participate in data collection at any stage of the study. The allocation sequence will be concealed from the researchers responsible for participant recruitment and eligibility assessment. Eligible participants will be enrolled in the order in which they attend their scheduled study visits. Only after eligibility has been confirmed and enrollment completed will a fourth researcher, who is not involved in generating the randomization sequence, assign each participant to the intervention or control group according to the next allocation in the pregenerated randomization list. Thus, the allocation sequence will remain concealed from the researchers responsible for recruitment and eligibility assessment until participant assignment. Because of the nature of the behavioral intervention delivered via WhatsApp, blinding participants and the researcher delivering the intervention will not be feasible. However, the researcher responsible for statistical analysis will remain blinded to group allocation, with the groups coded to conceal their identities during analysis. Allocation concealment will also be maintained until eligibility assessment and participant enrollment have been completed.

Inclusion and Exclusion Criteria

Inclusion Criteria

Participants will be eligible for inclusion if they meet the following criteria: (i) are 18–75 years of age; (ii) have had a physician-confirmed diagnosis of HF for at least one year, verified by echocardiography; (iii) have a left ventricular ejection fraction (LVEF)<40% documented by echocardiography; (iv) experience poor sleep quality and sleep-related problems, defined as a Pittsburgh Sleep Quality Index (PSQI) score≥5; (v) are not currently enrolled in an intervention program aimed at improving sleep quality; (vi) have access to a WhatsApp-enabled device (e.g., a smartphone, tablet, or computer) and sufficient technical literacy to use the application; and (vii) provide voluntary written informed consent to participate in the study.

Exclusion Criteria

Participants will be excluded if they meet any of the following criteria: (i) have severe cognitive impairment, such as dementia or Alzheimer's disease, that may impair their ability to use WhatsApp; (ii) currently use sleep medications or receive pharmacological treatment intended to regulate sleep; (iii) currently use antidepressants or related psychotropic medications; or (iv) have significant communication difficulties due to hearing or visual impairments or language barriers that would preclude effective participation in the intervention.

Study Outcomes

In this study, the independent variable is the WhatsApp-based sleep intervention, defined as a Transtheoretical Model (TTM)–guided WhatsApp Sleep Health Promotion Program. Dependent variables will be evaluated as primary and secondary outcomes. Sleep quality, assessed using the PSQI, is the primary outcome. Secondary outcomes include sleep hygiene, measured using the Sleep Hygiene Index (SHI), and quality of life, assessed using the Minnesota Living with Heart Failure Questionnaire (MLHFQ).

Subjective sleep quality will be assessed using the Turkish version of the PSQI.[18] The PSQI is a self-report instrument comprising 18 items across seven components, with total scores ranging from 0 to 21. Scores>5 indicate poor sleep quality. The Turkish version has demonstrated good diagnostic accuracy, with a sensitivity of 89.6% and a specificity of 86.5%.

Sleep hygiene will be assessed using the SHI, a 13-item self-report measure designed to evaluate the presence and frequency of behaviors affecting sleep hygiene. Each item is rated on a 5-point scale, yielding total scores ranging from 13 to 65, with higher scores indicating poorer sleep hygiene. The SHI assesses domains including the regularity of sleep–wake schedules, behaviors before bedtime that may negatively affect sleep (e.g., tobacco or caffeine use, cognitively demanding activities, and computer use), environmental sleep conditions, and anxiety-related behaviors before bedtime. The Turkish version adapted by Ozdemir et al.[19] will be used in this study.

Quality of life will be assessed using the Turkish version of the MLHFQ.[20] The MLHFQ consists of 21 items evaluating two domains: physical functioning and emotional functioning. Eight items (items 2, 3, 4, 5, 6, 7, 12, and 13) assess physical functioning, while five items (items 17, 18, 19, 20, and 21) assess emotional functioning. Each item is rated on a 6-point Likert scale ranging from 0 (no impact) to 5 (very much). Subscale scores are calculated by summing the relevant items, and the total score is obtained by summing all 21 items, yielding a possible range of 0 to 105. Physical functioning subscale scores range from 0 to 40, with higher scores indicating greater functional impairment. Lower total and subscale scores reflect better quality of life.

Study Procedures

In-person evaluations will be conducted at three time points—before randomization (baseline), at 3 months, and at 6 months—at the cardiology clinic of Bolu Abant Izzet Baysal University Hospital. The study team will coordinate appointment scheduling with each participant. Upon the participant's arrival at the clinic, the researcher will explain the procedures in detail and obtain written informed consent.

Patients with HF will be identified through the hospital outpatient database using relevant International Classification of Diseases, Tenth Revision (ICD-10) codes. Eligibility screening will include age and time since HF diagnosis. Potentially eligible patients will be contacted by telephone, informed about the study, and screened for sleep quality and access to a WhatsApp-enabled device. Those who meet the inclusion criteria will be invited for an in-person assessment, during which the exclusion criteria will be evaluated. LVEF will be confirmed using echocardiography performed within the previous three months; if no recent echocardiogram is available, echocardiography will be performed to determine LVEF. Eligible participants will then be scheduled for a follow-up visit, after which they will be randomized to the intervention or control group.

The intervention in this study is a TTM-guided WhatsApp Sleep Health Promotion Program. This six-month, nurse-led program is designed to improve sleep quality among patients with HF in the intervention group and comprises three core components. The first component consists of four weekly patient education sessions focused on sleep health, delivered during the first four weeks. The

first session will be conducted face-to-face and last approximately 50–60 minutes, followed by three weekly telehealth sessions lasting approximately 60 minutes each. These sessions will combine face-to-face and telehealth delivery to enhance patients' knowledge and awareness of strategies for improving sleep quality.

The second component comprises an eight-week WhatsApp-based messaging phase. During weeks 5–8, sleep hygiene messages will be delivered according to a predefined morning and evening schedule, with messages from weeks 5 and 6 repeated in weeks 7 and 8, respectively. During weeks 9–12, participants will receive one message per day and one video per week. During the subsequent 12-week maintenance phase, messages will be delivered weekly and video content every two weeks (Supplementary Material 1). These messages are intended to help participants maintain changes in sleep hygiene behaviors by providing practical recommendations and sustaining motivation. An initial pool of 50 messages was developed, and content validity was evaluated using the Davis technique based on feedback from five doctoral-level nursing experts. Following expert review, the message pool was refined to 28 items, each with a content validity index (CVI)≥0.80. The third component is a 12-week follow-up phase aimed at monitoring the sustainability of acquired sleep hygiene behaviors. This phase is designed to assess the long-term maintenance of positive changes in sleep patterns and provide additional support when necessary. Participant adherence will be monitored through attendance at scheduled educational sessions and continued engagement with the WhatsApp-based intervention. Intervention fidelity will be supported by delivering all educational sessions, messages, and video materials according to the predefined content and schedule.

The study is structured according to the TTM to support stage-based behavior change aimed at improving sleep habits in patients with HF. Given the 24-week (six-month) intervention period, the program focuses exclusively on the stages-of-change component of the TTM, which comprises five stages: precontemplation, contemplation, preparation, action, and maintenance. Initially, eligible participants will attend a face-to-face interview at the hospital. During this visit, baseline (T0) data on primary and secondary outcomes will be collected, and participants' stages of change will be assessed. Following this assessment, all participants in the intervention group will receive individualized, evidence-based patient education tailored to their characteristics and needs. Educational content will address sleep hygiene recommendations, adjustments to daily routines, and strategies to support behavior change (Table 1).[21-24] Participants who reach the preparation stage will be enrolled in the WhatsApp-based telehealth intervention. During the intervention, periodic messages and video content designed to promote sleep hygiene and improve sleep quality will be delivered progressively via WhatsApp to support participants' progression through the action and maintenance stages (Supplementary Material 1).[6,21-24] The intervention process will be guided by a predefined decision tree (Figure 2).

Control group participants will receive routine outpatient care without behavioral or technology-based interventions. Primary and secondary outcomes will be assessed at predefined time points. After the intervention is completed (month 6), control group participants will receive written educational materials on sleep hygiene to ensure equitable access to this information.

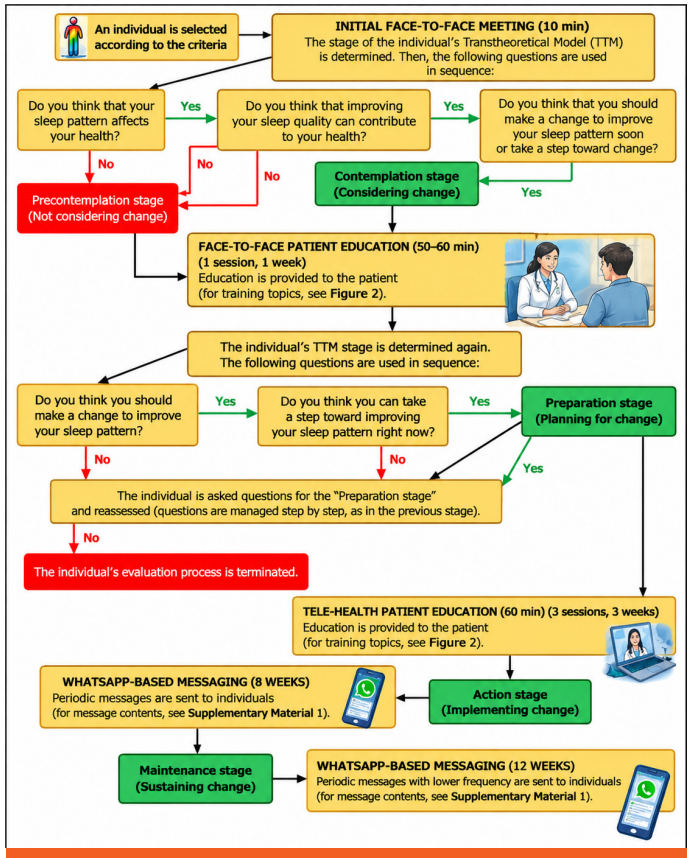


Figure 2. Decision tree for the intervention algorithm.

Data Analysis

Data analysis will be performed using jamovi version 2.3.28 (The jamovi project, Sydney, Australia). Statistical significance will be set at $p<0.05$. Descriptive statistics (mean, standard deviation, median, interquartile range, frequency, and percentage) will be used to summarize the data. The normality of data distributions will be assessed using skewness and kurtosis values within ±1 and the Shapiro–Wilk test. Appropriate parametric or nonparametric tests will be applied according to the data distribution. For the primary outcome, changes in subjective sleep quality over time (baseline, 3 months, and 6 months) will be analyzed using repeated-measures analysis of variance (ANOVA) for normally distributed data or the Friedman test for nonnormally distributed data. Group-by-time interaction effects will be evaluated using two-way ANOVA. Secondary outcomes, including sleep hygiene and quality of life scores, will be analyzed using similar approaches according to their distributions.

Ethical Considerations

The study will be conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval for this study was obtained from the Bolu Abant Izzet Baysal University Non-Interventional Clinical Research Ethics Committee (Approval Number: 2024/322; Date: 19.11.2024). Informed consent will be obtained from all participants.

Table 1. Evidence-based educational content for sleep hygiene and behavior change[21-24]

Topic Title	Purpose	Learning Objectives	Teaching and Learning Methods	Materials
Session 1: Face-to-face ● Fundamentals of the sleep cycle ● Problems associated with reduced sleep quality ● Heart failure and the importance of sleep quality ● Factors that disrupt sleep quality	To inform patients about sleep stages and the normal sleep cycle and to raise awareness of the importance of sleep quality in heart failure and the factors that impair sleep quality.	At the end of this session, participants will be able to: 1. Identify the stages of sleep. 2. Describe the recommended sleep duration according to age. 3. Define reduced (poor) sleep quality. 4. Identify at least three health problems associated with reduced sleep quality. 5. Recognize sleep-related problems that may occur in patients with heart failure. 6. Explain the importance of sleep quality in patients with heart failure. 7. Identify factors that impair sleep quality. 8. Explain at least three factors that negatively affect sleep quality.	Lecture Questions and answers	Computer (PowerPoint presentation)
Session 2: Telehealth education delivered via WhatsApp ● Basic principles of the sleep cycle ● Consequences of poor sleep quality ● Heart failure and the importance of sleep quality ● Factors negatively affecting sleep quality	To provide patients with information about sleep stages and the normal sleep cycle via telehealth and to increase awareness of the importance of sleep quality in heart failure and the factors that impair sleep quality.	At the end of this session, participants will be able to: 1. Identify the stages of sleep. 2. Describe the recommended sleep duration according to age. 3. Define reduced (poor) sleep quality. 4. Identify at least three health problems resulting from reduced sleep quality. 5. Recognize sleep-related problems that may occur in patients with heart failure. 6. Explain the importance of sleep quality in patients with heart failure. 7. Identify factors that impair sleep quality. 8. Explain at least three factors that negatively affect sleep quality.	Lecture Questions and answers	Computer (PowerPoint presentation)
Session 3: Telehealth education delivered via WhatsApp ● Sleep hygiene practices and their impact on disease management (daily life modifications and environmental adjustments)	To enhance awareness of sleep quality and educate patients on good sleep hygiene practices and lifestyle and environmental changes to improve sleep health.	At the end of this session, participants will be able to: 1. Explain the principles of good sleep hygiene. 2. Identify at least three daily lifestyle modifications aimed at improving sleep hygiene. 3. State their intention to implement at least one daily lifestyle modification to enhance sleep hygiene. 4. Discuss the impact of environmental factors on sleep health.	Lecture Questions and answers	Computer (PowerPoint presentation)

Table 1. Continued[21–24]

Topic Title	Purpose	Learning Objectives	Teaching and Learning Methods	Materials
Session 4: Telehealth education delivered via WhatsApp ● Enhancing sleep quality through dyspnea management in heart failure: instruction in breathing exercises ● Optimization of heart failure–specific pharmacotherapy to improve sleep quality	To educate patients on deep breathing exercises and to inform them about the impact of heart failure–specific pharmacotherapy on sleep quality, including medication optimization strategies such as dose adjustment and timing.	At the end of this session, participants will be able to: 1. Learn deep breathing exercises. 2. State their intention to practice deep breathing exercises regularly. 3. Demonstrate deep breathing exercises in practice. 4. Explain the effects of their prescribed medications on sleep quality. 5. State their intention to collaborate with their physician regarding dose management to maintain or improve sleep quality. 6. State their intention to collaborate with their physician regarding the timing of medications to maintain or improve sleep quality.	Lecture Questions and answers	Computer (PowerPoint presentation)

Discussion

Sleep disturbances are common in patients with HF and may negatively affect daily functioning and quality of life. Addressing these problems requires continuous support to promote healthy sleep behaviors. The WhatSleeP-HF trial evaluates a nurse-led, TTM-guided WhatsApp intervention to improve sleep quality, sleep hygiene, and quality of life in patients with HF.

One of the important features of the proposed intervention is its theoretical foundation. The TTM conceptualizes behavioral change as a gradual process involving five stages: precontemplation, contemplation, preparation, action, and maintenance. Rather than assuming that all patients are equally ready to change their behaviors, the model recognizes individual differences in motivation and readiness for change.[10] A previous study demonstrated improvements in the nutritional status of patients with HF following a TTM-based intervention.[11] Applying the TTM to sleep hygiene may therefore provide a structured approach to assessing patients' readiness for change and tailoring behavioral support accordingly. However, evidence regarding its application specifically to sleep hygiene behaviors in this population remains limited. Therefore, this study may contribute to understanding the potential role of stage-based behavioral interventions in improving sleep-related outcomes. In the WhatSleeP-HF intervention, educational sessions are intended to increase awareness and promote readiness for change. Subsequent messages and video content are expected to support the adoption and maintenance of healthier sleep behaviors.

For patients with HF who may have difficulty attending frequent face-to-face appointments due to physical limitations or disease-related symptoms, digital communication can help maintain contact with healthcare professionals and reinforce self-care recommendations. Mobile messaging applications enable accessible, continuous, and relatively low-cost communication between healthcare professionals and patients. The integration of WhatsApp into the intervention is therefore an important aspect of this study. Previous studies have highlighted the potential of WhatsApp-based educational and supportive interventions to improve self-care-related outcomes in patients with HF.[14,15] However, the WhatSleeP-HF intervention has the potential to provide valuable insights by focusing specifically on sleep health and incorporating a structured behavioral change framework.

From a nursing practice perspective, the proposed intervention may offer a feasible approach to integrating sleep health promotion into HF management. Sleep disturbances are frequently associated with reduced functioning and quality of life in patients with HF.[7] Addressing modifiable sleep hygiene behaviors through nurse-led education and continued support may therefore complement existing self-care interventions. If effective, the program could provide a practical framework for delivering theory-based sleep education through commonly available digital communication tools.

Limitations

This study has several limitations. First, the single-center design and relatively small sample size may limit the generalizability of the findings. In addition, the outcomes rely on self-reported measures, which may be subject to reporting bias.

Conclusion

This study represents the first WhatsApp-based sleep intervention for patients with HF grounded in behavioral theory, specifically the

TTM. The expected outcomes include improvements in subjective sleep quality, improved sleep hygiene behaviors, and better quality of life. At the time of manuscript submission, participant recruitment is ongoing. If effective, this nurse-led, theory-based digital intervention may offer a scalable, low-cost approach that can be integrated into routine nursing practice to support self-management and improve sleep-related outcomes in patients with HF. By using an accessible mobile platform, the intervention has the potential to reduce the burden on health care systems by minimizing the need for in-person follow-up while maintaining continuity of care. Moreover, incorporating a behavior change framework into nurse-led telehealth practice may enhance patient engagement, promote long-term adherence to self-care behaviors, and support sustainable HF management.

Ethics Committee Approval: Ethics committee approval was obtained from Bolu Abant Izzet Baysal University Non-Interventional Clinical Research Ethics Committee (Approval Number: 2024/322; Date: 19.11.2024).

Informed Consent: Written informed consent will be obtained from all participants prior to their inclusion in the study.

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