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The Relationship Between Immobilization, Environmental Stressors, and Patient Anxiety in Patients Undergoing Coronary Angiography

Koroner Anjiyografi Uygulanan Hastalarda İmmobilizasyon, Çevresel Stresörler ve Anksiyete Arasındaki İlişki

ABSTRACT

Objective: This study aimed to examine the relationship between immobilization duration, environmental stressors, and anxiety levels in patients undergoing coronary angiography.

Method: This descriptive and correlational study included 255 coronary angiography patients hospitalized in a university hospital's coronary intensive care unit in the Black Sea Region. Participants met the inclusion criteria and agreed to participate. Data collection occurred between July 2022 and July 2023 using the Personal Information Form, State-Trait Anxiety Scale, and Intensive Care Environmental Stressors Scale. Data were analyzed using SPSS v26, with statistical significance set at $P < 0.05$.

Results: The participants' mean age was 59.19±11.82 years, and their immobilization period in the supine position averaged 6.25±1.79 hours. The mean scores were 123.71±21.71 on the Environmental Stressors Scale, 53.70±8.86 on the State Anxiety Scale, and 47.22±6.10 on the Trait Anxiety Scale. No statistically significant relationship was found between immobilization duration and environmental stress or anxiety levels. However, a weak positive correlation was observed between environmental stress and both state and trait anxiety levels.

Conclusion: Patients undergoing coronary angiography experienced above-average environmental stress levels and moderate state and trait anxiety levels. Additionally, environmental stress significantly influenced anxiety levels. These findings highlight the importance of reducing environmental stressors in clinical settings to improve patient well-being.

Keywords: Anxiety, coronary angiography, environmental stressor, immobilization, nursing care

ÖZET

Amaç: Bu çalışma, koroner anjiyografi uygulanan hastalarda immobilizasyon süresi, çevresel stresörler ve anksiyete düzeyleri arasındaki ilişkiyi belirlemek amacıyla yapılmıştır.

Yöntem: Tanımlayıcı ve ilişki arayıcı türdeki bu araştırma, Karadeniz Bölgesi'nde bir üniversite hastanesinin koroner yoğun bakım ünitesinde yatan ve çalışmaya katılmayı kabul eden 255 koroner anjiyografi hastasıyla gerçekleştirilmiştir. Temmuz 2022 - Temmuz 2023 tarihleri arasında Kişisel Bilgi Formu, Durumluk-Sürekli Kaygı Ölçeği ve Yoğun Bakım Çevresel Stresörler Ölçeği kullanılarak veriler toplanmıştır. Veriler SPSS v26 programında analiz edilmiş ve istatistiksel anlamlılık $P < 0.05$ olarak kabul edilmiştir.

Bulgular: Hastaların yaş ortalaması 59.19±11.82 yıl, hareketsiz yatış süresi ise 6.25±1.79 saat olarak saptanmıştır. Ortalama ölçek puanları 123.71±21.71 (Çevresel Stresörler), 53.70±8.86 (Durumluk Kaygı) ve 47.22±6.10 (Sürekli Kaygı) olarak belirlenmiştir. İmmobilizasyon süresi ile çevresel stres ve kaygı düzeyleri arasında anlamlı bir ilişki saptanmamıştır. Ancak, çevresel stres ile durumluk ve sürekli kaygı düzeyleri arasında zayıf fakat anlamlı bir pozitif ilişki bulunmuştur.

Sonuç: Koroner anjiyografi uygulanan hastaların çevresel stres düzeyleri ortalamanın üzerinde, kaygı düzeyleri ise orta seviyede bulunmuştur. Ayrıca, çevresel stres, hastaların kaygı düzeylerini önemli ölçüde etkilemiştir. Klinik ortamda çevresel stres faktörlerinin azaltılması, hasta konforu ve psikolojik iyilik hali için önemlidir.

Anahtar Kelimeler: Anksiyete, koroner anjiyografi, çevresel stresör, immobilizasyon, hemşirelik bakımı

ORIGINAL ARTICLE
KLİNİK ÇALIŞMA

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Introduction

Coronary Artery Disease (CAD), which can progress to advanced stages, potentially leading to myocardial infarction and even death,[1] is one of the leading causes of mortality

and morbidity in our country, as well as globally. CAD is recognized as one of the most common cardiovascular diseases in adults.[2] According to the World Health Organization (WHO) 2021 report, heart disease-related deaths ranked first among the top 10 causes of death worldwide.[3] Additionally, a 2024 report from the Centers for Disease Control and Prevention (CDC) indicated that in 2022, 371,506 people died from coronary heart disease. Approximately 1 in 20 adults aged 20 years and older has CAD (around 5%), and nearly 1 in 5 deaths from cardiovascular disease (CVD) occurs among adults under 65 years of age.[4] WHO's 2020 report on life-limiting diseases also listed cardiovascular diseases as the leading cause, with 45% of these cases attributed to coronary artery disease.[5] In Türkiye, CAD is the leading cause of morbidity and mortality. When the results of the Heart Disease and Risk Factors in Turkish Adults study were analyzed, it was reported that cardiovascular diseases were responsible for 43% of all deaths. In our country, 420,000 coronary cases are seen annually, with 120,000 of these being recurrence of existing acute events in patients with coronary artery disease, while 180,000 new cases are diagnosed each year. Deaths due to coronary artery disease are 3.8% in women and 7% in men in the 45-74 age range.[6]

Early and accurate diagnosis is crucial for patients with CAD. Coronary angiography is considered the gold standard in diagnosing CAD.[7,8] This procedure is the most effective diagnostic method for detecting potential vascular blockages by assessing the size, location, and presence of thrombus in the coronary arteries. Patients undergoing coronary angiography via the femoral artery are required to remain in a supine position for 6–12 hours post-procedure to minimize or prevent acute and chronic complications. However, prolonged bed rest may increase discomfort in patients, and monitoring in intensive care units post-procedure can further elevate their anxiety levels.[9]

For patients undergoing coronary angiography, immobilization is essential to minimize the risk of bleeding and hematoma in coronary intensive care and cardiology units.[10] Determining whether immobilization duration and environmental stressors contribute to anxiety is critical for effective anxiety management. An analysis of existing research found no specific studies examining the connection between immobilization, environmental stressors, and anxiety in coronary angiography patients. This study aims to explore the relationship between post-procedural immobilization duration, environmental stressors, and anxiety levels in patients undergoing coronary angiography. The study will address the following research questions:

1. What is the typical duration of immobilization following coronary angiography?
2. How do patients perceive environmental stress during coronary angiography?
3. What are the levels of state and trait anxiety in patients undergoing coronary angiography?
4. Is there an association between immobilization duration and environmental stress levels in these patients?
5. Does the duration of immobilization correlate with anxiety levels in patients undergoing coronary angiography?
6. Is there a connection between environmental stress levels and anxiety levels in this patient population?

MAIN POINTS

- The study found no statistically significant relationship between the duration of immobilization and patients' anxiety levels or environmental stress.
- A weak positive correlation was observed between environmental stressors and both state and trait anxiety levels, suggesting that higher stress levels in the intensive care unit contribute to increased anxiety.
- Patients undergoing coronary angiography reported moderate levels of state and trait anxiety, and above-average levels of environmental stress.
- The findings emphasize the need to reduce environmental stressors in hospital settings to enhance patient comfort and well-being.

Methods

Study Design and Sample

This study, which follows a descriptive and correlational design, was conducted between July 2022 and July 2023 at the Coronary Intensive Care Unit (ICU) of a university hospital in Ordu, a city in northern Türkiye. The study focused on patients admitted to and treated in the hospital's coronary ICU, with a sample size of 255 coronary angiography patients. The sample size calculation was performed using power analysis via R v3.6.1. The alpha error was set at 5%, the beta error at 20%, and the effect size was calculated as 0.25 based on the results of the Environmental Stressors Scale in the ICU used by Karadeniz and Kanan[11] in their study. It was determined that a minimum sample size of 255 would be sufficient for the study.

The inclusion criteria were individuals aged 18 years and older, diagnosed with coronary artery disease, myocardial infarction, unstable angina pectoris, or chest pain, who underwent coronary angiography via the femoral artery, were hospitalized in a coronary ICU, oriented to time and place, did not experience communication difficulties, were literate (able to read and write), and voluntarily agreed to participate in the study.

Exclusion criteria were patients with neurological and/or psychological disorders that would interfere with communication, intubated patients, and patients whose angiography was performed via transradial intervention.

Data Collection Instruments

Data were collected using a Personal Information Form, State-Trait Anxiety Scale, and Intensive Care Environmental Stressors Scale.

Personal Information Form

The sociodemographic and disease characteristics of the patients were assessed using a form prepared by the researchers, based on existing literature.[6,7,9,12,13]

Intensive Care Unit Environmental Stressor Scale (ICUESS)

The ICUESS was originally developed by Ballard in 1981 and updated by Cochran and Ganong in 1989. It was adapted into Turkish by Aslan in 2010 to identify stressors perceived by patients receiving treatment in ICU. The scale is a four-point

Table 1. Descriptive characteristics of patients

	$\bar{X}$±SD	Min–Max		n	%
Age (year)	59.19±11.82	28-89	People living together		
Duration of lying motionless in the supine position (hour)	6.25±1.79	2-12	Alone	16	6.3
Time to diagnosis of CAD (month)	56.33±62.30	0-100	With my wife and/or child	197	77.3
	n	%	With my relatives	42	16.4
Gender			Complaints about CAD*		
Male	135	52.9	Chest pain	202	79.2
Female	120	47.1	Fatigue	77	30.2
Marital status			Palpitations	53	20.8
Single	32	12.5	Shortness of breath	117	45.9
Married	223	87.5	Other	21	8.2
Education level			Previous hospitalization due to CAD		
Literate	74	30.0	Yes	172	67.5
Primary education	98	38.4	No	83	32.5
High school	68	26.7	Previous angiography		
University and above	15	5.9	Yes	162	63.5
Job			No	93	36.5
Housewife	85	33.3	Having any chronic disease other than CAD		
Officer	28	11.0	Yes	176	69.0
Labourer	35	13.7	No	79	31.0
Farmer	12	4.7	Continuous medication use		
Pensioner	51	20.0	Yes	196	76.9
Self-employment	44	17.3	No	59	23.1
Income status			Smoking status		
My income is less than my expenditure	37	14.5	Yes	92	36.1
My income is equal to my expenses	135	52.9	No	160	62.7
My income exceeds my expenses	83	32.5	I quit	3	1.2
Place of residence			Status of regular exercise		
Village	54	21.2	Yes	23	9.0
District center	90	35.3	No	232	91.0
Province center	111	43.5	Enjoying activities during the day		
			Yes	112	43.9
			No	143	56.1

$\bar{X}$, Mean; SD, Standard deviation; Min, Minimum; Max, Maximum; CAD, Coronary artery disease; *More than one option has been selected.

Likert-type instrument consisting of 42 items, with response options ranging from "It affects very much" (4) to "It does not affect at all" (1). The total score is obtained by summing the responses, with possible scores ranging from 42 to 168. Higher values indicate a higher degree of stress. The Cronbach's Alpha coefficient of the original scale was reported as 0.94, and Aslan's study calculated it as 0.946.[14] In this study, the Cronbach's alpha coefficient of internal consistency was determined to be 0.921.

State-Trait Anxiety Inventory

The State-Trait Anxiety Inventory, originally developed by Spielberger and colleagues in 1970, was adapted into Turkish through a validity and reliability study conducted by Öner and Le Compte in 1983. It comprises 40 items, with the first 20 assessing state anxiety and the last 20 measuring trait anxiety.[15,16]

The State Anxiety Scale evaluates how an individual feels at a specific moment under certain conditions. Participants respond by rating the intensity of their thoughts, emotions, or behaviors using a four-point scale: Never (1), Somewhat (2), Much (3), Completely (4). The original Cronbach's Alpha coefficient for this scale ranges between 0.94 and 0.96, while in this study, it was calculated as 0.756.

The Trait Anxiety Scale measures an individual's general anxiety levels. Participants indicate how frequently they experience the thoughts, emotions, or behaviors described in the items, using the

Table 2. Intensive Care Unit Environmental Stressors Scale, State Anxiety Scale, Trait Anxiety Scale of Score

	Medyan (min-max)	$\bar{X}$±SD	Cronbach Alpha
Intensive Care Unit Environmental Stressors Scale Total	126 (51-168)	123.71±21.71	0.921
State Anxiety Scale Total	53 (31-77)	53.70±8.86	0.756
Trait Anxiety Scale Total	49 (27-64)	47.22±6.10	0.609

$\bar{X}$, Mean; SD, Standard deviation; Min, Minimum; Max, Maximum.

Table 3. Correlation between the Scores of The Scales

	Intensive Care Unit Environmental Stressors Scale	State Anxiety Scale	Trait Anxiety Scale
Immobilisation duration			
r/s	0.004	0.037*	-0.044*
p	0.944	0.560	0.482
Intensive Care Unit Environmental Stressors Scale			
s	-	0.432	0.398
p	-	0.000	0.000

*Spearman correlation analysis, P < 0.0.

same four-point scale. The total score ranges from 20 to 80 and is categorized as follows: 20–39 points: Mild anxiety, 40–59 points: Moderate anxiety, 60–79 points: Severe anxiety, 80 points: Panic (indicating a need for professional support).[17] The original Cronbach's Alpha coefficient for the Trait Anxiety Scale falls between 0.83 and 0.87, while in this study, it was found to be 0.609.

Data Collection

Once the required permissions for the study were obtained, patients hospitalized in the coronary ICU and undergoing coronary angiography were provided with information about the study and asked if they wished to participate. Occasionally, the forms were filled out with the help of the researcher at the participants' request.

Data Analysis

Data were analyzed by an experienced statistician using the Statistical Package for Social Sciences (SPSS) for Windows, version 26.0 (IBM SPSS Statistics for Windows, version 26.0, Armonk, New York, USA). During the evaluation of the study data, the Shapiro-Wilk or Kolmogorov-Smirnov test was used to assess the suitability of the parameters for normal distribution. In addition to descriptive statistical methods, the Student t-test was used for comparisons of quantitative data between two groups with normal distribution, and the Mann-Whitney U test was used for those without normal distribution. When there were more than two groups, one-way ANOVA was used for comparisons between groups with normal distribution, and the Kruskal-Wallis test was used for those without normal distribution. When a difference was found between groups, post hoc analyses were performed to identify which group was responsible for the difference. To assess the relationship between continuous variables, Pearson correlation analysis was applied for normally distributed data, while Spearman correlation analysis was used for non-normally distributed data. The results were evaluated with a 95% confidence interval and a significance level of P < 0.05.

Ethical Consideration

Ethical approval for this study was granted by Ordu University Clinical Research Ethics Committee (Approval Number: 2022/173, Date: 22.07.2022). In addition, written permission was obtained from the institution where the study was conducted (number: E-35766460-605.01). All participants provided written informed consent. The study was carried out in accordance with the principles outlined in the Declaration of Helsinki.

Results

The mean age of the individuals who agreed to participate in the study was 59.19 ± 11.82 years. The mean duration of lying motionless in the supine position was 6.25 ± 1.79 hours, and the mean duration of being diagnosed with chronic arterial disease was 56.33 ± 62.30 months. The demographic and clinical characteristics of the participants are as follows: 52.9% were male, 87.5% were married, 38.4% were primary school graduates, 33.3% were housewives, and 52.9% had an income equal to their expenses. In terms of residence, 43.5% lived in the city center, and 77.3% lived with their spouses and/or children. Regarding health-related factors, 79.2% were admitted to the hospital with the complaint of chest pain, 67.5% had been hospitalized before, 63.5% had a prior hospitalization history, 5% had previously undergone angiography, 69% had a chronic disease other than coronary artery disease, 76.9% used medication continuously, 62.7% did not smoke, 91% did not exercise regularly, and 56.1% did not engage in daytime activities (Table 1).

The scores obtained by individuals from the ICUESS and the State-Trait Anxiety Scale (STAS-Trait Anxiety Scale) are summarized in Table 2. Participants had an average score of 123.71 ± 21.71 on the ICUESS, 53.70 ± 8.86 on the State Anxiety Scale, and 47.22 ± 6.10 on the Trait Anxiety Scale (Table 2).

Table 3 presents the relationship between immobilization duration and the mean scores of the ICUESS, State Anxiety Scale, and Trait Anxiety Scale in patients undergoing coronary

angiography. The findings indicate that there was no statistically significant correlation between immobilization duration and scores on any of these scales ($P > 0.05$). However, a statistically significant correlation was identified between ICUESS scores and both state and trait anxiety scores ($P < 0.001$) (Table 3).

Discussion

The mean immobilization time of patients who agreed to participate in the study and underwent coronary angiography was 6.25 ± 1.79 hours. After coronary angiography, complications such as bleeding, hematoma, ambulation issues, and arteritis thrombosis at the catheter insertion site can occur in patients.[18,19] To prevent these complications, patients are typically hospitalized in a supine position for 2–24 hours. The literature recommends that patients should remain in the supine position for at least 6 hours.[20] A systematic review by Mehraeen et al.[19] examining the effect of early mobilization on vascular complications in patients undergoing coronary angiography via the femoral artery found that patients typically remained immobile for an average of 2–4 hours. Similarly, Wang et al.[21] in a systematic review and meta-analysis emphasized that mobilization time should be between 2–4 hours after angiography performed from the femoral artery, as part of the ERAS protocols. Additionally, it has been reported that providing early information minimizes complications that may arise from the angiography procedure. The literature also highlights that mobilization times may vary depending on factors such as catheter size, the heparin dose used, and the protocols followed in various cardiac centers.[19,21] While this study's findings align with similar studies in the literature, it is noteworthy that the individuals in this study remained immobile for a longer duration compared to those in the systematic reviews.

The study found that the mean ICU Environmental Stressors Scale (ICUESS) score for patients undergoing coronary angiography was above average. This contrasts with the findings of Dönmez et al.,[22] who reported low stress levels in patients hospitalized in the ICU. However, a review of the literature reveals that environmental stress levels in ICU patients are generally high, which aligns with the findings of this study. For instance, Karaağaç and Özkaptan[23] investigated the impact of environmental stressors on ICU patients' comfort, while Bülbüloğlu et al.[24] assessed environmental stressors in internal, surgical, and COVID-19 ICUs. The study by Gezginci et al.[25] also explored the relationship between anxiety, depression, and environmental stressors in ICU patients, all of which found above-average environmental stress levels. These results suggest that regardless of the ICU type, intensive care units are a significant source of stress for patients.

The state and trait anxiety levels of the study participants were found to be moderate, which is consistent with what one might expect: the state anxiety levels of individuals experiencing trait anxiety tend to align with their trait anxiety levels when exposed to stress. Similar results have been found in studies such as that by Gün et al.,[26] which examined the effect of music on anxiety and pain after coronary angiography. Karaman Özlü et al.[27] investigated the effect of privacy on anxiety in patients undergoing coronary angiography and elective percutaneous coronary intervention, while Ramezanibadr et al.[28] focused on anxiety levels in male patients undergoing coronary angiography. Moazami Goudarzi et al.[29] explored the effect of relaxation on anxiety in patients undergoing radial angiography. All these studies reported moderate anxiety levels. In another study by Göktuna et al.,[30] reflexology hand massage was found to reduce pain and anxiety in patients post-coronary artery bypass graft surgery. Similarly, Rachmah et al.[31] found that Murattal Therapy effectively reduced anxiety levels in coronary ICU patients. These findings are in line with both national and international research and are consistent with the current study's results.

Intensive care units expose patients to various physiological and psychosocial stressors, many of which are linked to the environment. Physical stressors such as mechanical ventilation, invasive procedures, sleep disturbances, pain, and agitation are commonly encountered in ICUs. Environmental factors like inappropriate ambient temperature, continuous artificial lighting, equipment noise, lack of privacy, unpleasant odors, and poor bed design also contribute to stress. Furthermore, factors such as immobilization, dependency, movement restrictions, disruption of daily routines, communication difficulties, and separation from loved ones exacerbate the stress experienced by ICU patients.[32]

The study also revealed no statistically significant relationship between immobilization duration and participants' mean scores on the ICUESS, State Anxiety Scale, and Trait Anxiety Scale. Although patients undergoing coronary angiography may remain immobilized for up to 24 hours,[33] the stress from prolonged immobility, combined with pressure on the catheter insertion site, could elevate anxiety and stress levels. While a significant relationship between immobilization duration and stress or anxiety was expected, the study's results did not show this correlation. This unexpected finding suggests that the post-coronary angiography care practices in the ICU where the data were collected may have had an anxiety- and stress-reducing effect on patients.

Moreover, the study found a low but statistically significant positive correlation between the mean scores of the ICUESS and the State and Trait Anxiety Scale scores in coronary angiography patients. Similarly, studies by Gezginci et al.[25] and Yun and Lee[18] found significant correlations between hospital anxiety levels and environmental stressors. As stress is a known contributor to anxiety, the positive correlation between the ICU Environmental Stressors Scale and the anxiety scores in this study is consistent with expectations.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, the research was conducted in a single coronary intensive care unit of a university hospital, which may limit the generalizability of the results to other settings with different patient populations or clinical practices. Second, due to its descriptive and correlational design, the study cannot establish causal relationships between immobilization duration, environmental stressors, and anxiety levels. Another limitation is the use of self-reported instruments to assess environmental stress and anxiety, which may have introduced response bias influenced by participants' perceptions or emotional states at the time of data collection.

Conclusion

The findings of this study indicate that patients undergoing coronary angiography experience significant environmental stressors in the ICU, as reflected in their high scores on the ICU Environmental Stressors Scale (ICUESS). Additionally, a statistically significant positive relationship was found between environmental stressors and both state and trait anxiety levels, suggesting that exposure to ICU-related stressors may contribute to increased anxiety in patients. However, no significant relationship was observed between immobilization duration and anxiety or stressor scores. This result contrasts with existing literature, where prolonged immobilization is often associated with higher stress and anxiety levels. This discrepancy may be attributed to specific care practices implemented in the ICU, which could mitigate the negative effects of immobilization on anxiety and stress Overall, these findings emphasize the importance of addressing environmental stressors in ICU settings to reduce anxiety levels in patients undergoing coronary angiography. Implementing strategies to create a less stressful hospital environment and providing psychological support may contribute to improved patient outcomes.

Ethics Committee Approval: Ethics committee approval was obtained from Ordu University Clinical Research Ethics Committee (Approval Number: 2022/173, Date: 22.07.2022).

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