ISSN 0973-2063 (online) 0973-8894 (print)

Bioinformation 22(9): 6067-6070 (2026)

©Biomedical Informatics (2026)

BIOINFORMATION
Discovery at the interface of physical and biological sciences

BIOMEDICAL INFORMATICS

www.bioinformation.net

Volume 22(9)

Research Article

Received September 1, 2026; Revised September 30, 2026; Accepted September 30, 2026, Published September 30, 2026

DOI: 10.6026/973206300226067

SJIF 2026 (Scientific Journal Impact Factor for 2026) = 8.478
2022 Impact Factor (2023 Clarivate Inc. release) is 1.9

Declaration on Publication Ethics:
The author's state that they adhere with COPE guidelines on publishing ethics as described elsewhere at https://publicationethics.org/. The authors also undertake that they are not associated with any other third party (governmental or non-governmental agencies) linking with any form of unethical issues connecting to this publication. The authors also declare that they are not withholding any information that is misleading to the publisher in regard to this article.

Declaration on official E-mail:
The corresponding author declares that lifetime official e-mail from their institution is not available for all authors

License statement:
This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited. This is distributed under the terms of the Creative Commons Attribution License

Comments from readers:
Articles published in BIOINFORMATION are open for relevant post publication comments and criticisms, which will be published immediately linking to the original article without open access charges. Comments should be concise, coherent and critical in less than 1000 words.

Disclaimer:
Bioinformation provides a platform for scholarly communication of data and information to create knowledge in the Biological/ Biomedical domain after adequate peer/editorial reviews and editing entertaining revisions where required. The views and opinions expressed are those of the author(s) and do not reflect the views or opinions of Bioinformation and (or) its publisher Biomedical Informatics. Biomedical Informatics remains neutral and allows authors to specify their address and affiliation details including territory where required.

Edited by Ritik Kashwani
E-mail: docritikkashwani@yahoo.com
Citation: Shankar *et al.* Bioinformation 22(9): 6067-6070 (2026)

Illness perception, cognitive function and cardiac rehabilitation expectations among patients of post coronary artery disease: A mixed-method analysis

Bharathi Shankar[1], Shankar Shanmugam Rajendran[2,*], Anandhi Duraikannu[1], Amaravathy Theerthan[1], Easter Raj Emmanuel Chandra[1], Jeyakomala Palani[1] & Sailaja Easter Raj Emmanuel[1]

[1]Department of Medical Surgical Nursing, College of Nursing, Madras Medical College, The TN Dr MGR Medical University, Chennai, Tamil Nadu, India; [2]Department of Nursing Research, College of Nursing, Madras Medical College, The TN Dr MGR Medical University, Chennai, Tamil Nadu, India; *Corresponding author

Affiliation URL:
https://www.mmc.tn.gov.in

ISSN 0973-2063 (online) 0973-8894 (print)
Bioinformation 22(9): 6067-6070 (2026)
©Biomedical Informatics (2026)

Author contact:
Bharathi Shankar - E-mail: bharathiiuma@gmail.com
Shankar Shanmugam Rajendran - E-mail: shankarshaki@yahoo.com
Anandhi Duraikannu - E-mail: danandhi01@gmail.com
Amaravathy Theerthan - E-mail: amarajjeevan@gmail.com
Easter Raj Emmanuel Chandra - E-mail: jerecare@gmail.com
Jeyakomala Palani - E-mail: koushi.rk1@gmail.com
Sailaja Easter Raj Emmanuel - E-mail: shailajacaru@gmail.com

Abstract:
Coronary artery disease (CAD) is a leading cause of morbidity worldwide, affecting not only physical health but also cognition, psychological well-being and engagement in recovery programmes. Therefore, it is of interest to assess the illness perception, cognitive function and cardiac rehabilitation expectations among 60 post-CAD patients attending a tertiary-care cardiology centre in Chennai. The Mini-Mental State Examination (MMSE) and the Brief Illness Perception Questionnaire (BIPQ) were administered, followed by semi-structured interviews with a qualitative subsample. Findings showed that 80% of patients had normal cognitive function while 86.67% reported a high perceived illness threat, with a significant negative correlation between the two ($r = -0.35$, $p = 0.01$). Qualitative analysis revealed three themes: perceived uncertainty and stress as illness triggers, importance of family support and barriers to rehabilitation, particularly time and livelihood constraints. Thus, data shows the need for integrated cardiac rehabilitation programmes that address cognitive, emotional and contextual dimensions of recovery.

Keywords: Coronary artery disease (CAD); illness perception; cognitive function; cardiac rehabilitation (CR); mixed-method study; brief illness perception questionnaire; mini-mental state examination (MMSE)

Background:
Coronary artery disease (CAD) remains the leading cause of mortality and disability worldwide, accounting for an estimated 17.9 million deaths annually and disproportionately affecting low- and middle-income countries, including India, where the disease tends to manifest at a younger age and with greater severity **[1]**. Beyond its haemodynamic and structural consequences, CAD has increasingly been recognised as a systemic condition that affects cognition, mood and the patient's overall capacity to engage in long-term self-management **[2].** Cognitive decline in CAD patients is now attributed to a combination of cerebral hypoperfusion, microvascular dysfunction, systemic inflammation and shared vascular risk factors and has been shown to influence treatment adherence and rehabilitation outcomes **[3, 4].** Illness perception, the cognitive and emotional representation that patients develop about their condition, is a powerful determinant of post-event recovery, lifestyle modification and engagement with cardiac rehabilitation **[5].** Patients who perceive their illness as highly threatening, chronic and uncontrollable are more likely to experience psychological distress, reduced quality of life and poorer participation in secondary prevention activities **[6, 7].** Conversely, balanced illness perceptions are associated with better self-management, medication adherence and emotional adjustment after acute coronary events **[8].** Cardiac rehabilitation (CR) is a class I guideline-recommended, evidence-based, multidisciplinary intervention that reduces cardiovascular mortality, improves functional capacity and supports psychosocial recovery in CAD patients **[9].** Yet, participation in CR remains suboptimal globally, with reported barriers including logistical constraints such as travel distance and cost, work and family responsibilities, low perceived need and limited awareness of programme benefits **[9, 10 and 11]**. In the Indian context, additional barriers such as livelihood pressures, limited availability of structured CR services and family-centred decision-making further shape patients' rehabilitation experiences **[11].** Therefore, it is of interest to assess illness perception and cognitive function among post-CAD patients and to explore their cardiac rehabilitation expectations using a mixed-method approach.

Materials and Methods:
An explanatory sequential mixed-method design was adopted at a tertiary-care cardiology outpatient department in Chennai, Tamil Nadu. In the quantitative phase, 60 post-CAD patients were recruited via non-probability purposive sampling over a period of one month. Sample size was estimated based on previous prevalence data on illness perception among CAD patients **[6],** with 95% confidence and an acceptable margin of error, yielding a minimum required sample of 60. Adult patients aged 30 years or older with a confirmed diagnosis of CAD (post myocardial infarction, post percutaneous coronary intervention, or post coronary artery bypass grafting), at least four weeks beyond the index event, fluent in Tamil or English and providing informed consent were included. Patients with pre-existing neurological or psychiatric disorders, acute decompensated heart failure, or those critically ill at the time of assessment were excluded. Data were collected using a socio-demographic and clinical profile sheet, the Mini-Mental State Examination (MMSE) for cognitive function and the Brief Illness Perception Questionnaire (BIPQ) for illness perception. Content validity was established through expert review by nursing faculty, cardiologists and a biostatistician. A pilot study with 10% of the target sample confirmed feasibility; pilot participants were excluded from the final analysis. In the qualitative phase, a purposive subsample of participants was selected for semi-

structured audio-recorded interviews exploring expectations from cardiac rehabilitation, perceived lifestyle changes, anticipated challenges and desired knowledge and skills. Interviews were transcribed verbatim and analysed using Braun and Clarke's thematic analysis framework. Ethical approval was obtained from the Institutional Ethics Committee, Madras Medical College, and Chennai. Written informed consent was obtained from all participants, with assurance of confidentiality and the right to withdraw at any time. Quantitative data were analysed using SPSS version 25; descriptive statistics, Pearson's correlation and chi-square tests were applied, with $p \leq 0.05$ considered statistically significant. Qualitative and quantitative findings were integrated at the interpretation stage to provide a comprehensive understanding of patients' rehabilitation experiences.

Results:

Of the 60 post-CAD patients, the majority were middle-aged adults, with a male predominance reflecting the local epidemiology of premature CAD in South India. Most participants were married, had completed secondary or higher secondary schooling and were engaged in self-employment or manual occupations, with livelihood demands frequently competing with rehabilitation attendance. A substantial proportion lived in nuclear families and depended on close relatives for emotional and instrumental support during recovery. Cognitive function, assessed using the MMSE, was preserved in most participants. The mean MMSE score was 27.12 ± 4.58, corresponding to 90.40% of the maximum possible score. Overall, 80.00% of patients' demonstrated normal cognitive function, 13.33% had mild cognitive impairment, 6.67% had moderate impairment and none fell into the severe impairment category. Illness perception, measured by the BIPQ, indicated that the cohort experienced a high perceived illness threat. The mean BIPQ score was 72.17 ± 10.59 (90.21% of the maximum). A high experienced threat was reported by 86.67% of participants, a moderate threat by 13.33% and none scored within the low threat range. Patients particularly emphasised concerns about consequences, timeline chronicity and emotional impact of CAD. Pearson's correlation revealed a significant negative fair correlation between illness perception and cognitive function ($r = -0.35$, $p = 0.01$), indicating that stronger illness threat perceptions were associated with reduced cognitive function scores. A consolidated summary of quantitative findings is presented in **(Table 1).** Thematic analysis of the qualitative interviews generated four overarching themes describing patients' cardiac rehabilitation expectations: (1) expectations from the cardiac rehabilitation programme, encompassing physical health goals such as regaining strength and tolerance for daily activities, alongside the need for emotional and social support; (2) desired lifestyle modifications, particularly stress management and dietary changes, with participants frequently linking mental stress and poor food habits to the onset of their cardiac event; (3) perceived challenges to participation, dominated by time constraints related to work and family responsibilities, as well as transport and financial barriers stemming from distance to the rehabilitation centre; and knowledge and skills anticipated, including symptom recognition, safe medication use and access to counselling and coping strategies to manage emotional and lifestyle adjustments after a cardiac event. Together, these themes contextualised the quantitative findings, illustrating how high illness threat perception coexists with strong family-anchored coping and structural barriers to formal rehabilitation engagement.

Table 1: Mean scores, level distribution and correlation between illness perception and cognitive function among post-coronary artery disease patients (n = 60).

Outcome variable	Mean ± SD	% of maximum	Level distribution n (%)	Correlation (r, p)
Mini-Mental State Examination (MMSE)	27.12 ± 4.58	90.40%	Normal: 48 (80.00%); Mild: 8 (13.33%); Moderate: 4 (6.67%); Severe: 0 (0.00%)	r = -0.35, p = 0.01*
Brief Illness Perception Questionnaire (BIPQ)	72.17 ± 10.59	90.21%	Low threat: 0 (0.00%); Moderate threat: 8 (13.33%); High threat: 52 (86.67%)	(MMSE vs BIPQ)

**p ≤ 0.05 (statistically significant). A significant negative fair correlation indicates that as illness threat perception increases, cognitive function scores decrease.*

Discussion:

This mixed-method study highlights a striking pattern among post-CAD patients in urban South India: although the majority retained normal cognitive function, an overwhelming 86.67% reported a high perceived illness threat and the two were inversely correlated. The qualitative narratives further revealed that this perceived threat is woven into everyday concerns about livelihood, family obligations and access to structured rehabilitation. Globally, similar patterns of high illness threat perception and its psychological consequences have been documented among CAD patients. Kiessling and Henriksson (2004) **[12]** showed that perceived cognitive function explained the largest single share of health-related quality of life in an unselected CAD cohort, underscoring that patients' subjective appraisal of their cognition profoundly shapes recovery. Aalto *et al.* (2005) **[5]** reported that disease-related factors, along with social and psychosocial influences, are key correlates of illness cognitions in coronary heart disease, supporting the high BIPQ scores observed in our cohort. Darsin Singh *et al.* (2023) **[6]** in a longitudinal study of 450 acute coronary syndrome patients across two Malaysian hospitals found that illness perception measured by the BIPQ changes significantly during structured Phase II cardiac rehabilitation, with stronger illness coherence and lower emotional impact at programme completion. This reinforces the present finding that high baseline illness threat in post-CAD patients represents a modifiable target for nurse-led psychoeducational interventions. The significant negative correlation between illness perception and cognitive function ($r = -0.35$, $p = 0.01$) in our study aligns with Rauseo *et al.* (2023) **[3],** who showed that CAD is independently associated with

cognitive decline even in the absence of structural brain changes on magnetic resonance imaging. Moazzami *et al.* (2021) **[4]** further showed that mental stress-induced myocardial ischaemia is associated with cognitive impairment, providing a mechanistic link between psychological burden and cognitive performance in coronary disease. Smolderen *et al.* (2023) **[13]** in a large multinational analysis of chronic coronary and peripheral artery disease patients reported that combined assessment of health status and cognitive function provides incremental value for risk stratification, supporting the integration of cognitive screening tools such as the MMSE into routine cardiac rehabilitation pathways. Chong *et al.* (2024) **[10]** similarly highlighted that perceived need and logistical barriers are key determinants of Phase II cardiac rehabilitation participation, mirroring the time, transport and financial constraints articulated by patients in our qualitative subsample. Sugiharto *et al.* (2023) **[9]** in a scoping review of patients with coronary heart disease after reperfusion therapy identified patient-level, programme-level and health system-level barriers to cardiac rehabilitation, including misperceptions about illness severity, family responsibilities, distance and cost, all of which were echoed in the present cohort. Resurreccion *et al.* (2017) **[11]** equally emphasised that patient expectations, emotional burden and accessibility issues are major determinants of cardiac rehabilitation participation, supporting the centrality of family support and structural facilitators in the recovery narratives shared by our participants. Taken together, these findings suggest that while cognitive function may remain comparatively preserved after a coronary event, illness perception exerts a strong and modifiable influence on psychological well-being and rehabilitation engagement. Nurse-led cardiac rehabilitation programmes that explicitly assess and address illness representations, incorporate brief cognitive screening, mobilise family support and offer flexible service models such as home-based or hybrid rehabilitation, may meaningfully improve participation and outcomes for Indian patients. Limitations include the modest sample size, single-centre design, short data-collection window and reliance on self-report instruments, which may constrain generalisability. Multi-centric longitudinal studies are warranted to confirm causal pathways and evaluate culturally tailored cardiac rehabilitation models in the Indian context.

Conclusion:

Patients with coronary artery disease showed preserved cognition but high illness-threat perceptions, with greater threat linked to poorer cognitive function. Recovery was influenced by psychological stress, family support and practical barriers to rehabilitation. Integrated nurse-led rehabilitation addressing cognitive, psychological, family and contextual needs may improve adherence and long-term outcomes.

Acknowledgements:

The authors thank the patients who generously shared their experiences, the Department of Cardiology and the Institutional Ethics Committee of Madras Medical College for facilitating data collection and the faculty and mentors at the College of Nursing, Madras Medical College, for their continued guidance and support throughout the study.

References:

[1] Roth GA *et al. J Am Coll Cardiol.* 2020 **76**:2982. [PMID: 33309175]
[2] Nelogal SS *et al. Medicine (Baltimore).* 2025 **104**:e46819. [PMID: 41466001]
[3] Rauseo E *et al. JACC Cardiovasc Imaging*. 2023 **16:**905. [PMID: 37407123]
[4] Moazzami K *et al. J Psychosom Res*. 2021 **141**:110342. [PMID: 33360843]
[5] Aalto AM *et al. J Psychosom Res*. 2005 **58:**393. [PMID: 16026654]
[6] Darsin Singh SK *et al. Healthcare (Basel).* 2023 **11**:311. [PMID: 36766886]
[7] Leite Â. *Healthcare (Basel).* 2025 **13**:1396. [PMID: 40565424]
[8] Wang Y *et al. PLoS One.* 2025 **20**:e0316551. [PMID: 39982871]
[9] Mueller AS & Kim SM. *J Clin Med.* 2025 **14**:5573. [PMID: 40807202]
[10] Chong MS *et al. J Clin Nurs*. 2024 **33**:1084. [PMID: 37909483]
[11] Resurrección DM *et al. Eur J Cardiovasc Nurs.* 2019 **18**:38. [PMID: 29909641]
[12] Kiessling A & Henriksson P. Qual Life Res. 2004 **13**:1621. [PMID: 15651534]
[13] Smolderen KG *et al. Eur J Prev Cardiol*. 2023 **30**:535. [PMID: 36444513]

Caveat Emptor is applicable among the literate community where required and possible. The publisher, its journal, editors and the internal/external reviewers take adequate steps to check, evaluate, correct, edit, revise and improve content where possible and required.