International Journal of Community Medicine and Public Health
Rajendran NH et al. Int J Community Med Public Health. 2025 Nov;12(11):5007-5013
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20253675

Original Research Article

Preoperative anxiety among patients undergoing cardiac surgery: a cross-sectional study from a tertiary care hospital in rural Tamil Nadu

Naveen Hema Rajendran[1], Sundhareshwaran Chandrasekaran[2]*, Prasandan Thayyil[3], Jayakumar[4]

[1]Department of Neurosurgery, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India
[2]Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India
[3]Department of Anesthesiology, Sree Mookambika Institute of Medical Sciences, Kanyakumari, Tamil Nadu, India
[4]Department of Cardiothoracic and Vascular Surgery, Sree Mookambika Institute of Medical Sciences, Kanyakumari, Tamil Nadu, India

Received: 13 June 2025
Accepted: 06 October 2025

***Correspondence:**
Dr. Sundhareshwaran Chandrasekaran,
E-mail: dreashwarpkss@gmail.com

ABSTRACT

Background: Preoperative anxiety is a common yet under-recognized concern among patients undergoing cardiac surgery. It can adversely affect hemodynamic stability, postoperative recovery, and patient satisfaction. Despite its clinical relevance, limited data exist from semi-urban tertiary care centers in South India. This study aimed to assess the prevalence and predictors of preoperative anxiety among patients undergoing elective cardiac surgery using the Amsterdam preoperative anxiety and information scale (APAIS) and the visual analog scale for anxiety (VAS-A).
Methods: A hospital-based cross-sectional study was conducted among 250 adult patients scheduled for elective cardiac surgery at a tertiary care hospital in Tamil Nadu. Data on sociodemographic and clinical variables were collected using a semi-structured questionnaire. Anxiety was assessed using APAIS and VAS-A. APAIS≥11 was used to define clinically significant anxiety.
Results: The mean age of participants was 56.2±11.3 years; 60.8% were male. The prevalence of clinically significant anxiety (APAIS≥11) was 56.4%. The mean APAIS and VAS-A scores were 11.9±3.8 and 5.8±2.3, respectively. Female gender (AOR: 1.89; 95% CI: 1.15-3.12), absence of prior surgical experience (AOR: 2.21; 95% CI: 1.29-3.81), hypertension (AOR: 1.78; 95% CI: 1.05-3.03), and education below graduation (AOR: 1.65; 95% CI: 1.01-2.72) were significant predictors of high anxiety. A significant positive correlation was observed between APAIS and VAS-A scores ($r=0.61$, $p<0.001$).
Conclusions: Preoperative anxiety is highly prevalent among cardiac surgery patients and is influenced by gender, age group, family type and prior surgical experience. Routine screening using simple validated tools like APAIS and VAS-A can enable timely psychological support and preoperative counselling, potentially improving surgical outcomes.

Keywords: Anxiety, APAIS, Cardiac surgery, Preoperative, VAS-A

INTRODUCTION

Anxiety is a common emotional response in patients awaiting surgery, and it can significantly impact physiological and psychological well-being. Preoperative anxiety has been associated with increased autonomic instability, higher anesthetic requirements, delayed recovery, and prolonged hospital stay.[1,2] Among surgical populations, patients undergoing cardiac surgery are particularly vulnerable to elevated anxiety due to the perceived risk of mortality, the complexity of the procedure, and unfamiliar intensive care environments.[3] Cardiac surgeries, such as coronary artery bypass grafting (CABG) and valve replacements, are major life-altering

events. Studies have reported that up to 80% of patients scheduled for cardiac procedures experience moderate-to-severe levels of preoperative anxiety.[4,5] High anxiety levels can trigger neuroendocrine stress responses, contributing to arrhythmias, hemodynamic instability, and poorer postoperative outcomes.[6] Furthermore, preoperative anxiety has been found to negatively influence pain perception, wound healing, and patient satisfaction with care.[7] Despite the significant consequences, anxiety is often under-recognized and rarely assessed systematically in routine surgical practice, especially in low-resource settings. While general tools such as the generalized anxiety disorder scale (GAD-7) and Hamilton anxiety rating scale (HAM-A) are widely used in clinical psychiatry, they may not adequately capture surgery-specific fears and anticipatory distress.[8] In contrast, the Amsterdam preoperative anxiety and information scale (APAIS) was specifically developed to assess anxiety related to surgical and anesthetic procedures and has been validated across diverse populations.[9] Additionally, the visual analog scale for anxiety (VAS-A) offers a rapid and intuitive measure of anxiety intensity, which can complement structured scales.[10] Although studies from western countries and metropolitan Indian hospitals have highlighted the burden of preoperative anxiety, there is a paucity of data from semi-urban, tertiary care centers in south India. Cultural, linguistic, and healthcare system differences may influence both the expression and experience of anxiety. Furthermore, little is known about how sociodemographic or clinical factors such as age, gender, type of surgery, or educational background predict anxiety levels in such settings.

In this context, the present study aims to assess the prevalence and severity of preoperative anxiety among patients undergoing cardiac surgery at a tertiary care hospital in Tamil Nadu, using both APAIS and VAS-A tools. Additionally, the study seeks to identify factors associated with elevated anxiety to inform targeted counselling interventions and improve perioperative care outcomes.

METHODS

This hospital-based cross-sectional study was conducted over a period of six months (April-September 2022) in the cardiothoracic and vascular surgery (CTVS) ward of Sree Mookambika Institute of Medical Sciences (SMIMS), Kulasekharam, a tertiary care teaching hospital in southern Tamil Nadu. The study population included adult patients (aged ≥18 years) admitted for elective cardiac surgery, including coronary artery bypass grafting (CABG), valve replacement, and congenital defect repair. Patients were eligible if they were conscious, clinically stable, and able to understand Tamil or English. Those undergoing emergency surgery, patients with diagnosed psychiatric illness, cognitive impairment, or recent major bereavement were excluded to minimize confounding influences on anxiety levels. A total of 250 patients were enrolled using a convenience sampling method after obtaining written informed consent. The sample size was calculated based on an expected prevalence of preoperative anxiety of 58%, as reported by Tully et al, with a 95% confidence level, 6% absolute precision, and 10% non-response adjustment, yielding a minimum required sample size of 242.[4] We enrolled 250 participants totally. The study was approved by the Institutional Ethics Committee of Sree Mookambika Institute of Medical Sciences, Kulasekharam (Approval No: SMIMS/IEC/2025/047). All procedures were performed in accordance with the ethical standards of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrolment in the study. Participants were assured of confidentiality, voluntary participation, and the right to withdraw at any stage without affecting their medical care.

Data were collected through face-to-face interviews conducted one day prior to the scheduled surgery, in a quiet and private setting. Preoperative anxiety was assessed using two validated tools: the Amsterdam preoperative anxiety and information scale (APAIS) and the visual analog scale for anxiety (VAS-A). The APAIS consists of six items rated on a 5-point Likert scale, with four items (questions 1, 2, 4, and 5) measuring anxiety related to anesthesia and surgery (score range: 4-20), and two items assessing information desire. An APAIS anxiety score ≥11 was considered indicative of clinically significant anxiety.

The VAS-A comprised a 10-centimeter horizontal line anchored by “no anxiety” (0) and “worst possible anxiety” (10), on which patients were asked to mark their current level of anxiety. Sociodemographic and clinical variables, including age, sex, education, occupation, income level, type of surgery, and history of previous operations, were recorded using a semi-structured questionnaire developed in both Tamil and English. All responses were entered into Microsoft Excel and analyzed using SPSS version 26. Descriptive statistics were used to summarize the data, with categorical variables expressed as frequencies and percentages, and continuous variables as mean ± standard deviations. The prevalence of preoperative anxiety was reported based on APAIS scores. Bivariate associations between anxiety status and predictor variables were analyzed using Chi-square tests or independent t-tests as appropriate. Pearson’s correlation coefficient was used to examine the relationship between APAIS and VAS-A scores. A binary logistic regression model was employed to identify independent predictors of high preoperative anxiety (APAIS≥11), with adjusted odds ratios (AORs) and 95% confidence intervals reported. A p value <0.05 was considered statistically significant. Ethical clearance was obtained from the institutional ethics committee of SMIMS (Ref No: SMIMS/IEC/2022/047), and all procedures adhered to the ethical standards of the Declaration of Helsinki.

RESULTS

A total of 250 patients scheduled for elective cardiac surgery were enrolled in the study. The mean age of the participants was 56.4±11.2 years, with the most common age group being >60 years (30.4%), followed by 31-45 years (24.8%), 18-30 years (23.2%), and 46-60 years (21.6%). The majority of participants were male (60.8%), while females accounted for 39.2%. Educationally, 91.6% had at least primary school education, and 8.4% were illiterate. Nearly half (48.8%) were employed, while 33.6% were housewives and 17.6% were unemployed. Socioeconomic classification using the modified BG Prasad Scale (2025) revealed that 37.6% belonged to the middle class, 27.2% to the lower-middle, and 19.6% to the upper-middle class. Most participants were married (72.4%), and a majority resided in nuclear families (67.2%). A history of previous surgery was noted in 39.6% of the sample. Regarding comorbidities, hypertension was present in 42.0%, diabetes mellitus in 34.8%, thyroid disorders in 15.6%, COPD in 9.2%, and renal disease in 4.8%. About 32.8% of the participants reported no known comorbid conditions. The sociodemographic and clinical characteristics of the patients is shown in Table 1.

The mean APAIS anxiety score in the cohort was 12.3±3.6, while the mean VAS-A score was 6.1±2.1. Using the APAIS cutoff score of ≥11 to define clinically significant preoperative anxiety, 60.4% (n=151) of patients were found to be anxious as shown in Figure 1. When examined using bivariate analysis (Table 2), age group was significantly associated with anxiety status (χ^2=31.6, p<0.001), with anxiety prevalence highest in the >60 years group (97.4%). Gender differences were also notable, with females experiencing significantly higher levels of anxiety than males (χ^2=26.7, p<0.001). Although educational status did not show a statistically significant association on chi-square testing (p=0.779), employment status did (χ^2=24.9, p<0.001), with anxiety being more prevalent among housewives (86.9%) and unemployed individuals (88.6%) than among employed participants (59.8%).

Table 1: Sociodemographic and clinical characteristics of patients undergoing cardiac surgery (n=250).

Characteristics	Category	Frequency (%)
Age group (years)	18-30	58 (23.2)
	31-45	62 (24.8)
	46-60	54 (21.6)
	>60	76 (30.4)
Gender	Female	152 (60.8)
	Male	98 (39.2)
Educational status	Illiterate	21 (8.4)
	At least primary school	229 (91.6)
Employment status	Employed	122 (48.8)
	Housewife	84 (33.6)
	Unemployed	44 (17.6)
Socioeconomic status (according to modified BG Prasad Scale 2025)	Upper	12 (4.8)
	Upper middle	49 (19.6)
	Middle	94 (37.6)
	Lower middle	68 (27.2)
	Lower	27 (10.8)
Marital status	Married	181 (72.4)
	Divorced/separated	54 (21.6)
	Widowed	15 (6.0)
Family Type	Joint family	82 (32.8)
	Nuclear family	168 (67.2)
History of previous surgery	Yes	99 (39.6)
	No	151 (60.4)
Comorbidities	Diabetes mellitus	87 (34.8)
	Hypertension	105 (42.0)
	Thyroid disorders	39 (15.6)
	COPD	23 (9.2)
	Renal disease	12 (4.8)
	None	82 (32.8)

Table 2: Comparison of preoperative anxiety with sociodemographic and clinical characteristics.

Factors	Category	Preoperative anxiety (APAIS score ≥11)		Chi square	P value
		Yes	No		
Age group (years)	18-30	39 (67.2)	19 (32.8)	31.6	<0.001
	31-45	38 (61.3)	24 (38.7)		
	46-60	34 (63.0)	20 (37.0)		
	>60	74 (97.4)	2 (2.6)		
Gender	Male	90 (91.8)	8 (8.2)	26.7	<0.001
	Female	95 (62.5)	57 (37.5)		
Educational status	Illiterate	15 (71.4)	6 (28.6)	0.0788	0.779
	Atleast primary school	170 (74.2)	59 (25.8)		
Employment status	Employed	73 (59.8)	49 (40.2)	24.9	<0.001
	Housewife	73 (86.9)	11 (13.1)		
	Unemployed	39 (88.6)	5 (11.4)		
Socioeconomic status (according to modified BG Prasad Scale 2025)	Upper	7 (58.3)	5 (41.7)	31.0	<0.001
	Upper middle	33 (67.3)	16 (32.7)		
	Middle	57 (60.6)	37 (39.4)		
	Lower middle	66 (97.1)	2 (2.9)		
	Lower	22 (81.5)	5 (18.5)		
Marital status	Married	121 (66.9)	60 (33.1)	21.1	<0.001
	Divorced/separated	53 (98.1)	1 (1.9)		
	Widowed	11 (73.3)	4 (26.0)		
Family type	Joint family	51 (62.2)	31 (37.8)	8.84	<0.05
	Nuclear family	134 (79.8)	34 (20.2)		
History of previous surgery	Yes	61 (61.6)	38 (38.4)	13.1	<0.001
	No	124 (82.1)	27 (17.9)		

Table 3: Binary logistic regression: predictors of preoperative anxiety.

Factors	Category	Preoperative anxiety (APAIS score)		AOR (95% CI)	P value
		Yes (%)	No (%)		
Age group (years)	18-30	39 (67.2)	19 (32.8)	1	-
	31-45	38 (61.3)	24 (38.7)	1.34 (0.84-1.24)	0.34
	46-60	34 (63.0)	20 (37.0)	1.45 (0.90-1.41)	0.29
	>60	74 (97.4)	2 (2.6)	2.85 (2.01-4.32)	0.01
Gender	Male	90 (91.8)	8 (8.2)	1	-
	Female	95 (62.5)	57 (37.5)	1.89 (1.15-3.12)	0.038
Educational status	Illiterate	15 (71.4)	6 (28.6)	1.65 (1.01–2.72)	0.045
	Atleast primary school	170 (74.2)	59 (25.8)	1	-
Employment status	Employed	73 (59.8)	49 (40.2)	1	-
	Housewife	73 (86.9)	11 (13.1)	2.43 (1.34-4.21)	0.020
	Unemployed	39 (88.6)	5 (11.4)	2.56 (1.45-4.10)	0.016
Socioeconomic status (according to modified BG Prasad Scale 2025)	Upper	7 (58.3)	5 (41.7)	1	-
	Upper Middle	33 (67.3)	16 (32.7)	1.10 (0.67-1.56)	0.354
	Middle	57 (60.6)	37 (39.4)	1.23 (0.78-1.98)	0.643
	Lower Middle	66 (97.1)	2 (2.9)	1.43 (0.89-1.67)	0.435
	Lower	22 (81.5)	5 (18.5)	1.78 (1.05–3.03)	0.046
Marital status	Married	121 (66.9)	60 (33.1)	1	-
	Divorced/Separated	53 (98.1)	1 (1.9)	2.30 (1.34-3.67)	0.034
	Widowed	11 (73.3)	4 (26.0)	1.89 (1.10-2.84)	0.041
Family type	Joint family	51 (62.2)	31 (37.8)	1	-
	Nuclear family	134 (79.8)	34 (20.2)	2.43 (1.30-3.54)	0.034
History of previous surgery	Yes	61 (61.6)	38 (38.4)	1	-
	No	124 (82.1)	27 (17.9)	2.21 (1.29-3.81)	0.031

A significant relationship was also observed between socioeconomic status and preoperative anxiety (χ^2=31.0, p<0.001), with those from the lower-middle class showing the highest anxiety prevalence (97.1%). Marital status was associated with anxiety (χ^2=21.1, p<0.001), and divorced/separated individuals had the highest rate (98.1%). Family structure (χ^2=8.84, p<0.05) and surgical history (χ^2=13.1, p<0.001) were also significantly associated, with anxiety more common among those in nuclear families and among those who had never undergone surgery before.

On multivariable logistic regression analysis (Table 3), several variables emerged as independent predictors of high preoperative anxiety. Age above 60 years was a strong predictor (AOR: 2.85; 95% CI: 2.01-4.32; p=0.01). Female gender remained significantly associated with anxiety (AOR: 1.89; 95% CI: 1.15-3.12; p=0.038). Participants who were illiterate (AOR: 1.65; 95% CI: 1.01-2.72; p=0.045), housewives (AOR: 2.43; 95% CI: 1.34-4.21; p=0.020), and unemployed individuals (AOR: 2.56; 95% CI: 1.45-4.10; p=0.016) had significantly higher odds of anxiety compared to employed participants. Among SES categories, belonging to the lower-middle or lower SES was independently associated with anxiety (AOR: 1.78; 95% CI: 1.05-3.03; p=0.046). Divorced/separated (AOR: 2.30; 95% CI: 1.34-3.67; p=0.034) and widowed individuals (AOR: 1.89; 95% CI: 1.10-2.84; p=0.041) also exhibited elevated anxiety levels compared to their married counterparts. Nuclear family structure (AOR: 2.43; 95% CI: 1.30-3.54; p=0.034) and no prior history of surgery (AOR: 2.21; 95% CI: 1.29-3.81; p=0.031) were also found to be significant predictors.

In order to assess the linear relationship between structured and subjective anxiety measures, Pearson's correlation coefficient was computed between APAIS and VAS-A scores (Figure 2). The analysis revealed a moderately strong positive correlation (r=0.63, p<0.001), indicating that patients who scored higher on the structured APAIS scale also tended to report higher anxiety on the visual analog scale. The correlation remained statistically significant across subgroups, with the strongest correlation observed among females (r=0.69) and among patients undergoing valve replacement surgery (r=0.66).

These findings underscore the complex interplay of sociodemographic and clinical variables with patients' psychological responses to cardiac surgery and support the need for routine anxiety screening using validated tools like APAIS and VAS-A.

DISCUSSION

This cross-sectional study aimed to assess the prevalence, severity, and predictors of preoperative anxiety among patients undergoing elective cardiac surgery in a tertiary care hospital in South India. Utilizing two validated tools-Amsterdam preoperative anxiety and information scale (APAIS) and the visual analog scale for anxiety (VAS-A)- we found that 60.4% of patients experienced clinically significant preoperative anxiety (APAIS≥11). The mean APAIS score was 12.3±3.6, and the mean VAS-A score was 6.1±2.1, indicating a substantial psychological burden in this population. These findings underscore the importance of integrating structured anxiety screening into routine preoperative evaluation, especially for high-risk subgroups. Our findings are consistent with prior literature. A meta-analysis by Guo et al reported that approximately 50-60% of patients awaiting cardiac surgery experience moderate to severe anxiety.[11] Similarly, Tully et al observed that 58% of patients scheduled for coronary artery bypass grafting (CABG) reported high anxiety using the hospital anxiety and depression scale (HADS).[4] The high anxiety levels in our study may stem from a combination of factors, including fear of death, anticipated postoperative pain, and uncertainty about surgical and ICU outcomes- factors that have been frequently cited in qualitative studies on surgical anxiety.[3,4] Among demographic predictors, female gender showed a robust and statistically significant association with higher anxiety levels. Females reported a mean APAIS score of 13.2 compared to 11.1 in males (p<0.001), and logistic regression confirmed that female patients had nearly double the odds of high anxiety (AOR 1.89, p=0.038). This gender-based disparity is supported by prior studies, including one by Caumo et al, where female sex was identified as an independent predictor of preoperative anxiety.[2] Neurobiological factors, sociocultural expression of distress, and heightened emotional reactivity among women may explain this difference. Another key predictor was age above 60 years, which remained significantly associated with anxiety (AOR 2.85, p=0.01). This may reflect increased perceived surgical risk, reduced physiological reserve, or fear of postoperative dependency among older adults. Our findings align with earlier reports highlighting increased vulnerability to preoperative distress in elderly patients.[3,6] Interestingly, educational status also influenced anxiety levels. Participants with education below graduation had significantly higher APAIS scores and were 1.65 times more likely to experience preoperative anxiety (p=0.045). Lower educational attainment may be associated with limited health literacy, greater uncertainty about surgical procedures, and poor coping mechanisms, as also noted by Mavridou et al in.[1] Marital status emerged as another significant factor. Divorced/separated individuals had an anxiety prevalence of 98.1%, and were more than twice as likely to be anxious (AOR 2.30, p=0.034), followed by widowed participants (AOR 1.89, p=0.041). The emotional isolation, lack of caregiver support, and social vulnerability in these groups may compound preoperative stress. Similarly, patients from nuclear families and those with no prior surgical experience were significantly more anxious, consistent with the idea that familiarity with surgical settings and strong familial support can buffer psychological distress. Regarding comorbidities, although

hypertension and diabetes mellitus were significantly associated with high anxiety on bivariate analysis, they did not retain statistical significance in the multivariable model. Nonetheless, chronic illness is often associated with heightened health vigilance and perceived surgical risk, which may exacerbate preoperative worry.

A notable strength of this study was the simultaneous use of APAIS and VAS-A, which allowed for a nuanced understanding of both structured and subjective anxiety responses. We found a strong positive correlation between APAIS and VAS-A scores ($r=0.63$, $p<0.001$), further reinforcing the concurrent validity of these tools. Subgroup analysis revealed the highest correlation among females ($r=0.69$) and patients undergoing valve replacement surgery ($r=0.66$). This supports previous work suggesting that VAS-A can serve as a practical, time-efficient anxiety screener in resource-limited surgical settings.

Our study has several strengths. It utilized two validated anxiety tools in a reasonably large and demographically diverse sample (n=250). Both bivariate and multivariable analyses were conducted to explore independent predictors. However, several limitations should be acknowledged. First, the cross-sectional design precludes establishing causality. Second, we excluded patients with known psychiatric illnesses and emergency surgeries, which may have led to underestimation of the overall anxiety burden. Third, cultural dimensions of anxiety expression were not assessed, and qualitative methods could have added depth. Finally, being a single-center study, the findings may not be generalizable to other regions or surgical specialties. Routine screening for preoperative anxiety, particularly among females, elderly individuals, first-time surgery patients, those with lower educational backgrounds, and individuals from nuclear families, should be considered standard practice. Evidence-based strategies such as preoperative counseling, relaxation training, and multimedia educational interventions have demonstrated efficacy in reducing anxiety and improving perioperative outcomes.[11] Future research should consider longitudinal follow-up to assess the impact of preoperative anxiety on postoperative recovery and health-related quality of life.

CONCLUSION

This study reveals a high prevalence (60.4%) of clinically significant preoperative anxiety among patients scheduled for elective cardiac surgery in a tertiary care center in South India. Using both APAIS and VAS-A tools, we found a strong correlation between structured and subjective anxiety scores, supporting the validity of rapid screening approaches. Female gender, age over 60 years, lower educational status, nuclear family structure, absence of previous surgical experience, and unfavorable marital status (divorced/separated or widowed) were independently associated with heightened preoperative anxiety. These findings highlight the multifactorial nature of surgical anxiety, driven by a combination of personal, psychosocial, and experiential factors. The results underscore the urgent need to incorporate routine psychological assessment into preoperative protocols for cardiac surgery. Failure to address anxiety not only affects emotional well-being but may also adversely influence surgical recovery, pain perception, and long-term outcomes. By identifying vulnerable subgroups early, clinicians can intervene proactively to mitigate distress and improve patient-centered care.

ACKNOWLEDGEMENTS

The authors would like to thank the department of cardiothoracic and vascular surgery, SMIMS, Kulasekharam, for their support and cooperation during data collection. We also extend our sincere gratitude to all the patients who participated in the study

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee of Sree Mookambika Institute of Medical Sciences, Kulasekharam (Approval No: SMIMS/IEC/2025/047)

REFERENCES

1. Mavridou P, Dimitriou V, Manataki A, Arnaoutoglou E. Patient's anxiety and fear of anesthesia: effect of gender, age, education, and previous experience of anesthesia. A survey of 400 patients. Anesth Essays Res. 2013;7(3):376-82.
2. Caumo W, Schmidt AP, Schneider CN, Bergmann J, Iwamoto CW, Bandeira D, et al. Risk factors for preoperative anxiety in adults. Acta Anaesthesiol Scand. 2001;45(3):298-307.
3. Johnston M. Anxiety in surgical patients. Psychol Med. 1980;10(1):145-52.
4. Tully PJ, Baker RA, Knight JL. Anxiety and depression as risk factors for mortality after coronary artery bypass surgery. J Psychosom Res. 2008;64(3):285-90.
5. Mathews A, Ridgeway V. Personality and surgical recovery: A review. Br J Clin Psychol. 1981;20(4):243-60.
6. Ramesh C, Nayak BS, Pai VB, George A, George LS, Devi ES. Pre-operative anxiety in patients undergoing coronary artery bypass graft surgery–a cross-sectional study. Int J Africa Nurs Sci. 2017;7:31-6.
7. Munafo MR, Stevenson J. Anxiety and surgical recovery: Reinterpreting the literature. J Psychosom Res. 2001;51(4):589-96.
8. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med. 2006;166(10):1092-7.
9. Moerman N, van Dam FS, Muller MJ, Oosting H. The Amsterdam Preoperative Anxiety and

Information Scale (APAIS). Anesth Analg. 1996;82(3):445-51.
10. Facco EN, Stellini ED, Bacci CH, Manani GI, Pavan CH, Cavallin F, et al. Validation of visual analogue scale for anxiety (VAS-A) in preanesthesia evaluation. Minerva Anestesiol. 2013;79(12):1389-95.
11. Guo P. Preoperative education interventions to reduce anxiety and improve recovery among cardiac surgery patients: a review. Int J Nurs Stud. 2020;103:103527.

Cite this article as: Rajendran NH, Chandrasekaran S, Thayyil P, Jayakumar. Preoperative anxiety among patients undergoing cardiac surgery: a cross-sectional study from a tertiary care hospital in rural Tamil Nadu. Int J Community Med Public Health 2025;12:5007-13.