Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

Prevalence of Depression and Anxiety Among Patients with Coronary Artery Disease Attending a Tertiary Care Hospital – A Cross-sectional Study

[1]Dr Raghul Raj P

[1]Associate Professor, Depatment of Psychiatry, The oxford Medical College, Hospital & Research Centre, Karnataka, India.

Corresponding Author: [1]Dr Raghul Raj P

Abstract

Background:

Coronary artery disease (CAD) is one of the leading causes of morbidity and mortality worldwide. Depression and anxiety are common psychological comorbidities among patients with CAD, often underdiagnosed and inadequately treated, despite their negative impact on recovery, quality of life, and cardiovascular outcomes.

Objectives:

To estimate the prevalence of depression and anxiety among patients with CAD and to identify associated socio-demographic and clinical factors.

Methods:

This cross-sectional study was conducted over 6 months at a tertiary care hospital among 103 patients diagnosed with CAD. Data were collected using a structured questionnaire, the Patient Health Questionnaire-9 (PHQ-9) for depression, and the Generalized Anxiety Disorder-7 (GAD-7) scale for anxiety. Associations with clinical and demographic variables were analyzed using Chi-square tests and logistic regression. A p-value <0.05 was considered statistically significant.

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

Results:

Clinically significant depression (PHQ-9 ≥10) was present in 43.7% of participants, and significant anxiety (GAD-7 ≥10) in 49.5%. Older age (>60 years), female gender, diabetes mellitus, longer duration of CAD, and smoking history were significantly associated with higher prevalence of depression and/or anxiety. A strong positive correlation ($r = 0.71$, $p < 0.001$) was observed between depression and anxiety scores.

Conclusion:

Depression and anxiety are highly prevalent among patients with CAD, with significant associations to both clinical and demographic factors. These findings highlight the need for routine psychological screening and mental health integration in cardiac care to improve outcomes and quality of life.

Key words:

Coronary artery disease, Depression, Anxiety, PHQ-9, GAD-7.

Introduction

Cardiovascular diseases (CVDs), particularly coronary artery disease (CAD), have emerged as the most prevalent non-communicable disorders globally, posing a significant public health challenge. According to the World Health Organization (WHO), an estimated 17.9 million people die annually from CVDs, representing 32% of all global deaths, with CAD being the most common type [1]. This burden is disproportionately higher in low- and middle-income countries, which account for over 75% of global cardiovascular deaths, primarily due to factors such as increasing urbanization, lifestyle transitions, economic stress, and inadequate access to healthcare services [2].

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

India is at the epicenter of this cardiovascular epidemic. Recent epidemiological data suggest that CAD affects Indians at a younger age compared to Western populations, often by a decade earlier. A nationwide study estimates that nearly 28% of all deaths in India are attributable to cardiovascular causes, with CAD contributing to the majority [3]. Furthermore, the prevalence of CAD has been steadily increasing in both urban and rural populations due to rising rates of hypertension, diabetes, smoking, obesity, and physical inactivity [3]. Despite advances in diagnosis and treatment, the psychosocial dimension of CAD remains under-addressed, particularly in resource-limited settings. Depression and anxiety are two of the most common psychiatric disorders globally, and they frequently coexist with chronic physical illnesses like CAD. The biopsychosocial model suggests that psychological factors significantly influence the onset, progression, and outcome of cardiovascular diseases. Depression and anxiety in CAD patients are not merely coexisting conditions but are recognized independent risk factors for poor cardiac outcomes, including higher rates of hospital readmission, delayed recovery, poor medication adherence, and increased mortality [4]. Depression has been shown to increase the risk of developing CAD by 1.5 to 2 times, while anxiety contributes to sympathetic overactivity, which can exacerbate myocardial ischemia and arrhythmias [5]. From a mechanistic standpoint, depression and anxiety are believed to contribute to CAD through various pathways, including increased platelet aggregation, endothelial dysfunction, systemic inflammation, and dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis [6]. Additionally, behavioral aspects such as reduced physical activity, unhealthy diet, poor adherence to cardiac medications, and substance abuse further worsen cardiac health. Globally, the prevalence of depression among patients with CAD ranges between 20% to 30%, while anxiety symptoms are seen in up to 40% of cases [6]. In the Indian context, hospital-based studies have reported a higher prevalence of psychological comorbidities, with depression rates ranging from 35% to 45%

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

and anxiety levels reaching up to 50% in patients with established CAD [7]. This discrepancy may be attributed to cultural stigma, lack of awareness, underdiagnosis, and limited integration of mental health services within cardiology departments.

Despite the high burden, mental health screening in cardiology outpatient and inpatient settings remains inconsistent, particularly in tertiary care centers across India. Early identification and appropriate management of depression and anxiety in CAD patients could significantly improve both quality of life and cardiovascular outcomes. Yet, routine psychiatric evaluation is often neglected in clinical practice, especially in low-resource settings where the primary focus remains on managing the physical illness.

Therefore, this study aims to explore the prevalence of depression and anxiety among patients with coronary artery disease attending a tertiary care hospital, with the objective of emphasizing the urgent need to incorporate mental health assessments as a routine part of cardiovascular care. Findings from this research will help highlight the magnitude of this overlooked public health issue and may provide evidence for initiating holistic, integrated approaches to CAD management in the Indian healthcare system.

Aim

To find out how common depression and anxiety are present among patients with coronary artery disease attending a tertiary care hospital.

Objectives

1. To assess the level of depression among patients diagnosed with coronary artery disease using a standard questionnaire (PHQ-9).

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

2. To assess the level of anxiety in these patients using a standard questionnaire (GAD-7).

Methodology

Study Design

This study is a hospital-based cross-sectional observational study conducted to estimate the prevalence of depression and anxiety among patients diagnosed with coronary artery disease (CAD) attending a tertiary care hospital.

Study Setting and Duration

The study was conducted in the Department of Cardiology and Psychiatry, at a tertiary care teaching hospital, over a period of 6 months.

Study Population

Patients diagnosed with coronary artery disease (acute or chronic), attending the cardiology outpatient department or admitted in cardiology wards.

Inclusion Criteria

- Age ≥18 years
- Patients with a confirmed diagnosis of coronary artery disease (angina, myocardial infarction, or history of percutaneous coronary intervention or coronary artery bypass grafting)
- Willing to give informed written consent

Exclusion Criteria

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

- Patients with previously diagnosed psychiatric illnesses (depression, anxiety, schizophrenia, bipolar disorder, etc.)
- Critically ill patients unable to participate in the interview process
- Patients with neurocognitive impairment or dementia
- Patients who declined consent

Sample Size Calculation

The sample size was calculated using the formula:

$$n=Z^2 \times p(1-p) / d^2$$

Where:

- Z = 1.96 for 95% confidence level
- p = estimated prevalence of depression or anxiety among CAD patients = 40% (based on Indian studies)
- d = allowable error (10%)

Thus, the minimum sample size required = 93.

Considering a 10% non-response rate, the final sample size was **rounded up to 103 patients**.

Sampling Method

A consecutive sampling technique was used. All eligible patients attending the cardiology OPD or admitted during the study period were approached and included until the sample size was met.

Data Collection Tools

1. Structured Proforma

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

Used to record:

- Socio-demographic data (age, sex, education, occupation, marital status, income)
- Clinical profile (type of CAD, duration of illness, risk factors like hypertension, diabetes, smoking, family history, BMI, etc.)

2. Patient Health Questionnaire-9 (PHQ-9)

- A validated screening tool to assess depression
- Comprises 9 items, each scored 0 to 3

No.	Question	Not at all (0)	Several days (1)	More than half the days (2)	Nearly every day (3)
1	Little interest or pleasure in doing things	0	1	2	3
2	Feeling down, depressed, or hopeless	0	1	2	3
3	Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4	Feeling tired or having little energy	0	1	2	3
5	Poor appetite or overeating	0	1	2	3
6	Feeling bad about yourself — or that you are a failure or let others down	0	1	2	3
7	Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8	Moving or speaking soslowly that other people could have noticed? Or the opposite — being so fidgety or restless that you've been moving around a lot more than usual	0	1	2	3
9	Thoughts that you would be better off dead, or of hurting yourself	0	1	2	3

- Total score ranges:
    - 0–4: Minimal
    - 5–9: Mild

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

- 10–14: Moderate
- 15–19: Moderately severe
- 20–27: Severe depression

- A score ≥10 was considered as clinically significant depression

3. Generalized Anxiety Disorder-7 (GAD-7)

- A validated screening tool for **anxiety**
- Comprises 7 items scored 0 to 3

No.	Question	Not at all (0)	Several days (1)	More than half the days (2)	Nearly every day (3)
1	Feeling nervous, anxious, or on edge	0	1	2	3
2	Not being able to stop or control worrying	0	1	2	3
3	Worrying too much about different things	0	1	2	3
4	Trouble relaxing	0	1	2	3
5	Being so restless that it is hard to sit still	0	1	2	3
6	Becoming easily annoyed or irritable	0	1	2	3
7	Feeling afraid as if something awful might happen	0	1	2	3

- Total score ranges:
  - 0–4: Minimal anxiety
  - 5–9: Mild
  - 10–14: Moderate
  - 15–21: Severe anxiety
- A score ≥10 was considered as clinically significant anxiety

These tools were translated and validated in the local language if required.

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

Data Collection Procedure

- After obtaining informed consent, participants were interviewed in a private setting using the structured proforma and screening tools. Interview was conducted in the patient's preferred language. Patients with significant scores were advised referral to the psychiatry department for further evaluation and management.

Statistical Analysis

- Data was entered and analyzed using IBM SPSS. Descriptive statistics were used to express frequencies, percentages, mean ± SD for quantitative variables. Chi-square test was used to assess associations between socio-demographic/clinical variables and depression/anxiety. Binary logistic regression analysis was performed to identify independent predictors of depression and anxiety. A p-value <0.05 was considered statistically significant.

Results

Table 1: Socio-Demographic Profile of Study Participants (n = 103)

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
18–40	12	11.7
41–60	54	52.4
>60	37	35.9
Gender		
Male	69	67.0
Female	34	33.0
Education		

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

Illiterate	21	20.4
Primary	30	29.1
Secondary	28	27.2
Graduate & above	24	23.3
Marital Status		
Married	92	89.3
Unmarried/Widow	11	10.7

Interpretation:

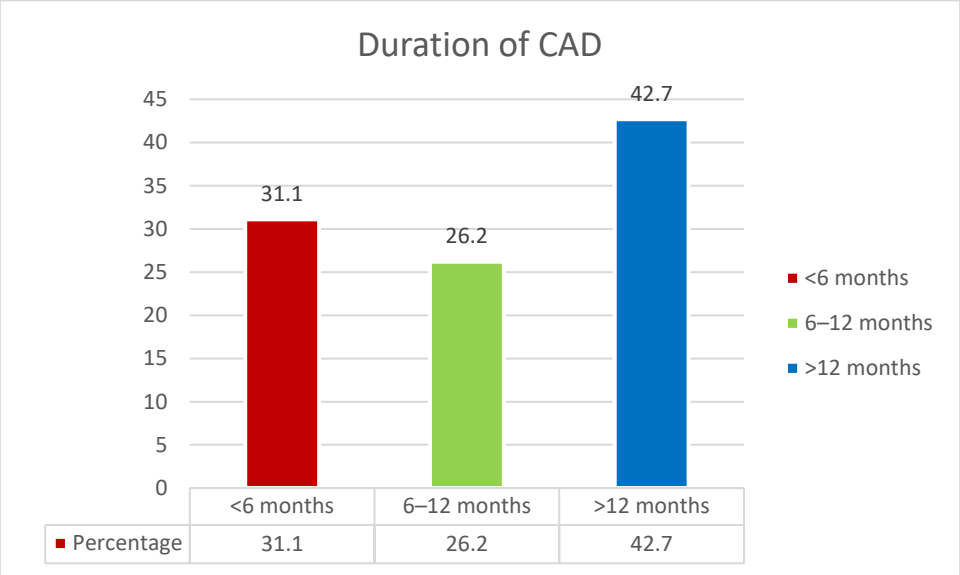
Most participants were aged between 41–60 years and male. A considerable number had low education levels, and nearly all were married.

Table 2: Clinical Characteristics of Participants (n = 103)

Variable	Frequency (n)	Percentage (%)
Duration of CAD		
<6 months	32	31.1
6–12 months	27	26.2
>12 months	44	42.7
Comorbidities		
Hypertension	58	56.3
Diabetes Mellitus	49	47.6
Dyslipidemia	41	39.8
Smoking History	34	33.0
BMI ≥25 (Overweight/Obese)	61	59.2

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

Fig 1: Duration of CAD of the participants



Interpretation:

More than 40% of patients had coronary artery disease for over 1 year. Common comorbidities included hypertension, diabetes, and obesity.

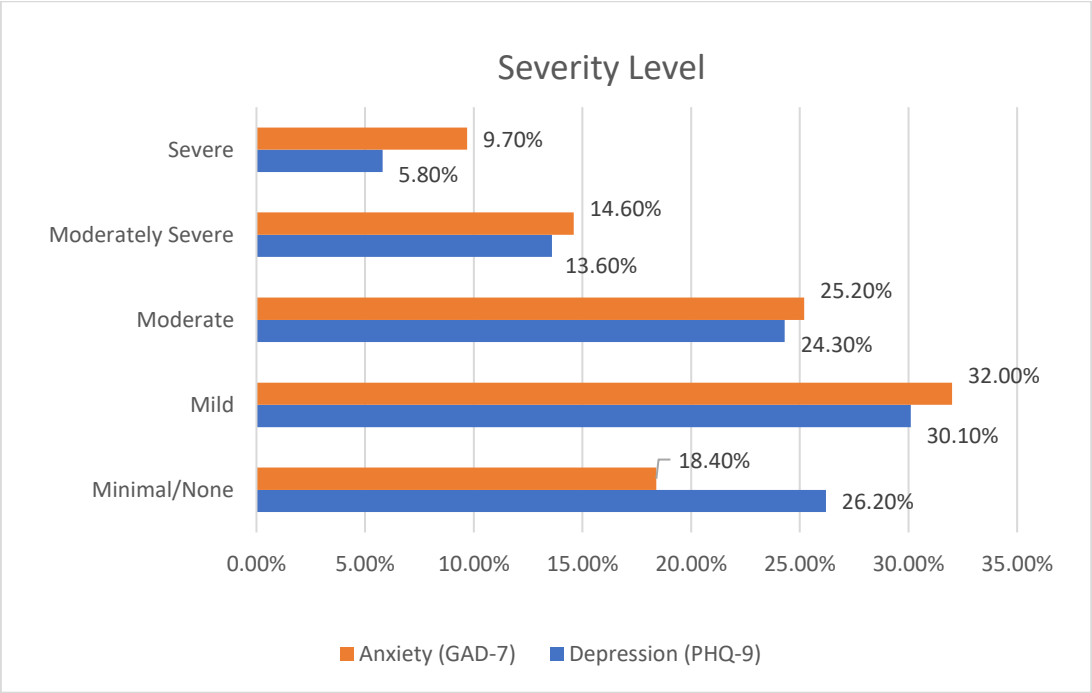
Table 3: Prevalence of Depression and Anxiety (based on PHQ-9 and GAD-7 Scales)

Severity Level	Depression (PHQ-9)	Anxiety (GAD-7)
Minimal/None	27 (26.2%)	19 (18.4%)
Mild	31 (30.1%)	33 (32.0%)
Moderate	25 (24.3%)	26 (25.2%)
Moderately Severe	14 (13.6%)	15 (14.6%)

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

Severe	6 (5.8%)	10 (9.7%)
Clinically significant (≥10)	**45 (43.7%)**	**51 (49.5%)**

Fig 2 : Severity Level of Depression and anxiety of the participants



Interpretation:

Around 44% of patients had clinically significant depression, and nearly 50% had significant anxiety symptoms, highlighting the high psychological burden in CAD patients.

Table 4: Association of Depression with Socio-demographic & Clinical Factors (Chi-square Test)

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

Factor	Depression Present (n=45)	Depression Absent (n=58)	p-value
Age >60 years	22	15	**0.012***
Female gender	21	13	**0.045***
Diabetes mellitus	29	20	**0.008***
BMI ≥25	33	28	0.320
Duration of CAD >12 mo	28	16	**0.006***

(*p<0.05 statistically significant)

Interpretation:

Depression was significantly more common among older adults, females, those with diabetes, and those with longer disease duration. No significant association was found with obesity.

Table 5: Association of Anxiety with Clinical Variables (Chi-square Test)

Factor	Anxiety Present (n=51)	Anxiety Absent (n=52)	p-value
Female gender	20	14	**0.048***
Diabetes mellitus	27	22	0.110
Smoking history	22	12	**0.030***
Duration of CAD >12 mo	30	14	**0.002***
BMI ≥25	36	25	0.091

(*p<0.05 statistically significant)

Interpretation:

Anxiety was significantly more common among females, smokers, and those with long-standing CAD. No significant association was noted with BMI or diabetes.

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

Table 6: Correlation Between PHQ-9 and GAD-7 Scores (Pearson Correlation Coefficient)

Variable	Mean ± SD	Correlation coefficient (r)	p-value
PHQ-9 Score	9.8 ± 5.3	**0.71**	**<0.001**
GAD-7 Score	10.4 ± 4.9		

Interpretation:

There is a strong positive correlation between depression and anxiety scores (r = 0.71), which is statistically significant. This means patients with higher depression scores tend to also have higher anxiety scores, suggesting a co-occurrence of symptoms.

Table 7: Binary Logistic Regression – Predictors of Clinically Significant Depression

Predictor Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Age >60 years	2.31	1.04 – 5.12	**0.039***
Female gender	1.78	0.89 – 3.56	0.096
Diabetes mellitus	2.85	1.33 – 6.10	**0.007***
Duration of CAD >12 mo	3.14	1.42 – 6.94	**0.005***

(*p<0.05 statistically significant)

Interpretation:

Diabetes mellitus and longer duration of CAD were independent predictors of clinically significant depression. Patients with CAD for more than a year were 3 times more likely to have depression.

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

Table 8: Treatment Willingness Among Patients with Depression/Anxiety

Willingness to Seek Help	Depression Present (n=45)	Anxiety Present (n=51)
Yes – Agreed to Psychiatry Referral	33 (73.3%)	36 (70.6%)
No – Refused Help	12 (26.7%)	15 (29.4%)

Interpretation:

About 70–73% of patients with depression or anxiety were willing to accept psychiatric help, while nearly 1 in 4 refused, indicating a need for better mental health awareness and destigmatization.

Discussion

The present cross-sectional study aimed to evaluate the prevalence of depression and anxiety among patients diagnosed with coronary artery disease (CAD) attending a tertiary care hospital and to identify associated demographic and clinical factors. The findings of this study highlight a high prevalence of psychological comorbidities, with 43.7% of participants exhibiting clinically significant depression and 49.5% presenting with clinically significant anxiety, based on PHQ-9 and GAD-7 scoring tools, respectively. These findings are consistent with previous research conducted in both global and Indian contexts. For instance, a study conducted by Khadpe et al. reported a depression prevalence of 42.2% among CAD patients in Maharashtra, India [8], while another hospital-based study by Sharma et al. found anxiety levels in 46.8% of similar patients [9]. International studies also reflect a comparable burden, such as the work by Celano et al., which estimated depression in 30–40% of CAD patients and anxiety in nearly 50% [10]. In the current study, older age (>60 years) and female gender were significantly associated with higher levels of depression and anxiety. Depression was present in 59.5% of those aged above 60 years ($p = 0.012$), and 61.8% of

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

females had depression ($p = 0.045$). These associations are supported by previous studies that suggest elderly patients may experience greater emotional distress due to physical limitations, social isolation, and disease burden [11]. Similarly, women have been shown to report higher levels of affective symptoms and may be more vulnerable to psychological consequences of chronic diseases like CAD [12].

Another important finding was that diabetes mellitus and longer duration of CAD (>12 months) were significantly associated with both depression and anxiety. In our study, 64.4% of diabetic patients had depression ($p = 0.008$), and 68.2% had anxiety (though not statistically significant for anxiety). Longer disease duration (>1 year) was significantly associated with both depression ($p = 0.006$) and anxiety ($p = 0.002$). These observations align with the findings of Lalonde et al., who noted that chronic comorbid conditions increase the psychological burden and decrease coping ability in patients with CAD [13]. Additionally, smoking history showed a significant association with anxiety ($p = 0.030$) but not with depression. Smoking is both a risk factor and coping mechanism, and its relationship with anxiety symptoms has been reported previously in cardiovascular cohorts [14]. BMI, however, was not significantly associated with either depression or anxiety in this study, although other studies have found mixed results, possibly due to regional differences in diet, perception of weight, and cultural acceptance [15]. A notable result from our study was the strong positive correlation between depression and anxiety scores ($r = 0.71$, $p < 0.001$), indicating that these psychological conditions often coexist and may share underlying neurobiological or psychosocial mechanisms. This is in line with the findings of Huffman et al., who emphasized the overlapping features and combined impact of depression and anxiety on cardiovascular health [16]. Furthermore, although over 70% of patients with clinically significant depression and anxiety were willing to accept psychiatric referral, a sizable

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

minority (~25%) refused help. This highlights the ongoing issue of mental health stigma, lack of awareness, and poor integration of psychiatric services in general medical settings.

In summary, the present study confirms that depression and anxiety are highly prevalent, significantly associated with clinical and demographic risk factors, and often under-recognized in CAD patients. These findings emphasize the need for routine mental health screening and the integration of psycho-cardiology services in tertiary care hospitals.

Conclusion

This cross-sectional study reveals a high prevalence of depression (43.7%) and anxiety (49.5%) among patients diagnosed with coronary artery disease (CAD), highlighting the significant psychological burden in this population. The findings emphasize that older age, female gender, longer duration of illness, diabetes mellitus, and smoking history are important factors associated with increased risk of mental health disturbances in CAD patients. A strong positive correlation was observed between depression and anxiety scores, suggesting that these conditions frequently co-exist and may compound the overall disease burden. Despite the high prevalence, a considerable proportion of patients were either unaware of their psychological symptoms or reluctant to seek mental health support, underscoring the need to address mental health stigma and improve integration of psychiatric care in cardiac settings. Overall, the study underscores the importance of routine psychological screening in patients with CAD and the necessity of a holistic, multidisciplinary approach to cardiac care. By identifying and managing depression and anxiety early, healthcare providers can significantly improve treatment adherence, patient quality of life, and long-term cardiovascular outcomes.

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

References

1. World Health Organization. Cardiovascular diseases (CVDs) [Internet]. 2023 [cited 2025 Jun 18]. Available from: https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)
2. Roth GA, Mensah GA, Johnson CO, et al. Global Burden of Cardiovascular Diseases and Risk Factors, 1990–2019: Update from the GBD 2019 Study. *J Am Coll Cardiol*. 2020;76(25):2982–3021.
3. Prabhakaran D, Jeemon P, Roy A. Cardiovascular diseases in India: current epidemiology and future directions. *Circulation*. 2016;133(16):1605–20.
4. Lichtman JH, Froelicher ES, Blumenthal JA, et al. Depression as a Risk Factor for Poor Prognosis Among Patients With Acute Coronary Syndrome: Systematic Review and Recommendations. *Circulation*. 2014;129(12):1350–69.
5. Huffman JC, Celano CM, Beach SR, Motiwala SR, Januzzi JL. Depression and Cardiac Disease: Epidemiology, Mechanisms, and Diagnosis. *Cardiol Clin*. 2016;34(4):617–25.
6. Roest AM, Martens EJ, Denollet J, de Jonge P. Prognostic association of anxiety post myocardial infarction with mortality and new cardiac events: a meta-analysis. *Psychosom Med*. 2010;72(6):563–9.
7. Kulkarni S, Oke D, Deshmukh R, Patil A, Salvi M. Prevalence of depression and anxiety among patients with coronary artery disease in a tertiary care hospital in India. *Indian J Psychol Med*. 2021;43(4):317–22.
8. Khadpe S, Maske A, Gadkari M. A study of prevalence and correlates of depression in coronary artery disease patients in a tertiary care hospital. *J Clin Prev Cardiol*. 2020;9(1):21–6.

ISSN: 0975-3583,0976-2833 VOL 13, ISSUE 11, 2022

9. Sharma V, Rawat R, Taneja N, Sharma R. Assessment of anxiety and depression among coronary artery disease patients: A cross-sectional study. *Indian J Psychol Med*. 2022;44(2):150–6.
10. Celano CM, Villegas AC, Albanese AM, Gaggin HK, Huffman JC. Depression and anxiety in heart failure: A review. *Harv Rev Psychiatry*. 2018;26(4):175–84.
11. Kharroubi T, Darawad M. Depression and its correlates among elderly patients with cardiovascular diseases. *J Geriatr Cardiol*. 2019;16(9):766–72.
12. Nayeri ND, Dehghan Nayeri N, Mirrezaie SM. Gender differences in depression and anxiety in patients with coronary artery disease. *Iran J Psychiatry*. 2017;12(3):219–26.
13. Lalonde L, O'Connor AM, Drake E, et al. Heart disease and depression: A systematic review. *Psychosomatics*. 2015;56(5):420–9.
14. Strine TW, Mokdad AH, Balluz LS, et al. Depression and anxiety in the United States: Findings from the 2006 Behavioral Risk Factor Surveillance System. *Psychiatr Serv*. 2008;59(12):1383–90.
15. Gan Y, Gong Y, Tong X, et al. Depression and the risk of coronary heart disease: A meta-analysis of prospective cohort studies. *BMC Psychiatry*. 2014;14:371.
16. Huffman JC, Celano CM, Januzzi JL. The relationship between depression, anxiety, and cardiovascular outcomes in patients with heart failure. *Curr Cardiovasc Risk Rep*. 2016;10(1):1.