

Relationship Between Perceived Stress and Anxiety in Patients Undergoing Coronary Angiography

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ABSTRACT

Objective: This study was conducted to determine the relationship between perceived stress and anxiety levels in patients undergoing coronary angiography (CAG).

Methods: A descriptive-observational study design was conducted in a single center in Turkey with 190 patients.

Results: The mean age of the participants was 61.2 ± 12.4 , 68.4% were male, 64.2% were primary school graduates and 56.3% had angiography for the first time. It was found that having a family history of heart disease and receiving information for angiography affected stress status, while education level, income status, and access to intervention-oriented information from health professionals affected anxiety. It was found that there was a positive low and significant relationship between Perceived Stress level and trait anxiety levels, while there was no relationship between state anxiety levels.

Conclusions: Perceived stress and anxiety levels were found to be moderate in patients who underwent CAG. For this reason, health workers need to plan interventions to reduce the stress and anxiety in patients.

Keywords: Anxiety, coronary angiography, stress.

1. INTRODUCTION

Coronary Artery Disease (CAD) is a condition that occurs as a result of the deterioration of the nutrition of the heart muscle. In some individuals, it may progress more rapidly and appear in the 30s, while in others it may remain silent until the ages of 50s and 60s (1-3). Early diagnosis of atherosclerosis and early identification of risky lesions have an important place in the reduction of cardiovascular diseases. A clinical history, physical examination, and electrocardiogram for diagnosing CAD are important tools for diagnosing coronary heart disease and informing decision-making, however, the only absolute way to evaluate coronary heart disease is CAG (Coronary Angiography) (4-7). CAG is a procedure performed with radiopaque material given by entering the coronary arteries through a catheter entered through the brachial or femoral artery (8,9). Although it provides many benefits in the diagnosis of coronary artery disease, it can lead to physical problems such as bleeding, hematoma, pain, nausea, and vomiting as well as psychological problems. Infarction,

arrhythmia, vascular complications, hypersensitivity, and inflammatory and hemodynamic problems also increase the stress and anxiety levels of patients due to fear (10,11).

Stress can be defined as a response to a stimulus or external situation. The effects of stress on individuals can vary widely. It is widely believed that stress is closely linked to the development of cardiovascular disease (12-15). Individual responses to stressful situations complicate the determination and categorization of stress levels and their implications for health. Numerous techniques and instruments have been developed to identify and quantify stress levels. Perceived stress (PS) offers a more realistic measure than objective stress levels, making it a better predictor of health (12,16,17). Perceived stress can also play a role in anxiety. Anxiety is defined as an emotional state in which an individual experiences uneasiness or worry in response to a perceived or real threat. It is evaluated as situational and persistent anxiety. State anxiety is a temporary

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emotional state, while persistent anxiety is a lifelong pattern of anxiety as a personality trait (18). It is a warning sign that warns of impending danger and allows the individual to take measures to deal with this threat (19-21). Research has shown that people who will undergo a CAG procedure are exposed to performing the procedure on the heart as a vital organ, wondering how the results of the procedure will be revealed, feeling pain and insecurity (22,23). The healthcare providers should focus on the patient's psychological activity and cognitive process to relieve the patient's stress and anxiety (24). Very little is known about the anxiety levels of patients undergoing CAG during different hospital stages. Identifying such characteristics can help providers identify patients at high risk for anxiety. It is important to create this awareness in healthcare providers so that providers can prevent or respond to the patient's anxiety. Therefore, the study was conducted to determine the relationship between perceived stress with anxiety levels and the factors affecting perceived stress in patients undergoing coronary angiography.

Research Questions

- 1) What are the perceived levels of stress and anxiety in patients undergoing coronary angiography?
- 2) Do the perceived stress situations of the patients who underwent coronary angiography change according to their socio-demographic and disease characteristics?
- 3) Is there a relationship between the perceived stress levels and anxiety levels of patients undergoing coronary angiography?

2. METHODS

2.1. Study Permissions and Ethical Statement

In order to conduct the research, the ethics committee approval was obtained from the Ethics Committee of a University (Decision No: 2022/248). Informed consent was obtained from the patients included in the study. In all stages of the study, the STROBE checklist were followed.

2.2. Study design

This is a descriptive observational study.

2.3. Participants and sample size

The research was carried out between August and October 2022 in the Department of Cardiology. According to a calculation the sample size required for moderate effect size (0.15), 95% power and 13 independent variables were determined as 190.²⁵ Those who are confirmed to undergo coronary angiography, who are over 18 years old, who speak and understand Turkish, and who volunteer to participate in the study are included in the study. Those with previous or ongoing psychological or psychiatric conditions such as major depressive disorder, generalized anxiety disorder or dementia were excluded from the study.

2.4. Instruments

Patient Information Form: A form consisting of sociodemographic and clinical questions was used in the study. Whereas, disease characteristics questions are as follows: the presence of chronic disease, previous angiography status, information status for the intervention, status of receiving information about angiography, if so, from whom, and status of receiving social support during the procedure.

Perceived Stress Scale (PSS): The scale was assess the extent to which certain situations in a person's life are stressful (26). The "PSS" was adapted to Turkish society and determined to be appropriate by Eskin et al., (27) in 2013 by conducting a validity and reliability study. In the study of Eskin et al. (2013), the Cronbach alpha internal consistency coefficient of the scale was 0.84, and the test-retest reliability was 0.87. In this study, the reliability value was found to be 0.64.

The State-Trait Anxiety Inventory (STAI): The Persistent Anxiety Inventory was developed in 1970 (28). It is a 4-pack type inventory that the individual can answer on his own, easy to apply, and consists of 20 questions. There are direct and inverted statements in the inventory. There are 7 inverted statements (items 1, 6, 7, 10, 13, 16 and 19) in the Inventory of Persistent Anxiety (29). The test reliability method found 0.71 to 0.86. In this study, Cronbach's alpha value was found as 0.81 for the state anxiety inventory, and 0.73 for the trait anxiety inventory.

2.5. Data collection procedure

The data were collected by the researchers between August and October 2022 by interviewing the patients face-to-face after permission was granted by the ethics committee and the institution.

2.6. Statistical analysis

The data were analyzed using the IBM SPSS Statistics User V 26. In the analysis of the data obtained as a result of the research, number, percentage, mean and standard deviation were used for descriptive statistics. Student's t-test was used to compare the paired group with normal distribution, and the Kruskal Wallis test was used to compare more than two groups that did not fit the normal distribution. If the variance analysis result was significant, multiple comparisons were made with Bonferroni test. Pearson correlation analysis were used in the analysis of the data obtained as a result of the research. The effect size was obtained with Cohen's d. $p < .05$ was considered the statistical significance level.

3. RESULTS

The sociodemographic data of the participants are presented in Table 1. The mean age of the participants in the study was 61.2 ± 12.4 years, 68.4% were male. The patients participants

in the study was 64.2% were primary school graduates, and 65.8% had a moderate income perception.

Table 1. Distribution of sociodemographic characteristics of patients (n:190)

Properties	Number	%
Gender		
Female	60	31.6
Male	130	68.4
Marital status		
Single	18	9.5
Married	172	90.5
Education		
Illiterate	23	12.1
Primary school graduate	122	64.2
High school and above	45	23.7
Profession		
Working	90	47.4
Nonoperating	100	52.6
Income		
Good	24	12.6
Middle	125	65.8
Bad	41	21.6
The presence of chronic diseases		
Yes	98	51.6
No	92	48.4
Family history of heart disease		
There is	107	56.3
No	83	43.7
	X	± SD
Average age	61.21	± 12.4
	Median	(Min-Max)
	50.0	18-80

The patients' characteristics of angiography intervention presented in Table 2. Of the participants, 56.3% reported that they had angiography for the first time, 52.1% received information about CAG, and 41.6% received information from health professionals. It was found that the social support during the procedure was mostly provided by the spouse and children.

When the PSS score distribution according to sociodemographic characteristics was examined, the mean score of those without a family history of heart disease was higher than those with a family history of heart disease ($p < .05$). It was found that the mean score of income status perception of the STAI-S was statistically significant and that the difference was between the groups with medium income status perception ($p < .05$). It was found that the mean scale score of those whose income perception was in the middle group was lower than those whose income perception was in the good and bad groups. It was found that the average score of the educational status of the trait anxiety level was statistically significant, and the score was low for those with high school education and above compared to illiterate and primary school graduates. It was found that the average level of trait anxiety decreased as the education level increased ($p < .05$) (Table 3).

Table 2. Distribution of patients' characteristics of angiography intervention (n:190)

Properties	Number	%
Number of Angiography		
First	107	56.3
Two and more	83	43.7
Information about angiography		
Yes	99	52.1
No	91	47.9
Place of education (n:99)		
Health worker	79	41.6
Friend/Relative/Social Media	20	10.6
Status of receiving social support during the procedure		
No	6	3.2
Wife	89	46.8
Children	89	46.8
Friends	6	3.2
Total	190	100

Table 3. PSS according to sociodemographic characteristics and STAI level distribution

Properties	PSS	STAI-S	STAI-T
Gender			
Female	31.18±6.31	43.31±5.14	51.65±5.76
Male	31.35±6.02	44.44±5.31	48.80±5.32
t:	-0.178	-1.376	3.331
p:	.483	.752	.432
Marital status			
Single	29.50±8.36	44.00±5.82	49.00±5.69
Married	31.48±5.82	44.09±5.22	49.77±5.61
t:	-1.317	-.075	-.559
p:	.145	.267	.618
Education			
Illiterate ^a	30.95±5.27	45.08±5.29	52.34±4.42
Primary ^b	31.40±6.22	43.94±5.01	50.13±5.51
Highschool-above ^c	31.20±6.29	43.97±5.96	47.20±5.58
KW:	0.130	0.935	14.832
p:	.937	.627	.001
			(a, b) > c
Income status perception			
Good ^a	32.00±5.10	45.87±5.68	48.54±6.59
Middle ^b	31.11±6.51	43.17±5.02	49.33±5.55
Bad ^c	31.46±5.40	45.82±5.17	51.51±4.84
KW:	0.357	11.525	6.190
p:	.837	.003	.145
		(a, c) > b	
The presence of chronic diseases			
Yes	30.59±6.15	43.41±5.42	50.23±5.69
No	32.05±5.98	44.80±5.03	49.14±5.49
t:	-1.658	-1.822	1.345
p:	.754	.299	.463
Family history of heart disease			
There is ^a	31.06±6.80	44.04±5.31	49.41±5.42
No ^b	31.60±5.08	44.14±5.24	50.08±5.85
t:	-.600	-.127	-.819
p:	.043	.746	.913
	b > a		

PSS: Perceived Stress Scale, STAI: State Trait Anxiety Inventory, STAI-S: State Trait Anxiety Inventory-State, STAI-T: State Trait Anxiety Inventory-Trait, t: independent sample t-test, KW: Kruskal Wallis.

The score distribution of the PSS according to the intervention characteristics is examined in Table 4. The mean score of those who did not receive information about angiography was higher than the mean score of those who received information ($p < .05$). When the distribution of scores of the State Anxiety Inventory according to intervention features was examined; the mean score of those who received information about the intervention from healthcare professionals was higher than those who received information from friends/relative/social media ($p < .05$).

According to the Pearson correlation analysis, there is a low and significant relationship between the PS level and the trait anxiety levels of the patients in a positive direction, and there is no relationship between the state anxiety levels (Table 5).

Table 4. PSS according to angiography intervention characteristics and STAI level distribution

Properties	PSS	STAI-S	STAI-T
Number of Angiography			
First	31.77±6.21	44.81±4.92	49.98±5.49
Two and more	30.68±5.93	43.15±5.58	49.34±5.77
t:	1.221	2.169	0.769
p:	.895	.191	.632
Information about angiography			
Yes	31.18±4.83	45.14±5.36	48.96±5.19
No	31.42±7.26	42.94±4.95	50.50±5.95
t:	-.278	2.925	-1.897
p:	.000	.492	.107
Where he studied (n:99)			
Health worker	31.56±4.74	45.21±4.89	48.97±4.94
Friend/Relative/ Socialmedia	29.65±5.00	44.85±7.07	48.95±6.23
t:	1.598	0.271	0.019
p:	.397	.029	.067

PSS: Perceived Stress Scale, STAI: State Trait Anxiety Inventory, STAI-S : State Trait Anxiety Inventory-State, STAI-T: State Trait Anxiety Inventory-Trait, t: independent sample t-test, KW: Kruskal Wallis. t: independent sample t-test.

Table 5. The relationship between the patients' PSS and STAI levels

Variables	1	2	3
PSS	-	r=0.124 p=.088	r=0.218 p=.002**
STAI-S	r=0.124 p=.088	-	r=.144 p=.048*
STAI-T	r=0.218 p=.002**	r=0.144 p=.048*	-

PSS: Perceived Stress Scale, STAI: State Trait Anxiety Inventory, STAI-S : State Trait Anxiety Inventory-State, STAI-T: State Trait Anxiety Inventory-Trait, r: Pearson Correlation.

*Correlation is significant at the .05 level (2-tailed),

**Correlation is significant at the .01 level (2-tailed),

4. DISCUSSION

In the study conducted to patients who underwent CAG, it was determined that the anxiety levels of the patients before

angiography were moderate level (44.08±5.27). In the study of Yel et al. (2020) (30) it was reported that the mean of the patients' state anxiety level was 42.5±6.3 and the mean of trait anxiety level was 46.3±6.0. In the study conducted by Moradi & Adib (2015), (31) it was shown that the mean score of the patients was 40.38±8.16 1.5 hours before the CAG. In the literature, patients undergoing CAG have been reported to be prone to stress and even panic even because they sign a consent form before the procedure (32). The variability in the rates obtained from the study may have been because the anxiety level of the patients before angiography, the causes of anxiety, the cultural and individual characteristics of the patients, and the reasons for concern differed according to the individuals.

While it was found that patients who did not receive information perceived the PS status higher, the level of state anxiety of those who received the information from health workers was found to be high. In the studies of Özdemir et al. (2015) (33) it was determined that all patients were given care before CAG and that patients experienced moderate anxiety before and after CAG. In the study conducted by Ho et al., it was reported that the emotional support provided to the patients by the nurses and the levels of post-counseling anxiety reached the lowest level compared to the previous period (34). In a meta-analysis of the effectiveness of nurse briefing patients and their families (35), was shown that informing them effectively reduced anxiety. In our study, the fact that the status anxiety level of those who received information from health workers was significant suggested that detailed information was given in these studies and that the target group in our study received on-foot information in general care.

It was found that those with a medium income perception had lower anxiety levels than those with low and high income perception. In the study conducted by Yel et al. (2020) (30) it was found that with the increasing income level of patients undergoing CAG, the level of pain, physical function, energy, and physical role limitations increased and the level of trait anxiety decreased. The researcher concluded that the average score of the trait anxiety level was lower in patients with high educational status, while low education level is associated with more anxiety. In the study conducted by Delewi et al. (2017) (36) post-procedure anxiety level were found to be higher in patients with low education levels than in both medium and highly-educated patients.

It was found that there was a low positive correlation between the PS mean scores of the patients evaluated before CAG and their State-Trait Anxiety levels. In a study conducted by Moradi & Adib (2015) (31) it was found that in patients who underwent CAG, the condition and trait anxiety level of the patients increased as the angiography time approached, the highest level of condition and trait anxiety was just before angiography, and the anxiety of the patients returned to almost the initial level after angiography. It has been reported that patients experience moderate trait anxiety before and after the angiography procedure and that the long waiting

time before the angiography procedure increases the anxiety level because the state anxiety of patients is not due to angiography (33). One study also emphasizes the importance of including patients in a well-organized preparatory program to control the high anxiety levels experienced by cardiac patients undergoing cardiac catheterization (37). Most patients awaiting angiography may experience fear, anxiety, and other unpleasant emotional experiences in which they do not have sufficient information about the medical procedure performed.

4.1. Limitations of Study

Our study had several limitations. The fact that the research was conducted in a single center posed a limitation on the generalizability of the findings. The current anxiety levels of the patients were not assessed through a structured clinical interview based on self-report. Other external factors affecting individuals' stress levels during that period were not investigated. Lastly, although the presence of a previous psychiatric disorder was set as an exclusion criterion, relying on participants' self-reports for this information was considered a limitation.

5. CONCLUSION

According to the findings, it was found that the mean scores of PS and anxiety in the patients were moderate and affected by some variables. It was found that there was a positive low and significant relationship between Perceived Stress levels and trait anxiety levels. For this reason, health workers need to plan interventions to reduce the stress and anxiety in patients.

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Research idea: AMY, SA

Design of the study: AMY, SA

Acquisition of data for the study: AMY, SA

Analysis of data for the study: AMY, SA

Interpretation of data for the study: AMY, SA

Drafting the manuscript: AMY

Revising it critically for important intellectual content: SA

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