Middle East Current Psychiatry

RESEARCH

Open Access

Prevalence and pattern of psychiatric morbidity in patients with first-episode acute coronary syndrome

Nighat Akbar[1], Kubra Farooq[1], Neelofar Jan[1], Marya Zahoor[1], Yasir Hassan Rather[1] and Ubaid Rasool Bhat[2*]

Abstract

Background The existing body of literature extensively highlights the impact of psychological determinants on the initiation of coronary heart disease. Globally, the incidence of psychiatric disorders is increasing, and India is no stranger to this trend. However, the connection between psychiatric co-morbidities and the onset of acute coronary syndrome has been relatively understudied in this region of the world.

Results Individuals experiencing acute coronary syndrome exhibited notably higher psychiatric morbidity compared to the control group, with an odds ratio of 4.14. Mood disorders, in particular, were the most prevalent among ACS patients, demonstrating an odds ratio of 5.023, followed by anxiety disorders with an odds ratio of 2.48.

Conclusion The findings revealed a substantial association underscoring the intricate interplay between mental and cardiovascular health emphasizing the importance of holistic healthcare approaches that consider both physical and psychological well-being, in the context of cardiovascular diseases. Further research in this area can contribute to a more comprehensive understanding of the links between mental health and cardiovascular outcomes, potentially informing targeted interventions and improving overall patient care.

Introduction

Coronary artery disease (CAD) is a form of heart disease characterized by a prolonged insufficient supply of oxygen-rich blood to the heart. This condition arises from the gradual narrowing of coronary arteries, primarily caused by the accumulation of cholesterol plaques. The reduced blood flow to the heart muscle can lead to various cardiovascular complications, making CAD a significant health concern [1]. Acute coronary syndrome (ACS) is characterized by the detection of acute myocardial injury through abnormal cardiac biomarkers, coupled with evidence of acute myocardial ischemia caused by sudden blockage of the blood supply [2, 3]. The clinical spectrum of ACS encompasses a range of conditions, including unstable angina, myocardial infarction (both STEMI and NSTEMI), and sudden cardiac death. This diversity highlights the severity and potential outcomes associated with ACS ranging from reversible chest pain (unstable angina) to more serious and potentially life-threatening events such as myocardial infarction and sudden cardiac death [4].

CAD has a multi-factorial etiology that extends beyond geographical, age, sex, and socioeconomic boundaries [5]. Modifiable risk factors, including cigarette smoking, hypertension, elevated serum cholesterol, diabetes, obesity, sedentary habits, and stress, contribute significantly. Non-modifiable risk factors encompass age, male sex, family history, and genetic predisposition. This dual categorization highlights the complex nature of CAD development, emphasizing the need for a comprehensive approach that addresses both lifestyle modifications and genetic considerations [6–9].

*Correspondence:
Ubaid Rasool Bhat
ubispeaks@gmail.com
[1] Department of Psychiatry, GMC Srinagar, Srinagar, India
[2] Institute of Mental Health and Neurosciences Kashmir, Srinagar, India

Psychological and social elements both play important roles in the etiology, course, and outcome of CAD. A bidirectional relationship exists between cardiovascular diseases and psychiatric co-morbidities [10]. Depressive and anxiety disorders, anger, and post-traumatic stress are identifiable markers of psychological distress that have been significantly associated with CAD [11]. Depression does not only serve as an independent risk factor for the onset of CAD but has also emerged as a significant predictor of increased morbidity in individuals already experiencing symptomatic CAD [12]. Both the American Heart Association (AHA) and the American Psychiatric Association (APA) recognize depression as a major risk factor for CAD [13]. Routine screening for depression has been recommended for patients with CAD [14]. The relationship between the risk of CAD and the severity of depression is direct, with reported increases of 1–2 times for minor depression and 3–5 times for major depression [15]. Anxiety has also been linked to negative illness outcomes [10]. The elevated risk posed by these psychological factors is comparable to more conventional CAD risk factors like smoking, dyslipidemia, and hypertension [16]. Psycho-social risk factors including stress, depression, type D personality, low socioeconomic status, poor social support, and social isolation trigger both biological (ANS dysfunction, increased stress reactivity, HPA axis dysfunction, endothelial dysfunction, low-grade inflammation) and behavioral mechanisms (physical inactivity, poor dietary and sleep habits, smoking and heavy alcohol use, reluctance to change, poor health-seeking behavior). These mechanisms cause an increase in the conventional CAD risk factors, such as hypertension, diabetes, dyslipidemia, obesity, and metabolic syndrome, leading to (subclinical) atherosclerosis and atherothrombosis, ultimately resulting in ACS [17, 18]. The World Health Organization (WHO) and the Global Burden of Disease study have identified increasing trends in YLLs and DALYs from CAD in India. According to a WHO report from 2014, age-adjusted cardiovascular disease death rates in India were substantially higher than in the USA, with rates of 349 and 265 per 100,000 in men and women, respectively, compared to 170 and 108 in the USA [7, 19]. In the UT of Jammu and Kashmir, lifestyle changes and the stressors from the region's tumultuous situation appear to contribute to an increased prevalence of CAD [20]. An epidemiological study in the valley found an overall CAD prevalence of 7.54% [21].

Stress-related illnesses also contribute significantly to morbidity and mortality. The National Mental Health Survey of India (NMHS) in 2015–2016 indicated that around 15% of Indian adults require active interventions for one or more mental health issues [22]. An international organization, MSF, reported that about 45% of the Kashmir Valley's population is experiencing mental distress [23].

Despite the significant impact of psychiatric morbidity and chronic traumatic situations on CAD patients, this aspect has been inadequately explored, even in developed countries. Our study aims to fill this gap by investigating the prevalence and patterns of psychiatric co-morbidities and exploring the relationship between psychological factors, including depression, anxiety, and stress with the occurrence of CAD.

Aims and objectives

1. To determine the lifetime prevalence and pattern of psychiatric morbidities in individuals diagnosed with their initial episode of acute coronary syndrome.
2. To compare psychiatric morbidities among first-episode ACS patients with age, sex, and frequency-matched controls.

Methods

Study design

The study is a hospital-based cross-sectional case-control study conducted at the Cardiology Department, Govt. Medical College Srinagar. The study was designed to be performed over 18 months from October 2018 to April 2020.

Sample size

The sample size was determined using a 95% confidence interval, a 5% margin of error, and an anticipated prevalence of coronary heart disease based on previous studies, resulting in a calculated value of 139.

Patient selection

Participants were categorized into two groups: cases (patients) and controls (non-patients). The study included 150 consecutive patients experiencing their initial episode of acute coronary syndrome, constituting the cases. ACS was diagnosed by the detection of acute myocardial injury through abnormal cardiac biomarkers, coupled with evidence of acute myocardial ischemia caused by sudden blockage of the blood supply. Consultant cardiologist was responsible for making all the cardiac diagnoses involved. The control group, comprising 150 subjects, primarily consisted of attendants who were close relatives of the same patients. These controls were carefully matched for socio-demographic factors and conventional risk factors associated with CAD.

Sampling process

Controls were initially randomly selected from caregivers accompanying the patients. Subsequently, only those

closely matching the patient group in demographics were further interviewed and included in the study.

Interview process

Interviews were conducted in a single setting, with selected patients interviewed 1 day before discharge when they were stable. Written informed consent was obtained in the local understandable language. Participants were briefed about the purpose of the interview, and incomplete interviews were not considered.

Ethical considerations

The research work was initiated following approval by the institutional Ethical Committee and BORS of Government Medical College, Srinagar.

Inclusion criteria

- Diagnosed with the first episode of ACS admitted to the hospital or followed up in the outpatient department.
- Both males and females
- Age 18 and above
- Who provided consent
- Age- and sex-matched non-patients willing to participate in the study as controls.

Exclusion criteria

- Individuals who refused to give consent
- Those with severe medical or terminal illnesses
- Individuals with structural heart disease

Measures

A socio-demographic datasheet was prepared to record the socio-demographic characteristics such as age, gender, employment, education, marital status, family type, and residence of cases and controls.

Kuppuswamy's Sociodemographic Scale is a measurement tool that calculates a composite score based on the education and occupation of the head of the family, as well as the monthly income of the household. This score ranges from 3 to 29. This scale utilizes the variables of education, occupation, and family wealth to categorize research groups into five distinct social classes: upper (I), upper middle (II), lower middle (III), upper lower (IV), and lower (V) socioeconomic status [24].

MINI 7.0.2

The Mini-International Neuropsychiatric Interview (M.I.N.I.) is a structured diagnostic interview, with high reliability and validity, for DSM-5 and ICD-10 psychiatric disorders. It is designed to meet the need for a short and accurate structured psychiatric interview for multicenter clinical trials and epidemiological studies. It was used for the assessment of psychiatric co-morbidities and all the diagnoses were confirmed by a consultant psychiatrist [25, 26].

Statistical analysis

Data was entered in SPSS V27. Categorical variables were summarized as percentages. The chi-square test was used for demographic variables. An odds ratio with a 95% confidence interval was used to measure the effect of psychiatric disorders on acute coronary syndrome. All *p*-values were two-sided and *p*-value <0.05 was considered as statistically significant.

Results

Socio-demographic characteristics

In Tables 1 and 2, it can be seen that the study population, with a mean age of 56.55 ± 13.1 among cases and 55.04 ± 12.96 among controls, predominantly comprised of married males (74.6%, male-to-female ratio 2.95:1), residing mostly in rural areas (64% of cases, 72% of controls), having received some formal education (66% of cases, 72% of controls), being primarily self-employed (58.7% of cases, 64.0% of controls), belonging to lower-middle and upper-lower socioeconomic status, and living in nuclear families (46.7% of cases, 44% of controls).

Clinical profile

Table 3 indicates that the majority of cases (56.7%) had a history of psychiatric diagnosis, in contrast to only 24% of controls, with a *p*-value of <0.01.

In Table 4, it is clear that across participants, mood disorders were the most prevalent diagnosis, accounting for 42% in cases and 14.7% in controls, followed by anxiety disorders at 11.3% and 8%, respectively, with odds ratios of 5.023 and 2.48 for mood and anxiety disorders, respectively, between the two groups.

MDD was the most common diagnosis both among cases and controls with an overall prevalence of 38% and 12%, respectively (Table 5). BPAD was seen among 4% of cases and 2% of controls. Panic, GAD, and SAD were seen in 6%, 3.3%, and 2% of cases respectively.

Table 1 Mean age of the study population

Identity	Frequency (*n*)	Mean age (years) ± SD	*t*-test value
Cases	150	56.55 ± 13.10	0.39
Controls	150	55.04 ± 12.96	

Table 2 Comparisons of socio-demographic variables

Variable	Frequency (%)		Chi-square (*p* value)
	Cases	Controls	
Gender			
Male	**112 (74.6)**	**112 (74.6)**	0.00 (1.00)
Female	38 (25.3)	38 (25.3)	
Marital status			
Unmarried	07 (4.6)	07 (4.67)	0.72 (0.70)
Married	**120 (80.0)**	**125 (83.3)**	
Widowed/separated	23 (15.3)	18 (12.0)	
Residence			
Rural	**96 (64.0)**	**108 (72.0)**	2.21 (0.14)
Urban	54 (36.0)	42 (28.0)	
Educational background			
Illiterate	51 (34.0)	42 (28.0)	10.39 (0.94)
Literate	**99 (66.0)**	**108 (72.0)**	
Socio-economic status			
Upper	19 (12.7)	17 (11.3)	0.79 (0.9)
Upper middle	20 (13.3)	24 (16.0)	
Lower middle	**54 (36.0)**	**57 (38.0)**	
Upper lower	**49 (32.7)**	**45 (30.0)**	
Lower	08 (5.3)	07 (4.7)	
Family structure			
Nuclear	**70 (46.7)**	**66 (44.0)**	0.53 (0.8)
Joint	30 (20.0)	28 (28.7)	
Extended	50 (33.3)	56 (37.3)	
Smoking status			
Smokers	42 (28.0)	57 (38.0)	5.7 (0.06)
Non-smokers	**99 (66.0)**	**90 (60.0)**	
Ex-smokers	09 (6.0)	03 (2.0)	
Co-morbid medical illnesses			
Present	**134 (89.0)**	**103 (68.7)**	**18.1 (0.01)**
Absent	16 (11.0)	47 (31.3)	
Occupation			
Student	01 (0.7)	01 (0.7)	0.96 (0.66)
Unemployed	26 (17.3)	21 (14.0)	
Unskilled work	26 (17.3)	28 (18.7)	
Skilled	**79 (52.6)**	**82 (54.6)**	
Professional	18 (12.0)	18 (12.0)	
Family history of psychiatric illness			
Present	**86 (57.4)**	**77 (51.3)**	0.85 (0.35)
Absent	64 (42.6)	73 (48.7)	
Religion			
Muslim	**141 (94.0)**	**146 (97.3)**	2.0 (0.15)
Others	09 (6.0)	04 (2.7)	

Table 6 reveals that 44% of cases fulfilled the criteria for at least one psychiatric disorder, while only 24% of controls did. Among cases, 12.7% had more than one psychiatric diagnosis, while only 0.67% of controls had concomitant dual psychiatric diagnoses.

Table 3 Frequency of psychiatric morbidity

Psychiatric diagnosis	Frequency (%)		$\chi 2$ value (*p* value)	Odds ratio
	Cases	Controls		
Present	**85 (56.7)**	35 (24.0)	33.256 (<0.01)	**4.14 (<0.01)**
Absent	65 (43.3)	**115 (76.0)**		

Table 7 shows that among patients with psychiatric morbidity, the majority were married males from rural areas belonging to middle and upper-lower SES from nuclear and extended nuclear families. Ninety percent of patients with psychiatric illness had a comorbid medical illness and 77% had a family history of a psychiatric illness

Discussion

The clinical spectrum of coronary artery disease spans from silent ischemia to stable angina and includes acute coronary syndrome, which encompasses unstable angina, myocardial infarction, and sudden cardiac death. The etiology of CAD is multi-factorial, with risk factors categorized as modifiable and non-modifiable. Among the modifiable factors, psychosocial elements, stress, and psychiatric co-morbidities have demonstrated a substantial impact on their existence and development [27]. The wealth of evidence indicates that individuals with severe mental illnesses such as schizophrenia, bipolar disorder, and major depression face an elevated risk of developing heart disease [28].

Despite the considerable relevance of the detrimental effects of mental illnesses on cardiovascular function, this aspect has not been extensively studied in India, specifically in Kashmir. Our study addresses this gap by suggesting that psychosocial factors, particularly depression and anxiety disorders, may play a significant role in mediating the impact of traditional risk factors, if not directly contributing to the pathogenesis of acute coronary syndrome.

Our study sample had an average age of 55.70 years with a standard deviation of ± 13.30 years, showing a diverse age range. The gender distribution leans significantly towards males, constituting 74.67% of the participants. This imbalance may be attributed to the well-established connection between male gender and CAD. Males have higher rates of smoking and increased exposure to stressful life events which are recognized risk factors for coronary artery disease. Most of the participants had a rural background encompassing 68% of the sample. The rural affiliation correlates with higher rates of illiteracy (28–34%) and unemployed/unskilled work

Table 4 Distribution of major psychiatric disorders

Psychiatric diagnosis	Frequency (%)		Adjusted residual		Odds ratio (*p* value)
	Cases	Controls	Cases	Controls	
Mood disorders (MDD and BPAD)	**63 (42.0)**	**22 (14.7)**	**5.5**	**−5.5**	**5.023**
Anxiety disorders	17 (11.3)	12 (8.0)	0.9	−0.9	2.480
Trauma and stress-related disorders	0 (0.0)	1 (0.67)	−0.1	0.1	0.331
Substance use disorders	5 (3.3)	0 (0.0)	0.3	−0.3	11.370

Table 5 Pattern of psychiatric disorders among cases and controls

Psychiatric disorder	Frequency (%)	
	Cases	Controls
MDD	**57 (38.0)**	**19 (12.7)**
BPAD	06 (4.0)	03 (2.0)
Panic disorder	09 (6.0)	05 (3.4)
GAD	05 (3.4)	03 (2.0)
Social anxiety disorder	03 (2.0)	04 (2.7)
Substance use disorder	05 (3.4)	0.0 (00)
Trauma and stress-related disorders	0.0 (00)	01 (0.7)

Table 6 Number of psychiatric diagnoses

No. of psychiatric diagnosis	Frequency (%)		Chi-square (*p*-value)
	Cases	Controls	
Zero	**65 (43.3)**	**115 (76.7)**	40.32 (< 0.01)
One	66 (44.0)	34 (22.6)	
More than one	19 (12.7)	01 (0.7)	

among the participants. This may be associated with limited educational opportunities in rural areas, resulting in fewer prospects for prestigious employment and contributing to a lower socio-economic status. The lower socio-economic status, in turn, may amplify stressors, as individuals with limited resources are potentially less equipped to cope with daily challenges.

The study revealed an increased prevalence of psychiatric disorders between the patient group and the control group with a significant *p*-value (< 0.01) and an odds ratio of 4.14. Major depressive disorder (MDD) emerged as the most prevalent diagnosis, exhibiting an odds ratio of 5.03 (95% CI, $p < 0.01$). Subsequently, anxiety disorders showed a significant association with an odds ratio of 2.48 (95% CI, *p* value <0.05), with panic disorder being the predominant subtype, followed by GAD and SAD. Substance use disorder was identified in 3.3% of cases, whereas no such history was present in the control group. These findings align with the study done by DK Nehra et al. where they compared psychosocial risk factors for CAD between conflict-free (Haryana) and disturbed (Kashmir) areas. The study noted significantly higher rates of depression, anxiety, and stress in CAD patients compared to controls at both places emphasizing the consistent impact of these psychosocial factors on cardiovascular health across different regions [29].

Depression is an independent risk factor and is implicated in predicting higher morbidity in CAD patients [30]. Bunker et al. concluded that there is robust and consistent evidence indicating an independent causal association between depression, social isolation, lack of social support, and the causes and prognosis of CAD [31]. Lett et al. found that depression imparts a relative risk between 1.5 and 2.0 for the onset of coronary artery disease in healthy individuals [32]. Additionally, studies by Roest et al. and Laura et al. have indicated that anxiety, when combined with depression, further amplifies the risk of developing CAD [33, 34].

While depression and anxiety are known to elevate the risk of coronary heart disease by encouraging unhealthy behaviors including physical inactivity and decreased health-seeking behavior, there is substantial literature indicating a direct causative role. Acute anxiety is correlated with physiological responses such as tachycardia at rest, expressions of anger and facial blushing, abnormal heartbeats, and heightened muscle tension. These factors can contribute to an increased risk of coronary events in vulnerable individuals due to the potential arrhythmogenic effects, particularly noteworthy in women [34, 35]. They also have been shown to disrupt various bodily systems, leading to sympathetic over-activity, reduced heart rate variability, HPA axis dysfunction, and endothelial dysfunction. These changes create a pro-inflammatory state, increasing clotting factors and promoting a prothrombotic environment, ultimately contributing to coronary artery disease [36].

Conclusions

The increased lifetime prevalence of psychiatric illnesses in individuals with first-episode ACS suggests a significant interconnection between psychosocial factors and cardiovascular health and calls for early and effective

Table 7 Comparison of psychiatric morbidity

Variable		No psychiatric morbidity			Psychiatric morbidity			Chi-square (*p*-value)
		Frequency (%)			Frequency (%)			
		Cases	Controls	Total	Cases	Controls	Total	
Sex	**Males**	56	89	**145 (80.5)**	56	23	**79 (65.9)**	**8.250 (0.01)**
	Females	09	26	**35 (19.5)**	29	12	**41 (34.1)**	
Marital status	**Unmarried**	05	04	**09 (5.0)**	02	03	**05 (4.2)**	**10.85 (0.01)**
	Married	56	100	**156 (86.6)**	64	25	**89 (74.1)**	
	Separated	04	11	**15 (8.4)**	19	07	**26 (21.7)**	
Residence	**Rural**	43	87	**130 (72.2)**	53	21	**74 (61.7)**	**3.686 (0.06)**
	Urban	22	28	**50 (27.8)**	32	14	**46 (38.3)**	
Socioeconomic status	**Upper**	07	15	**22 (12.2)**	12	02	**14 (11.7)**	1.368 (0.84)
	Upper middle	10	16	**26 (14.4)**	10	08	**18 (15.0)**	
	Lower middle	25	44	**69 (38.3)**	29	13	**42 (35.0)**	
	Upper lower	20	36	**56 (31.2)**	29	09	**38 (31.7)**	
	Lower	03	04	**07 (3.9)**	05	03	**08 (6.6)**	
Family structure	**Nuclear**	30	54	**84 (46.6)**	40	12	**52 (43.3)**	**9.228 (0.01)**
	Joint	08	17	**25 (13.9)**	22	11	**33 (27.5)**	
	Extended nuclear	27	44	**71 (39.5)**	23	12	**35 (29.2)**	
Educational background	**Illiterate**	23	30	**53 (29.4)**	28	12	**40 (33.3)**	0.509 (0.47)
	Literate	42	85	**127 (70.6)**	57	23	**80 (66.7)**	
Occupation	**Student**	01	00	**01 (0.5)**	00	01	**01 (0.8)**	6.44 (0.16)
	Unemployed	10	13	**23 (12.7)**	16	08	**24 (20.0)**	
	Unskilled work	08	22	**30 (16.7)**	18	06	**24 (20.0)**	
	Skilled	36	63	**99 (55.0)**	43	19	**62 (51.7)**	
	Professional	10	17	**27 (15.0)**	08	01	**09 (7.5)**	
Co-morbid medical illness	**Present**	55	72	**127 (70.6)**	79	31	**110 (91.7)**	**19.34 (0.01)**
	Absent	10	43	**53 (29.4)**	06	04	**10 (8.3)**	
Family history of psychiatric illness	**Present**	25	45	**70 (38.9)**	61	32	**93 (77.5)**	**43.26 (0.01)**
	Absent	40	70	**110 (61.1)**	24	03	**27 (22.5)**	
Smoking status	**Present**	14	35	**49 (27.2)**	33	22	**55 (45.8)**	**11.01 (0.01)**
	Absent	51	80	**131 (72.8)**	52	13	**65 (54.2)**	
No. of psychiatric diagnoses	**Zero**	34	85	**119 (66.1)**	31	30	**61 (50.8)**	**9.50 (0.01)**
	One	24	30	**54 (30.0)**	42	04	**46 (38.3)**	
	More than one	07	00	**07 (3.9)**	12	01	**13 (10.9)**	

addressing of psychological factors. MDD exhibits the strongest association with CAD, followed by anxiety disorders.

Limitations

The small sample size of the study may impact generalizability. Incomplete control of confounding factors limits the ability to precisely quantify the risk posed by individual psychosocial issues to CAD.

Abbreviations

ACS Acute coronary syndrome
AHA American Heart Association
ANS Autonomic nervous system
APA American Psychiatric Association
BORS Board of Research Studies
CAD Coronary heart disease
GAD Generalized anxiety disorder
HPA Hypothalamic pituitary axis
MDD Major depressive disorder
MINI Mini-International Neuropsychiatric Interview
MSF Médecins Sans Frontières
NSTEMI Non-ST elevation myocardial ischemia
OPD Outpatient department
SAD Social anxiety disorder
SPSS Statistical Package for the Social Sciences
STEMI ST elevation myocardial ischemia
WHO World Health Organization

Acknowledgements
Not applicable

Authors' contributions
NJ and KF collected the data and were major contributors to writing the manuscript; UR, NA, and MZ reviewed all the relevant research and analyzed and interpreted the data; and YR guided the whole research. All authors read and approved the final manuscript.

Funding
We verify that this research was not funded by any institution or organization.

Availability of data and materials
The data sets used and analyzed during this study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
Research work was initiated following approval by the institutional Ethical Committee and Board of Research Studies (BORS) of Government Medical College, Srinagar. Only those who gave the informed consent were taken for the study.

Consent for publication
Not applicable

Competing interests
The authors declare that they have no competing interests.

Received: 4 December 2023 Accepted: 3 February 2024
Published online: 11 March 2024

References

1. National Heart, Lung, and Blood Institute (n.d.) Coronary Heart Disease. Retrieved from https://www.nhlbi.nih.gov/health-topics/coronary-heart-disease
2. American Heart Association (n.d.) Acute Coronary Syndrome. Retrieved from https://www.heart.org/en/health-topics/heart-attack/about-heart-attacks/acute-coronary-syndrome
3. Thygesen K et al (2018) Fourth universal definition of myocardial infarction (2018). J Am Coll Cardiol. 72(18):2231–2264. https://doi.org/10.1016/j.jacc.2018.08.1038
4. Nateghian S et al Mental health and stressful life events in coronary heart disease patients and non-patients. Iran J Psychiatry 3(2):71–74
5. John S et al (2013) Prevalence and pattern of psychiatric morbidity and health related quality of life in patients with ischemic heart disease in a tertiary care hospital. Ind J Psychiatry 55(4):353–359. https://doi.org/10.4103/0019-5545.1205546
6. Braunwald E et al (2013) Unstable angina: is it time for a requiem? Circulation 127(24):2452–2457. https://doi.org/10.1161/CIRCULATIONAHA.113.001258
7. Xavier D et al (2008) Treatment and outcomes of acute coronary syndromes in India (CREATE): a prospective analysis of registry data. Lancet 371(9622):1435–1442. https://doi.org/10.1016/S0140-6736(08)60623-6
8. Mohanan P et al (2013) Presentation, management, and outcomes of 25 748 acute coronary syndrome admissions in Kerala, India: results from the Kerala ACS Registry. Europ Heart J 34(2):121–129. https://doi.org/10.1093/eurheartj/ehs219
9. Gupta R et al (2016) Trends in coronary heart disease epidemiology in India. Ann Glob Health 82(2):307–315. https://doi.org/10.29024/j.aogh.2016.04.002
10. Shruthi D et al (2018) Psychiatric comorbidities in acute coronary syndromes: six-month follow-up study. Ind J psychiatry 60(1):60–64. https://doi.org/10.4103/psychiatryIndianJPsychiatry_94_18
11. Ariyo AA et al (2000) Cardiovascular Health Study Collaborative Research Group. Depressive symptoms and risks of coronary heart disease and mortality in elderly Americans. Circulation 102:1773–1779
12. Ladwig K et al (2008) Posttraumatic stress symptoms and predicted mortality in patients with implantable cardioverter-defibrillators: results from the prospective living with an implanted cardioverter-defibrillator study. Archiv gen psychiatry 65(11):1324–1330. https://doi.org/10.1001/archpsyc.65.11.1324
13. Chockalingam V (2003) Estimation of subjective stress in acute myocardial infarction. J Postgrad Med 49:207–210
14. Kang HJ et al (2015) Effects of depression screening on psychiatric outcomes in patients with acute coronary syndrome: findings from the K-DEPACS and EsDEPACS studies. Int J Cardiol 190:114–121
15. Gupta R et al (1994) Educational status, coronary heart disease, and coronary risk factor prevalence in a rural population of India. BMJ 309:1332–1336. https://doi.org/10.1136/bmj.309.6965.1332
16. Wander GS et al (1994) Epidemiology of coronary heart disease in a rural Punjab population--prevalence and correlation with various risk factors. Indian Heart J 46:319–323
17. Hintsa, T et al (2012). The Role of Stress in a Pathogenesis of CHD. InTech. https://doi.org/10.5772/33184
18. Albus C et al. Psychosocial factors in coronary heart disease -- scientific evidence and recommendations for clinical practice. 2005 Jan;67(1):1-8
19. Dewan BD et al (1974) Epidemiological study of coronary heart disease in rural community in Haryana. Indian Heart J 26(2):68–78
20. Math SB, Srinivasaraju R et al (2010) Indian Psychiatric epidemiological studies: learning from the past. Indian J Psychiatry 52(Suppl 1):S95–S103
21. Gururaj G et al (2016). National Mental Health Survey of India, (2015-16): Summary. Bengaluru, National Institute of Mental Health and Neuro-Sciences, NIMHANS Publication No. 128, 2016.
22. Roose PS et al (2003) Depression: links with ischemic heart disease and erectile dysfunction. J Clin Psychiatry 64(Suppl 10):26–30
23. Mausbach BT et al (2007) Depression and distress predict time to cardiovascular disease in dementia caregivers. Health Psychol Sep 26(5):539–544. https://doi.org/10.1037/0278-6133.26.5.539
24. Saleem SM (2019) Modified Kuppuswamy socioeconomic scale updated for the year 2019. Ind J Foren Commun Med 6(1):1–3
25. Amorim P (2000) Mini International Neuropsychiatric Interview (MINI): validation of a short structured diagnostic psychiatric interview. Rev Bras Psiquiatr 22(3):106–115
26. Sheehan DV, Lecrubier Y, Sheehan KH et al The mini international neuropsychiatric interview (M.I.N.I): the development and validation of structured and diagnostic psychiatric interview. J Clin Psychiatry 59(20):22–33
27. Modabber AM (2008) Comparison of the prevalence and intensity of depression in patients admitted after acute coronary syndrome and patient with cataract. J Fundament Mental Health 10:128–148
28. De Hert M et al (2018) The intriguing relationship between coronary heart disease and mental disorders. Dialog clin neurosci 20(1):31–40
29. Nehra D et al (2012) Comparative study of prevalence of psychological distress factors in coronary heart disease patients living under disturbed conditions and a normal place of North India. Delhi Psychiatry J 15:99–106
30. Chida Y, Steptoe A (2009) The association of anger and hostility with future coronary heart disease: a meta-analytic review of prospective evidence. J Am Coll Cardiol. 53(11):936–946
31. Bunker SJ et al (2003) "Stress" and coronary heart disease: psychosocial risk factors. Med J Austr 178(6):272–276
32. Lett HS et al (2004) Depression as a risk factor for coronary artery disease: evidence, mechanisms, and treatment. Psychosom Med 66(3):305–315
33. Roest AM et al (2010) Anxiety and risk of incident coronary heart disease: a meta-analysis. J Am Coll Cardiol 56(1):38–46. https://doi.org/10.1016/j.jacc.2010.03.034
34. Laura D et al; Behav Med. (2006) Feb; 31(1): 21–29. https://doi.org/10.1207/s15324796abm3101_5
35. Suls J, Bunde et al (2005) Anger, anxiety, and depression as risk factors for cardiovascular disease: the problems and implications of overlapping affective dispositions. Psychol Bull Mar; 131(2):260-300.
36. Lagraauw HM et al (2015) Acute and chronic psychological stress as risk factors for cardiovascular disease: insights gained from epidemiological, clinical and experimental studies. Brain Behav Immun 50:18–30

Publisher's Note