

# State and Trait Anxiety in Patients Undergoing Coronary Angiography

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## Abstract

**Background and Objectives:** Studies have shown that patients awaiting coronary angiography (CA) are often anxious. High level of anxiety can lead to physical and psychological stress with adverse effects on organs, especially heart. There is limited information on state and trait anxiety level in these patients in the literature. This study was thus designed to investigate the level of these two types of anxiety in patients undergoing CA.

**Methods:** A cross-sectional study was conducted by enrolling 50 patients. A demographic questionnaire and Spielberger State and Trait Anxiety Inventory were used for data collection. *T* test was used to compare the anxiety level between gender and age groups.

**Findings:** The baseline state and trait anxiety mean levels in the CA patients were low ( $34.36 \pm 5.56$ ,  $35.98 \pm 7.49$ , respectively). The highest level of both state and trait anxieties was observed 30 minutes before CA ( $41.44 \pm 8.45$  and  $37.84 \pm 6.88$ , respectively), and it was significantly higher than the corresponding value at baseline state as well as the anxiety after CA ( $P < .05$ ). Female patients were significantly more anxious than male patients both before and after CA ( $P < .05$ ).

**Conclusions:** The state and trait anxiety of CA patients reaches to a relatively high level immediately before angiography. Given the adverse effects of anxiety on the patients' health, it is crucial to take measures to get the patients relaxed before CA. Evidence-based designing of nursing interventions, training the nurses on this issue, and providing patients with information on the nature of the CA practice may be effective. Females should be more focused in the relevant interventions.

**Keywords:** Coronary angiography, Patient care, State anxiety, Trait anxiety, Adverse effect

## Background and Objectives

The prevalence of coronary artery diseases has increased recently as a result of population aging and changes in the lifestyle.<sup>1</sup> Cardiovascular diseases (CVDs), especially coronary artery diseases, are a major cause of death and hospitalization.<sup>2,3</sup> According to the World Health Organization (WHO), about 18 million deaths have occurred due to CVDs in 2008; this rate is estimated to reach 23 million by the year 2030.<sup>4</sup> Coronary angiography (CA) is the method of choice for diagnosis of coronary artery disease and identification of the appropriate treatment strategy.<sup>5</sup> Annually, more than one million cardiac catheterization and angiogra-

phy is performed in the United States.<sup>6</sup> A comprehensive statistics on the number of cardiac catheterization is not available from Iran. However, one study has estimated that a total of 260 514 CA (347 per 100 000 individuals) has been performed in Iran in 2011, and this procedure has been cited as the fourth most common invasive treatment in this country.<sup>7</sup>

Like other invasive procedures, CA can be stressful for patients.<sup>1,5,8</sup> A study on the anxiety level of patients before angiography showed that more than 82% of patients undergoing angiography experience preoperative fear and anxiety.<sup>9</sup>

Increased anxiety can lead to physical and psychological stress with adverse effects on organs, especially heart.<sup>8,10,11</sup> Following increased anxiety, blood pressure as well as heart and breathing rates increase. These effects may negatively influence the

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patients' cardiovascular system.<sup>8,10</sup> Augmented heart rate and blood pressure may also result in increased endothelial injury and platelet aggregation through increased sympathetic nervous system activity. Increased heart rate, blood pressure, endothelial injury and platelet aggregation also carry the risk of ischemia during cardiac catheterization.<sup>5</sup> High anxiety may also lead to long hospitalization, postoperative complications, cardiovascular reactivity,<sup>5,12,13</sup> and, in general, reduced well-being.<sup>14</sup> Anxiety in patients undergoing CA also may lead to dysrhythmia, heart spasms, recurrent ischemia, reinfection, ventricular tachycardia/fibrillation, cardiovascular complications and even death.<sup>10,15</sup>

One of the major functions of nursing is to relieve patient discomfort. Therefore, the nurses as the foremost members of a medical team should assess anxiety and take measures to control it.<sup>2,5</sup>

The information about psychosocial status of patients waiting for CA is scarce,<sup>16</sup> and most studies have investigated this variable before CA.<sup>1,2,5,16,17</sup> There is a lack of investigation of continual state anxiety and trait anxiety level in the literature. The present study thus aimed to help fill this gap.

## Methods

### Study Design and Sample

A cross-sectional descriptive-analytical study was conducted. A sample of 50 patients who referred to the CA unit of Shahid Beheshti Medical Center of Kashan (Central Iran) was enrolled. The inclusion criteria were being candidate for CA for the first time, age of 30-70 years, and lack of mental disorder background. The exclusion criteria were occurrence of an active bleeding from the catheter during and after angiography, and the need for cardiopulmonary resuscitation during the procedure.

The Persian version of Spielberger's inventory was used for measuring anxiety. Reliability and validity of the Persian inventory have been confirmed by Dehghan-Nayeri and Adib-Hajbaghery<sup>17</sup> and Bassampour.<sup>18</sup> This questionnaire includes 20 items related to state anxiety and 20 items related to trait anxiety. Responses are scored from 1 to 4 based on a four-point Likert-type scale. In the case of state anxiety, responses are considered as "very low" to "very high." In the case of trait anxiety, responses are considered as "almost never" to "almost always."

Summing up of the response scores yields an anxiety score ranging from 20 to 80, with higher scores showing greater level anxiety; a score between 0-20

considered as having no anxiety, and scores from 21-40, 41-60 and 61-80 were considered as having low, moderate and severe anxiety, respectively.

### Procedure

Sampling was carried out consecutively. The patients who met the inclusion criteria were identified and invited to the study. The anxiety of patients was assessed at various times: 1 day, 2 hours, 1.5 hours, and 30 minutes before angiography as well as 30 minutes after angiography.

### Ethical Issues

The approval of the Research Ethics Committee and the Research Council of Kashan University of Medical Sciences (Iran) was obtained before conduction of the study. All participants were informed of the study objective, signed a written informed consent form and were assured of the confidentiality of their personal information. Also permissions were sought from the hospital as well as the angiography unit authorities.

### Data Analysis

Data were summarized using descriptive statistical methods. *T* test was used to compare the score means of state and trait anxieties between the males and females and also the age groups.  $P < .05$  was considered as significance in all tests. Data analysis was performed by SPSS version 16 software package.

## Results

In total, 60% of the patients were male, 70% had 50-70 years of age, and all were married. The mean score of baseline state anxiety in the patients was low ( $34.36 \pm 5.56$ ). Two hours before CA, the anxiety score mean increased to the level of  $38.14 \pm 7.36$ , and 1.5 hours before CA, it reached to the level of  $40.38 \pm 8.16$ . The increasing trend of anxiety level continued to  $41.44 \pm 8.45$ , at 30 minutes before CA, which is significantly higher than the baseline value ( $P < .05$ ). Thirty minute after CA, the mean state anxiety of the patients significantly decreased to  $33.24 \pm 3.49$  ( $P < .05$ ).

The mean score of baseline trait anxiety in the patients was low ( $35.98 \pm 7.49$ ). Two hours before CA, the anxiety score mean was at the level of  $36.46 \pm 7.24$ , and reached to the level of  $37.30 \pm 7.18$  at 1.5 hours before CA. The increasing trend of anxiety level continued to  $37.84 \pm 6.88$  at 30 minutes before CA, which is significantly higher than the baseline value ( $P < .05$ ). Thirty minutes after CA, the mean trait anxiety significantly decreased to  $36.70 \pm 6.32$  ( $P < .05$ ).

*T* test identified a significant difference in both state

and trait anxieties between the male and female patients ( $P < .05$ ) (Tables 1 and 2). No significant difference in anxiety level was found between the age groups (Tables 3 and 4).

### Discussion

Our results showed that the state and trait anxieties of the patients follow an increasing trend as it becomes more and more close to the time of angiography. The highest level of state and trait anxieties was observed immediately before angiography. On the other hand, the patients' anxiety returned nearly to the baseline after angiography.

The anxiety of patients before invasive procedures such as CA and per-cutaneous coronary interventions (PCI) has been explored by several studies.<sup>5,8,10,20</sup> Gallagher et al<sup>20</sup> and Uzun et al<sup>5</sup> reported moderate level of anxiety in the patients waiting for CA and PCI. In another study, Bally et al reported a relatively high level of anxiety (40.7) before CA, where it relaxed (to 33.6) after CA.<sup>8</sup>

While the baseline state anxiety was found to be lower than the trait anxiety in our survey, it elevated very faster than the latter. This indicates the higher priori-

ty of the state anxiety to be controlled using nursing interventions.<sup>5</sup>

The literature points towards patients' lack of knowledge of the medical practice and unfamiliarity with the hospitalization environment as the main reasons for their anxiety.<sup>5,8,10,20-22</sup> In particular, most of patients waiting for angiography reportedly lack adequate information about this medical procedure, making them anxious.<sup>9,23</sup> Fear, anxiety and other unpleasant emotional experiences are common before other cardiovascular interventions as well.<sup>24</sup>

According to Harkness et al, providing patients with information regarding the nature of CA a few days before the practice may significantly reduce the state anxiety.<sup>5,25</sup> Consistently, Jawaid et al,<sup>12</sup> found that providing correct information to the patients undergoing surgery and answering their questions may effectively reduce their anxiety level. In their survey, most patients stated that if the surgery procedure was explained to them in detail, their anxiety would reduce. They also showed that patients who have previous experience of invasive procedures experience less anxiety, confirming the relevance of previous familiarity of patients with the medical practices to their anxiety

**Table 1.** Comparison of State Anxiety Between Male and Female Patients

Time of Assessment	Males		Females		df	t	P Value
	Mean	SD	Mean	SD			
One day before CA	33.10	5.42	36.25	5.35	2	-2.02	.049
2 hours before CA	36.20	6.36	41.05	7.95	2	-2.28	.029
1.5 hours before CA	38.20	6.82	43.65	9.06	2	-2.29	.029
30 minutes before CA	39.07	7.27	45.00	9.01	2	-2.45	.019
30 minutes after CA	31.97	3.10	35.15	3.21	2	-3.50	.001

**Table 2.** Comparison of Trait Anxiety Between Male and Female Patients

Time of Assessment	Males		Females		df	t	P Value
	Mean	SD	Mean	SD			
One day before CA	32.97	5.86	40.50	7.50	2	-3.97	.0002
2 hours before CA	33.77	5.58	40.50	7.67	2	-3.37	.002
1.5 hours before CA	34.47	5.48	41.55	7.45	2	-3.64	.001
30 minutes before CA	35.57	5.45	41.25	7.51	2	-2.91	.006
30 minutes after CA	34.57	5.23	39.90	6.58	2	-3.18	.003

**Table 3.** Comparison of State Anxiety Between Age Groups

Time of Assessment	Age Groups				df	t	P Value
	Group 1: 30-50 Years		Group 2: 51-70 Years				
	Mean	SD	Mean	SD			
One day before CA	36.47	8.24	33.46	3.72	2	1.35	.19
2 hours before CA	39.80	9.46	37.43	6.29	2	0.89	.38
1.5 hours before CA	42.27	10.34	39.57	7.06	2	0.92	.36
30 minutes before CA	43.40	10.37	40.60	7.49	2	0.94	.35
30 minutes after CA	33.53	3.98	33.11	3.31	2	0.38	.70

**Table 4.** Comparison of Trait Anxiety Between Age Groups

Time of Assessment	Age Groups				df	t	P Value
	Group 1: 30-50 Years		Group 2: 51-70 Years				
	Mean	SD	Mean	SD			
One day before CA	36.53	9.26	35.74	6.73	2	0.29	.76
2 hours before CA	37.07	9.03	36.20	6.45	2	0.33	.70
1.5 hours before CA	38.40	8.82	36.83	6.45	2	0.70	.48
30 minutes before CA	39.13	8.66	37.29	6.02	2	0.75	.46
30 minutes after CA	38.00	7.63	36.14	5.70	2	0.84	.40

level.<sup>12</sup> Other studies have also shown that informing the patients can positively affect behaviors, attitudes and skills, maintain and promote health, and reduce anxiety in the patients.<sup>5,19,26</sup>

In our study, female patients showed higher level of state and trait anxiety compared with male patients. This finding is consistent with the results from several other studies. For instance, Vural et al reported higher level of anxiety in women with coronary artery disease compared with men suffering from the same disease,<sup>27</sup> before the diagnosis procedure. Also Yeganehkhah et al found a higher level of anxiety in females compared with males among the hospitalized patients with myocardial infarction.<sup>28</sup>

It maybe speculated that the higher level of anxiety in female patients may stem from the fact that women experience coronary artery disease at an older age as compared with male patients, and experience more severe limitations after that<sup>15</sup>; thus they have lower resistance against stressors. Nevertheless our and previous studies did not identify any significant difference in the

anxiety level of different age groups.<sup>29</sup>

#### Study Limitations

One of the limitations of this study was that the measurement of anxiety relied solely upon the patients' self-reports. Self-report methodology has several drawbacks. Also, the small sample and the used sample technique pose limits to generalizing the results. A comprehensive conclusion on the anxiety of patients undergoing CA may be resulted from future large-scale studies.

#### Conclusions

Our study surveyed the level of state and trait anxiety in patients undergoing CA. The results showed that both types of anxiety increases before CA, and their highest level appears immediately before this diagnosis practice. Considering the negative impact of anxiety on the well-being of cardiovascular patients and the subsequent medical outcomes, measures should be taken to alleviate anxiety in these patients. Evidence-based design of nursing interventions, training the nurses on

this issue, provision of structured care, and provision patients with information on the nature of the diagnostic practice before CA may be effective. Based on our findings, females should be more focused in the relevant interventions.

#### Abbreviations

(CA): Coronary angiography; (PCI): Per-cutaneous coronary interventions

#### Competing Interests

The authors declare no competing interests.

#### Authors' Contributions

TM and MAH jointly conceived and designed the study. TM performed the sampling, data collection, data analysis and prepared the draft manuscript. TM and MAH made critical revisions to the manuscript. Both authors read and approved the final manuscript.

#### Acknowledgments

The researchers would like to express their gratitude to the directors and personnel of the Angiography Unit of Shahid Beheshti Hospital of Kashan University of Medical Sciences. The authors are also thankful to all patients and their relatives who participated in this study. This study was granted by the Research Deputy in Kashan University of Medical Sciences (grant No. 9223).

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**Please cite this article as:**

Moradi T, Adib Hajbaghery M. State and trait anxiety in patients undergoing coronary angiography. *Int J Hosp Res*. 2015;4(3):123-128.