

Assessing Anxiety in the Cardiac Catheterization Pathway: Cross-Sectional Evidence from a Tertiary Center

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Abstract. Anxiety is a common response to stressful medical interventions. Patients undergoing cardiac catheterization frequently experience heightened anxiety due to fear of pain, complications, or an unfavorable diagnosis. Assess anxiety levels among patients undergoing cardiac catheterization and to examine their relationship with selected demographic variables. Cross-sectional study of 100 patients at Mosul Center for Cardiology and Cardiac Surgery. Data on anxiety were collected via interview questionnaires and analyzed in SPSS v28. Purposive sampling was used. Study period: 13 October 2024–20 April 2025. Fifty percent of patients had moderate anxiety. Anxiety correlated positively with gender ($r=0.240$, $p=0.016$) and negatively with educational level ($r=-0.198$, $p=0.048$) and occupation ($r=-0.335$, $p<0.001$). Most patients reported moderate anxiety. Gender and education showed weak but significant correlations with anxiety, while occupation showed a moderate negative correlation. Targeted mental-health programs and improved access to psychological services are recommended.

Highlights:

1. Moderate to severe anxiety was present in 80% of patients undergoing cardiac catheterization, with fear being the most dominant symptom.
2. Anxiety showed significant associations with gender, education, and occupation, but not with medical comorbidities.
3. Findings emphasize the need for routine anxiety screening and targeted psychosocial interventions in catheterization care.

Keywords: Anxiety, Cardiac catheterization, Demographic factors, Iraq, Psychological interventions

Introduction

Cardiac catheterization is widely used to diagnose and treat coronary artery disease, valvular disorders, and congenital defects; despite being minimally invasive, it can provoke substantial patient anxiety because of perceived cardiovascular risk and potential complications [1,2]. Elevated pre-/periprocedural anxiety adversely affects physical and psychological well-being and may influence clinical outcomes [2,3].

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Drivers of anxiety include inadequate procedural knowledge, prior negative medical experiences, uncertainty about outcomes, and personal factors such as age, gender, culture, and psychological history; recognizing these determinants enables targeted anxiety-reduction strategies [4,5].

Anxiety can also complicate technical aspects of catheterization by altering hemodynamics and sedation response, potentially increasing complications and recovery time [6]. Multidisciplinary interventions—clear communication, education, psychological support, relaxation techniques, music therapy, and when appropriate, pharmacologic approaches—can reduce preprocedural anxiety [7,8]. Improving patients' understanding and perceived support enhances satisfaction and adherence, contributing to better long-term outcomes [9]. Nonetheless, more focused research on the prevalence, correlates, and management of anxiety specifically in cardiac-catheterization populations remains needed to refine patient-centered care [10].

Methods

Design and setting

A non-experimental cross-sectional study was conducted at the Mosul Center for Cardiology and Cardiac Surgery (Nineveh Health Department, near Al-Salam Teaching Hospital Consultation) from 13 October 2024 to 20 April 2025.

Participants and sampling

A purposive sample of 100 adults (≥ 18 years) scheduled for or undergoing cardiac catheterization was recruited. Exclusion: age < 18 years.

Ethical/administrative approvals and consent

Formal approvals were obtained from the College of Nursing/University of Mosul (Clinical Nursing Science Department). Eligible patients were informed about the study, and written consent was secured.

Measures

Data were collected via interviewer-administered questionnaires covering:

1. Sociodemographics (age, gender, education, occupation, residence, weight, height),
2. Medical history (diabetes mellitus, hypertension, renal disease).
3. Anxiety severity using the **Hamilton Anxiety Rating Scale (HAM-A)** (14 items scored 0–4; total score interpreted as: ≤ 17 mild, 18–24 moderate, 25–30 severe, > 30 very severe) [11].

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Validity and reliability

Face/content validity was established by a panel of 10 subject-matter experts who reviewed and modified the instrument as needed. Internal consistency (Cronbach's alpha) was planned to be computed.

Pilot testing

A pilot with 10 catheterization patients (7–18 January 2025) assessed feasibility and clarity; pilot participants were excluded from the main sample.

Data collection procedures

Main data collection occurred 19 January–3 April 2025 through structured interviews conducted at the study site.

Statistical analysis

Data were coded and analyzed using SPSS v28. Descriptive statistics (frequencies, percentages, means, standard deviations) summarized sample characteristics and anxiety levels. Pearson's correlation coefficient assessed associations between anxiety and selected variables. Statistical significance was set at $p \leq 0.05$.

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Results

Table 1. Demographic Characteristics of Study Participants.

Variable	Minimum	Maximum	Mean	S. D.
Age in Years	36	80	58.38	8.452
Weight	44	123	82.67	14.887
Hight	100	190	165.51	13.052
BMI	17.19	83.00	30.7243	8.30071
Variable	Frequency	Percentage		
Gender				
Male	62	62.0		
Female	38	38.0		
Educational Level				
No Formal Education	18	18.0		
Can Read and Write	11	11.0		
Primary Education	38	38.0		
Secondary Education	10	10.0		
Higher Education	23	23.0		
Marital status				
Single	1	1.0		
Married	87	87.0		
Divoreced	1	1.0		
Widdow	11	11.0		
Occupation				
Unemployed/Hose wife	59	59.0		
Student	1	1.0		
Employed	20	20.0		
Retired	20	20.0		
Residence				
Urban	61	61.0		
Rural	39	39.0		
Total	100	100.0		

Among 100 participants (mean age 58.4 ± 8.5 years), the average BMI was 30.7 ± 8.3 kg/m², indicating obesity. Men comprised 62%. Education was generally low (67% primary or less;

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23% higher). Most were married (87%). Employment was limited: 59% unemployed/housewives, 20% retired, 20% employed. Residence was mainly urban (61% vs 39% rural).

Table 2. Medical History of Study Participants

Variable	Frequency	Percentage
Diabetes Mellitus		
Yes	49	49.0
No	51	51.0
Renal Diseases		
Yes	15	15.0
No	85	85.0
Hypertension		
Yes	61	61.0
No	39	39.0
Total	100	100.0

Among the 100 participants, nearly half had diabetes mellitus (49%), a minority had renal disease (15%), and hypertension was the most prevalent condition (61%). Conversely, 51% were non-diabetic, 85% had no renal disease, and 39% were non-hypertensive.

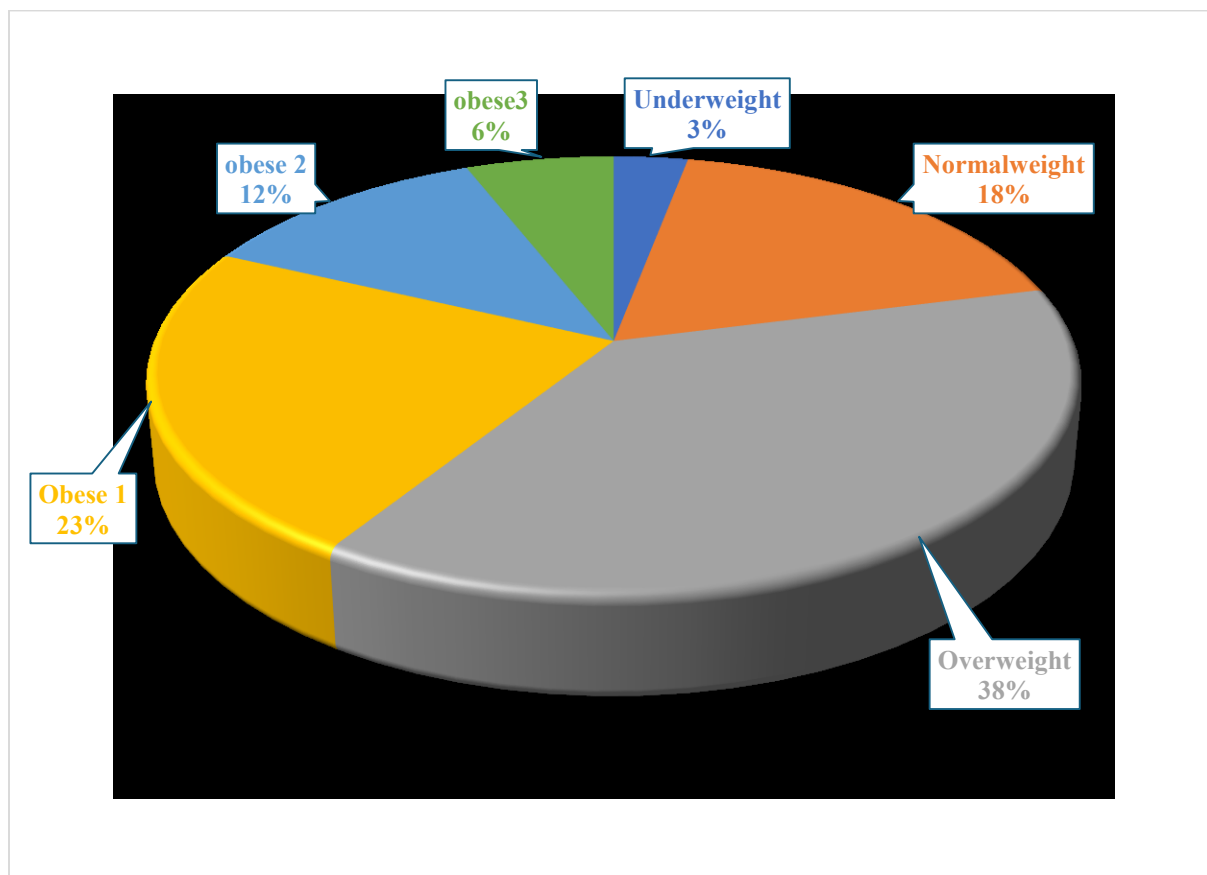


Figure 1. Distribution of Body Mass Index Classification

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Table 3. Percentage Distribution of Symptoms according to Hamilton Anxiety Rating Scale Among Participants (N = 100)

Symptom Category	No Symptoms	Light	Moderate	Severe	Very Severe
Mood Disturbance	47	15	16	17	5
Tension	26	17	24	27	6
Fear	1	15	19	43	22
Insomnia	26	25	18	22	9
Memory Issues	30	23	31	13	3
Depressive Mood	47	12	24	14	3
Behaviour Interview	During 56	14	14	15	1
Somatic Feelings	(Sensory) 34	23	21	18	4
Muscular	26	18	30	22	3
Cardiovascular	21	31	25	21	2
Respiratory Symptoms	31	23	18	26	2
Gastrointestinal	35	20	20	23	2
Urogenital	24	21	19	32	4
Nervous System	27	31	21	18	3

Symptom profiles showed pronounced fear, with 65% rated severe/very severe (43% and 22%, respectively) and virtually none symptom-free (1%), making it the most distressed domain. Tension and muscular symptoms were also burdensome, with moderate-to-very-severe levels in 57% and 55% of participants. Insomnia was mixed (49% moderate/severe/very severe), while cardiovascular, respiratory, and gastrointestinal complaints clustered around light-to-severe ($\approx 45\text{--}48\%$ moderate or worse). Urogenital symptoms had a notably high severe proportion (32%). In contrast, many participants reported no mood disturbance or depressive mood (47% each), and most showed normal behaviour during interview (56% no symptoms). Memory

issues and nervous system complaints were generally mild to moderate, with relatively few severe ratings.

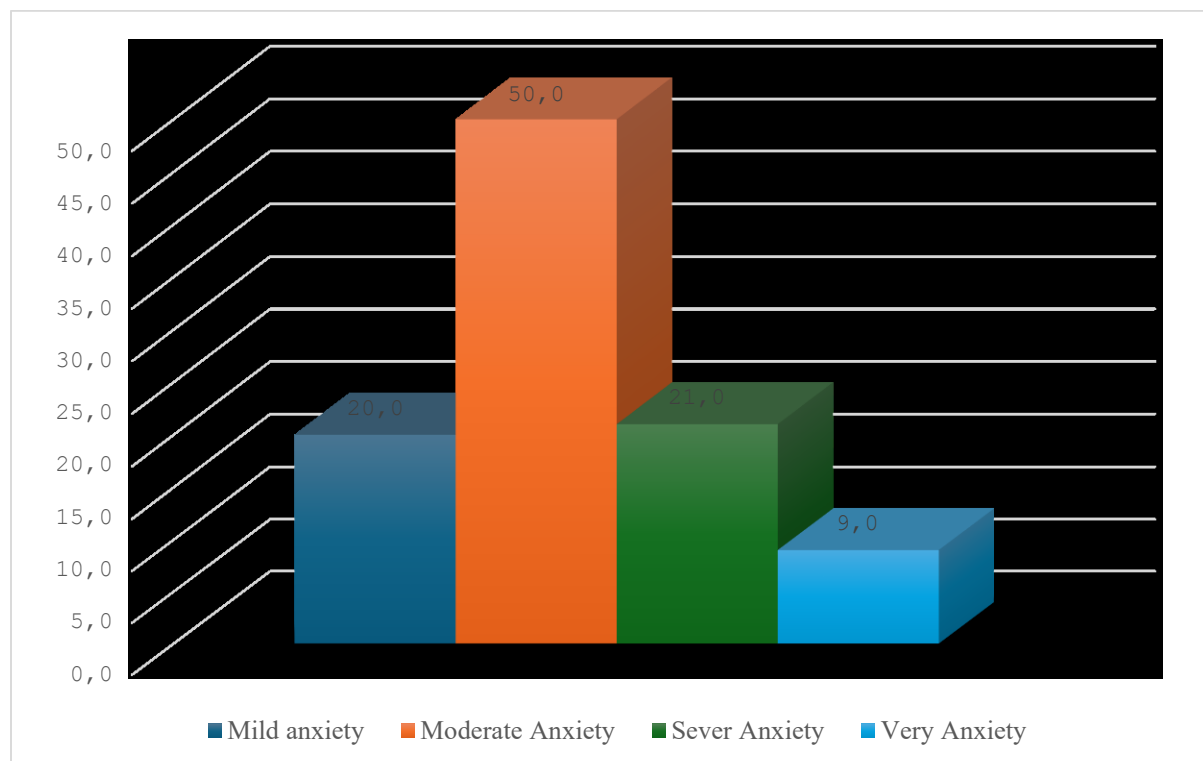


Figure 2. Percentage Distribution of Anxiety Level among Participants

Anxiety severity was dominated by moderate cases (50%), with 21% severe and 9% very severe; only 20% were mild. Overall, 80% of participants had at least moderate anxiety, and nearly one-third experienced severe/very severe levels—indicating a substantial clinical burden.

Table 4. Correlation Coefficients and Significance Values with Anxiety Level Score

Variable	Correlation Coefficient	Sig. (2-tailed)	Strength
Age	-0.048	0.634	Weak
BMI	0.089	0.380	Weak
Gender	0.240*	0.016	Weak
DM	-0.079	0.432	Weak
Renal	-0.076	0.455	Weak
HTN	-0.097	0.335	Weak
Educational Level	-0.198*	0.048	Weak
Marital Status	0.182	0.069	Weak
Occupation	-0.335**	<0.001	Moderate

Anxiety showed a weak positive correlation with gender ($r=0.240$, $p=0.016$) and a weak negative correlation with educational level ($r=-0.198$, $p=0.048$). The only notable association was a moderate negative correlation with occupation ($r=-0.335$, $p<0.001$), indicating higher anxiety among participants with lower occupational engagement. All other variables—age, BMI, diabetes, renal disease, hypertension, and marital status—had weak, non-significant correlations with anxiety ($p>0.05$).

Discussion

This study shows a high burden of pre-procedural anxiety among patients undergoing cardiac catheterization: four in five had at least moderate anxiety and nearly one-third had severe/very severe levels. These magnitudes are consistent with prior catheterization cohorts and perioperative literature. For example, Fernandez et al. found 53.5% of patients who underwent transradial catheterization had high state anxiety, whereas Delewi et al. reported peak anxiety prior to angiography/PCI [12,13], highlighting the process itself as an anxiety enhancer. At a more macro health-system level, a meta-analysis of studies from low- and middle-income countries calculated preoperative anxiety to be ~56%, hence, high preprocedural anxiety appears to be prevalent even in settings with limited resources [14]. Other studies specifically targeting catheterization populations in comparable settings also report very high preprocedural anxiety levels, consistent with our observations [15].

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Our sample symptom profiling emphasises fear as a major domain (65% severe/very severe). This is in accordance with meta-analytic findings that fear of complications, postoperative pain and death are the main sources driving preoperative anxiety, which indicates that 'fear-focused' counseling is to be the most effective [16]. The predominance of tension, muscular, and insomnia signs in our cohort is as well clinically typical in catheterization centres whose anxiousness is maximum on the consent, transfer, and arterial access stage [13].

In terms of determinants, our findings revealed a positive association between female sex and anxiety, as well as higher anxiety among those with lower educational levels. Both patterns are well described: women are more likely to report preoperative state anxiety than men in populations undergoing surgical and cardiac procedures [12,17], and low education often a proxy for low health literacy is correlated with higher anxiety, while better health literacy reduces it [17,18]. Of interest, some studies lack or report weak associations with education per se, yet consider health literacy key an observation that may help reconcile heterogeneity between tools and settings [18].

We also found a **moderate inverse association between occupational engagement and anxiety**. While direct evidence on employment status in catheterization cohorts is sparse, perioperative studies identify socioeconomic disadvantage (e.g., low or no income) as a risk factor for preoperative anxiety, consistent with the direction of our effect and suggesting that employment may function as a socioeconomic/psychosocial buffer (routine, income security, social support) [19,20]. In contrast, biomedical comorbidities (diabetes, hypertension, renal disease) did not correlate with anxiety in our data; similarly, prior catheterization research has emphasized psychosocial and informational factors (age < 65, female sex, education, urgency of PCI) over chronic medical diagnoses as anxiety predictors [13].

These patterns carry practical implications. First, meaningful anxiety screening (e.g., HAM-A) is "actually" beneficial prior to catheterization. Second, focused, preprocedural education that specifically addresses feared complications and the course of the procedure may help reduce anxiety particularly in patients with lower education/health literacy [16,18]. Third, we believe that there are increasing data to support non-pharmacological adjuncts: music therapy and progressive muscle relaxation diminish anxiety pre/peri-angiography, and virtual-reality distraction appears to hold potential for preprocedural anxiety reduction in invasive coronary angiography (some trials with inconsistent findings) [21–24]. Inclusion of these low-cost strategies combined with standard counselling and enhanced focus on women and those with lower education and occupational engagement may generate the best yield.

Strengths and limitations: Strengths include granularity of symptoms domains and analysis of social determinants. Limitations included a cross-sectional design, single-center purposive

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sample, and use of only one tool, limiting causal inference and generalizability. Differences between studies according to the anxiety instrument used and the timing of measurement (HAM-A vs STAI/APAIS; ward vs cath-lab holding area) also make direct comparisons of prevalence rates difficult.

Conclusion

This study highlights that preprocedural anxiety is highly prevalent among patients undergoing cardiac catheterization, with most participants experiencing at least moderate anxiety and a significant proportion reporting severe or very severe symptoms. Fear was the most dominant domain, while gender, education, and occupation emerged as significant correlates, underscoring the influence of sociodemographic and psychosocial factors rather than medical comorbidities. These findings support the integration of routine anxiety screening and tailored, literacy-sensitive interventions—such as patient education, counseling, relaxation strategies, and non-pharmacological adjuncts like music therapy or virtual reality—into the catheterization pathway. Addressing these psychosocial determinants may improve patient comfort, preparedness, and overall procedural outcomes

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