

Depression and Anxiety as Risk Factors in Patients Presenting with Acute Coronary Syndrome in a Tertiary Care Hospital

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ABSTRACT

Introduction: Non-communicable diseases (NCDs) are one of the major health challenges of the 21st century. Of the 56 million deaths worldwide in 2012, 38 million were due to NCDs, of which main are cardiovascular diseases (CVDs), cancer, and chronic respiratory diseases.

Aims: The study was planned with overall aim to assess the role of Depression and Anxiety as risk Factors among the patients presenting with Acute Coronary Syndrome in a Tertiary Care Hospital.

Materials and Methods: An institution based case control study was conducted from July, 2021 to August, 2022. The study was conducted at the department of General Medicine & Department of Psychiatry of R. G. Kar Medical College & Hospital, Kolkata. 57 patients were included in this study.

Results: Our study showed that incidence of anxiety among the cases was more than the controls, which was statistically significant. Age exhibited a statistically significant correlation with anxiety ($p = 0.002$). The prevalence of anxiety was higher among individuals aged 20-39 (85.7%) compared to those aged 40-59 (65.2%) and those aged 60 or beyond (34.2%). However, there was no significant correlation between gender and anxiety ($p = 0.498$), with 54.2% of males and 61.3% of females reporting anxiety. Marital status had a notable association with anxiety ($p = 0.001$), with a greater occurrence among unmarried individuals (87.5%) and those who were bereaved (93.3%), in contrast to married individuals (47.3%).

Conclusion: Incidence of anxiety among the cases was more than the controls, which was statistically significant. Age and marital status was significantly associated with anxiety, but sex, education and socio-economic status was not associated with anxiety among the subjects. Tobacco smoking was significantly associated with anxiety.

Keywords: Acute Coronary Syndrome (ACS), Anxiety, Depression

INTRODUCTION

Non-communicable diseases (NCDs) are one of the major health challenges of the 21st century. Of the 56 million deaths worldwide in 2012, 38 million were due to NCDs, mainly cardiovascular diseases (CVDs), cancer, and chronic respiratory diseases. The majority of these NCD deaths (28 million) took place in low-and-middle income countries. An increase in the NCD deaths from 6.7 million in 2000 to 8.5 million in 2012 is reported in Southeast Asia and such deaths are further projected to reach 52 million by 2030. Among the NCD deaths, CVDs account for 17.5 million (46.2% of NCD deaths) (1-3).

The World Health Organization (WHO) reports that cardiovascular diseases contribute to 17.5 million deaths per year and depressive disorders are the fourth leading cause of the global disease burden. By 2020, it is estimated that depression would be the second most common cause of death worldwide surpassing the other conditions (4). A bidirectional relationship has been noted between cardiovascular diseases and psychiatric co-morbidities. Acute rupture of plaque in the coronary artery resulting in flow-limiting lesion is one of the important mechanisms of acute coronary syndrome (ACS) which include ST-segment elevation myocardial infarction (STEMI), non-STEMI (NSTEMI), and unstable angina (USA). The INTER HEART study conducted across 52 countries found higher prevalence of four stress factors – stress at work and home, financial stress, and major life events in the past year, along with eight other risk factors of history of hypertension or diabetes, waist/hip ratio, dietary patterns, physical activity, smoking, consumption of alcohol, and blood apolipoprotein association with the increased risk of ACS (5). With the state of Kerala topping the list (6), limited data exist on the impact of psychosocial factors on MI in India.

Among patients with cardiac disease, depression is common, persistent, and under recognized. The syndrome of major depression is present in approximately 15% of patients with cardiac disease, including those suffering ACS. Such a rate is substantially higher than that seen in the general population (4% to 5%) or primary care patients (8% to 10%) (7). Though some cardiac illnesses may have associated impairments of appetite, concentration, sleep, and energy, true depression (with persistent depressed mood or anhedonia) is not a normal consequence of cardiac disease.

The large Sertraline Antidepressant Heart Attack Randomized Trial (SADHART) trial found that, among ACS patients who entered the hospital with major depression, 94% of such patients had been depressed for over one month, 61% had been depressed for over six months and more than half had a prior major depressive episode (8) (9).

MATERIALS AND METHODS

- A. Study Type and Design:** An institution based case control study was conducted.
- B. Study area:** The study was conducted in the department of General Medicine & Department of Psychiatry of R. G. Kar Medical College & Hospital, Kolkata.
- C. Study duration:** Necessary data for the study were collected from July, 2021 to August, 2022.

Work plan:

- A. PREPARATORY PHASE:**
- i. Selection of topic
 - ii. Protocol formation.
 - iii. Permission will be taken from the Institutional Ethical Committee.
- B. Data collection (Socio-demographic variables, history of alcohol and tobacco abuse, presence of Diabetes and Hypertension, presence of ACS, assessment of Depression and Anxiety) & data entry phase**
- C. Data analysis and interpretation**
- D. Thesis writing & publication**

3. Study population:

The study population was all patients attending In-patient and Out-patient in the Department of General Medicine and Department of Psychiatry R.G. Kar Medical College with Acute Coronary Syndrome.

• Inclusion Criteria: Cases

Cases	Controls
Patients Presenting with Acute Coronary Syndrome with known history of Diabetes, Hypertension	Patients without Acute Coronary Syndrome with known history of Diabetes and Hypertension

• Exclusion Criteria:

1. Acute Coronary Syndrome patients with comorbid psychosis.

2. Acute Coronary Syndrome patients with comorbid substance use except alcohol and tobacco smoking.
3. Acute Coronary Syndrome patients with intellectual disability.
4. Acute Coronary Syndrome patients with organic brain syndromes
5. Acute Coronary Syndrome Patients with any comorbid chronic physical illness

METHODOLOGY:

Tools: socio-demographic history sheet

Clinical tools to screen ACS, Diabetes & Hypertension in the patients

MINI (Mini International Neuropsychiatric Interview)- to screen depression and anxiety in the patients

BAI (Beck's Anxiety Inventory) to grade severity of anxiety in the patients

BDI (Beck's Depression Inventory) to grade severity of depression in the patients

Procedure:

- **Selection of Cases:** Patients presenting in the General Medicine & Psychiatry Department were selected considering the inclusion & exclusion criteria
- **Selection of controls:** Patients presenting in the General Medicine & Psychiatry Department were selected considering the inclusion & exclusion criteria
- Matching between the case and the control group according to age, sex and other socio-demographic variables
- Both groups were compared in terms of presence and severity of anxiety and depression among the patients
- Results are analysed using appropriate statistical tools
- Conclusion is drawn on the basis of the results

RESULTS

Table1: Distribution of study subjects according to anxiety among the groups

		Cases [n=57] n (%)	Controls [n=57] n (%)	Total	p value
Anxiety	None	23 (35.9)	41 (64.1)	64 (100)	0.006
	Mild	13 (61.9)	8 (38.1)	21 (100)	
	Moderate	13 (68.4)	6 (31.6)	19 (100)	
	Severe	8 (80)	2 (20)	10 (100)	
Depression	None	24(38.7)	38(61.3)	62(100)	0.118
	Mild	11(57.9)	8(42.1)	19(100)	
	oderate	13(65)	7(35)	20(100)	
	Severe	7(70)	3(30)	10(100)	
	Extreme	2(66.7)	1(33.3)	3(100)	

Table2: Distribution of study subjects according to anxiety by age, sex and marital status

Variables	Anxiety		Total	pvalue
	No	Yes		
Age				0.002
20-39	06(85.7)	1(14.3)	7(100)	
40-59	45(65.2)	24(34.8)	69(100)	
≥60	13(34.2)	25(65.8)	38(100)	
Sex				0.498
Female	19(61.3)	12(38.7)	31(100)	
Male	45(54.2)	38(45.8)	83(100)	
Marital status				0.001
Married	43(47.3)	48(52.7)	91(100)	
Unmarried	07(87.5)	1(12.5)	8(100)	
Widow/widower	14(93.3)	1(6.7)	15(100)	

Table3: Distribution of study subjects according to depression by age, sex and marital status

Variables	Depression		Total	pvalue
	No	Yes		
Age				
20-39	3(42.9)	4(57.1)	7(100)	0.014
40-59	31(44.9)	38(55.1)	69(100)	
≥60	28(73.7)	10(26.3)	38(100)	
Sex				
Female	19(61.3)	12(38.7)	31(100)	0.366
Male	43(51.8)	40(48.2)	83(100)	
Marital status				
Married	51(56)	40(44)	91(100)	0.598
Unmarried	3(37.5)	5(62.5)	8(100)	
Widow/widower	8(53.3)	7(46.7)	15(100)	

Table4: Distribution of study subjects according to anxiety by substance abuse

Substance abuse	Anxiety		Total	pvalue
	No	Yes		
Tobacco				
No	49(77.8)	14(22.2)	63(100)	0.001
Yes	15(29.4)	36(70.6)	51(100)	
Alcohol				
No	39(51.3)	37(48.7)	76(100)	0.142
Yes	25(65.8)	13(34.2)	38(100)	

Table5: Distribution of study subjects according to Depression by substance abuse

Substance abuse	Depression		Total	pvalue
	No	Yes		
Tobacco				
No	35(55.6)	28(44.4)	63(100)	0.781
Yes	27(52.9)	24(47.1)	51(100)	
Alcohol				
No	53(69.7)	23(30.3)	76(100)	0.001
Yes	09(23.7)	29(76.3)	38(100)	

In the presented study involving 57 cases and an equal number of controls, the prevalence of anxiety exhibited statistically significant variation across severity levels ($p = 0.006$). Notably, 35.9% of cases reported no anxiety, contrasting with 64.1% of controls. Mild anxiety was observed in 61.9% of cases and 38.1% of controls, while moderate and severe anxiety levels were reported in 68.4% and 80% of cases, respectively. Regarding depression, although no statistically significant differences emerged ($p = 0.118$), a higher proportion of cases (38.7%) than controls (61.3%) reported no depression.

The study examined the correlation between several demographic factors and the presence or absence of anxiety. Age exhibited a statistically significant correlation with anxiety ($p = 0.002$). The prevalence of anxiety was higher among individuals aged 20-39 (85.7%) compared to those aged 40-59 (65.2%) and those aged 60 or beyond (34.2%). However, there was no significant correlation between gender and anxiety ($p = 0.498$), with 54.2% of males and 61.3% of females reporting anxiety. Marital status had a notable association with anxiety ($p = 0.001$), with a greater occurrence among unmarried individuals (87.5%) and those who were bereaved (93.3%), in contrast to married individuals (47.3%).

The Table indicated that there were significant correlations between depression and age ($p = 0.014$), but no significant correlations were found between depression and gender ($p = 0.366$) or marital status ($p = 0.598$), 51.8% of males and 61.3% of females reported experiencing depression. Association of Anxiety with Tobacco was statistically significant ($p=0.001$). Association of Alcohol with Anxiety was not statistically significant ($p=0.142$). Association of Tobacco with Depression was not statistically significant ($p=0.781$). Association of Alcohol with Depression was statistically significant ($p=0.001$).

DISCUSSION

Depression and anxiety are known to be associated with poorer outcomes of coronary heart disease (CHD). Psychological factors, such as major depression and anxiety, are now known as risk factors for developing CHD, which is as important and is independent of classic risk factors, such as hypertension, diabetes mellitus, and cigarette smoking. Both conditions have great socioeconomic importance given that depression and CHD are likely to be two of the three leading causes of global burden of disease. Better understanding of the common causal pathways will help us delineate more appropriate treatments.

Studies have documented that treatment of depression in cardiac patients reduces cardiac disease symptoms, and decreases patients' morbidity and disabilities, thereby improving the quality of life. Poor adjustment to a chronic illness can lead to depression and anxiety as well as functional declines. Although some patients may subsequently adjust to a new or progressing illness, others continue to exhibit symptoms of depression, anxiety, and impairment. Subsequently, depression is associated with reduced adherence to medication, reduced participation and increased drop-out rates in cardiac rehabilitation programs, which encourage lifestyle changes.

Mental health and physical health are essentially linked. People living with severe mental disorders are at higher risk of suffering from many physical disorders. Mental or psychological disorders such as depression, anxiety, and some personality types may lead to direct pathophysiological changes increasing the risk of developing CVD (10).

The present case-control study was conducted to assess Depression and Anxiety as Risk Factors in Patients Presenting with Acute Coronary Syndrome in Tertiary Care Hospital. The findings of the study are being discussed with similar studies done here and abroad.

The present study found that the mean (SD) age of cases was 55.95 ± 9.47 years and among the controls was 56.49 ± 8.39 years; both the groups of cases and controls were comparable with regard to socio-demographic characteristics, as the difference in age, sex, marital status, education and socio-economic status distribution among the groups was not statistically significant.

Manoj *et al* (11) in their study "Association of Depression, Anxiety, and Stress with Myocardial Infarction: A Case-Control Study" observed that There was no significant difference between cases and controls with respect to gender and age, well matched study group.

The distribution of age, sex, marital status and socio-economic condition corresponds to the study by H. SiewEng, L. Chee Yean, S. Das, *et al.* (12) in their study on "Anxiety and Depression in Patients with Coronary Heart Disease: A Study in a Tertiary Hospital".

Lee C *et al*(13) in their study on "Severity, Progress, and Related Factors of Mood Disorders in Patients with Coronary Artery Disease: A Retrospective Study" observed the mean age of 58.5 ± 11.0 years, which corresponds with our study findings.

The present study observed that the mean BAI score among the cases were significantly high than the controls and incidence of anxiety among the cases was significantly more than the controls. Age and marital status was significantly associated with anxiety, but sex, education and socio-economic status was not associated with anxiety among the subjects. Tobacco smoking was significantly associated with anxiety. Association of Alcohol with Anxiety was not statistically significant (does not correspond with other similar study findings) (14).

Mean BDI score among the cases were significantly high than the controls and the incidence of depression among the cases was more than the controls. But, only the age was significantly associated with depression. Alcohol consumption was significantly associated with depression.

In another study by Jeff C Huffman *et al*, observed that the syndrome of major depression is present in approximately 15% of patients with cardiac disease, including those suffering ACS. Such a rate is substantially higher than that seen in the general population (4% to 5%) or primary care patients (8% to 10%) (15).

The importance of anxiety for patients recovering from an ACS is the association between anxiety and the stress response and the consequent effects of the cardiovascular system. Behaviorally induced activation of the autonomic nervous system might predispose to clinical cardiovascular events. An anxious person may experience elevations in blood pressure, heart rate, and catecholamine levels, leading to an increase in myocardial oxygen demand that can result in acute myocardial infarction. Moreover, untreated anxiety could have severe social, financial, and clinical consequences which could impair recovery. For general hospital patients, untreated anxiety may prolong hospitalization and complicate or exacerbate physical signs and symptoms (15).

CONCLUSION

- Both the groups of cases and controls were comparable with regard to socio-demographic characteristics, as the difference in age, sex, marital status, education and socio-economic status distribution among the groups was not statistically significant.
- Incidence of anxiety among the cases was more than the controls, which was statistically significant. Age and marital status was significantly associated with anxiety, but sex, education and socio-economic status was not associated with anxiety among the subjects. Tobacco smoking was significantly associated with anxiety.
- The incidence of depression among the cases was more than the controls, although it was statistically not significant. But, only the age was significantly associated with depression. Alcohol consumption was significantly associated with depression.

With respect to future research, it will be important to learn more about the combined effects of depression and anxiety on cardiac outcomes. Another important goal is the identification of subsets of cardiac patients for whom early and aggressive treatment of depression and anxiety is particularly critical. In addition, a better understanding of the mechanisms by which these psychiatric symptoms impair cardiovascular health may allow the development of mechanism- specific treatments. Clinically, it is vital to find ways to help front-line practitioners to systematically identify depression and anxiety among their patients with cardiovascular disease, especially patients with ACS.

REFERENCES

1. Global status report on noncommunicable diseases 2014 [Internet]. [cited 2024 Feb 10]. Available from: <https://www.who.int/publications/i/item/9789241564854>
2. Organization WH. Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks. World Health Organization; 2009. 71 p.
3. World Health Organization. Global action plan for the prevention and control of noncommunicable diseases 2013-2020 [Internet]. Geneva: World Health Organization; 2013 [cited 2024 Feb 9]. Available from: <https://iris.who.int/handle/10665/94384>
4. Mathers C, Stevens G, Hogan D, Mahanani WR, Ho J. Global and Regional Causes of Death: Patterns and Trends, 2000–15. In: Jamison DT, Gelband H, Horton S, Jha P, Laxminarayan R, Mock CN, *et al.*, editors. Disease Control Priorities: Improving Health and Reducing Poverty [Internet]. 3rd ed. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; 2017 [cited 2024 Feb 10]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK525280/>
5. Smyth A, O'Donnell M, Lamelas P, Teo K, Rangarajan S, Yusuf S. Physical Activity and Anger or Emotional Upset as Triggers of Acute Myocardial Infarction. *Circulation*. 2016 Oct 11;134(15):1059–67.

6. Thankappan KR, Shah B, Mathur P, Sarma PS, Srinivas G, Mini GK, *et al.* Risk factor profile for chronic non-communicable diseases: results of a community-based study in Kerala, India. *Indian Journal of Medical Research.* 2010 Jan;131(1):53.
7. Rudisch B, Nemeroff CB. Epidemiology of comorbid coronary artery disease and depression. *Biological Psychiatry.* 2003 Aug 1;54(3):227–40.
8. O'Connor CM, Jiang W, Kuchibhatla M, Silva SG, Cuffe MS, Callwood DD, *et al.* Safety and Efficacy of Sertraline for Depression in Patients With Heart Failure: Results of the SADHART-CHF Trial. *J Am Coll Cardiol.* 2010 Aug 24;56(9):692–9.
9. Dhar AK, Barton DA. Depression and the Link with Cardiovascular Disease. *Frontiers in Psychiatry* [Internet]. 2016 [cited 2024 Feb 10];7. Available from: <https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsy.2016.00033>
10. Janszky I, Ahlbom A, Hallqvist J, Ahnve S. Hospitalization for Depression Is Associated with an Increased Risk for Myocardial Infarction Not Explained By Lifestyle, Lipids, Coagulation, and Inflammation: The SHEEP Study. *Biological Psychiatry.* 2007 Jul 1;62(1):25–32.
11. Manoj MT, Joseph KA, Vijayaraghavan G. Association of Depression, Anxiety, and Stress with Myocardial Infarction: A Case–Control Study. *Journal of Clinical and Preventive Cardiology.* 2018 Sep;7(3):86.
12. Eng HS, Yean LC, Das S, Letchmi S, Yee KS, Bakar RA, *et al.* Anxiety and Depression in Patients with Coronary Heart Disease: A Study in a Tertiary Hospital. *Iran J Med Sci.* 2011 Sep;36(3):201–6.
13. Lee C, Lee SC, Shin YS, Park S, Won KB, Ann SH, *et al.* Severity, Progress, and Related Factors of Mood Disorders in Patients with Coronary Artery Disease: A Retrospective Study. *Healthcare.* 2020 Dec;8(4):568.
14. Kushner MG, Abrams K, Borchardt C. The relationship between anxiety disorders and alcohol use disorders: A review of major perspectives and findings. *Clinical Psychology Review.* 2000 Mar 1;20(2):149–71.
15. Huffman JC, Celano CM, Januzzi JL. The relationship between depression, anxiety, and cardiovascular outcomes in patients with acute coronary syndromes. *Neuropsychiatric Disease and Treatment.* 2010 May 6;6:123–36.