Journal of Young Pharmacists, 2023; 15(1):161-166.
www.jyoungpharm.org

Original Article

Prevalence of Anxiety, Depression and Stress in Patients with Cardiovascular Diseases: A Prospective Study in Cardiology Ward of Tertiary Care Hospital

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ABSTRACT

Background: Psychological problems of a person have a direct physiological effect on the elicitation of cardiac disease and these mental disorders add burden in managing cardiovascular diseases. There is a high incidence of mental disorders predominantly Depression, Anxiety and Stress in patients with cardiovascular disease. Few behavioral and biological factors are recognized as mechanisms causing the depression, which may further lead to cardiac complications. Chronic stress or severe psychological trauma can intensify the risk of developing CVD. **Materials and Methods:** We have made an attempt to determine the prevalence of Anxiety, Depression and Stress in patients diagnosed with cardiovascular diseases. It is a prospective observational study performed in Cardiology ward of Mahatma Gandhi Memorial Hospital (MGMH), Warangal, India. The duration of the study was six months and includes 961 patients with different cardiovascular diseases. Standardized questionnaires were used to assess the Depression, Anxiety and Stress conditions. From the study, it is evident that all the three psychological symptoms were present in patients diagnosed with cardiac problems. **Results and Conclusion:** The prevalence of depression was observed as Mild depression-32.6%, Severe depression- 39%, No depression- 28.3%; Anxiety at a pattern of Minimal anxiety-18%, Mild anxiety-26.3%, Moderate anxiety- 27.2%, Severe anxiety-28.4%; and whereas Stress at 30% likelihood of developing an illness in near future was 46.7%, 50% likelihood of developing an illness in near future was 44.3%, 80% likelihood of developing an illness in near future was observed as 8.9%. Prevalence of Severe depression, severe anxiety and 30% likelihood of developing an illness in near future in patients diagnosed with various CVDs was 39%, 28.4%, 46.7% respectively.

Keywords: Cardiovascular Disease, Depression, Anxiety, Stress, Psychological disorders.

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Received: 18-09-2022 ;
Revised: 20-10-2022 ;
Accepted: 28-11-2022.

INTRODUCTION

Cardiovascular diseases (CVD) are a group of disorders, usually effects the heart and blood vessels. CVD involves Coronary Artery Disease (CAD), Coronary Heart Disease (CHD), Acute Coronary Syndrome (ACS) and several other disorders. Health professionals normally use these three terms interchangeably. ACS is a subcategory of CAD and CHD usually a consequence of CAD. CAD is also called Ischemic Heart Disease (IHD) which is characterized by formation of atheroma and the resulted changes in coronary arteries, they can be of asymptomatic. In case of ACS, it is always present with the symptoms (i.e. unstable angina). CAD refers to the pathogenic mechanism such as atherosclerosis. CHD will include the diagnosis of angina pectoris, myocardial ischemia and myocardial infraction. CVDs are the leading cause of death worldwide with an estimation of 17.9 million lives every year, of which about 28% are from low and middle income countries and nearly 40% of deaths in high income countries.[1] It was expected that by 2030, the deaths due to CVDs are predicted as 23.6 million people, especially due to heart disease and stroke.[2]

Patients with cardiovascular disease commonly experience negative psychological state.[3] Anxiety is characterized by transient fear or nervousness, uncertainty and apprehension about what will happen or about the future.[4] The association between anxiety and CVDs is complex; there are several mechanisms, which explain the relation of anxiety and cardiac disease. Several physiological and behavioral factors are hypothesized to produce adverse cardiac outcomes, behavioral

DOI: 10.5530/097515050534

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changes include low physical activity, consumption of poor healthy diet, extreme smoking and physiologic changes include autonomic dysfunction, inflammation, platelet dysfunction, endothelial dysfunction.[3] One who suffers with depression experiences persistent feelings of sadness, hopelessness, decreased concentration, loss of interest and pleasure in doing activities.[5] It is said that depression in cardiac patients is common and either depression may lead to CVD, CVD may lead to depression or both can co-exist.[6]

Few behavioral and biological factors are identified as causative mechanisms into cardiac disorders. The potential biological mechanisms include the changes in the cardiac autonomic tone, common genetic alterations, hypothalamic pituitary-axis (HPA) over sensitization, improved platelet activation, endothelial dysfunction, amplified catecholamine, serotonin, and inflammatory mediator concentrations, also the mental stress induced ischemia, lower levels of omega-3 fatty acids. The potential behavioral mechanisms include the dietary habits, lack of exercise, non-adherence to medication, poor social and family support, and unhealthy lifestyle.[7] Treating patients with depression is required as it alleviates symptoms and increases the quality of life.[6] Exposure of a person to chronic, daily pressure or extreme psychological shock can increase the risk of developing any CVD.[4] The mechanism linking acute and chronic mental stress to CVD involves a raid rise in heart rate and arterial pressure due to the sympathetic tone and vagal inhibition along with atherothrombotic activation, also the stimulation of HPA axis.[8]

Patients diagnosed with CVD experience poor quality of life. Dyspnea, fatigue, edema, difficulty in sleeping, chest pain and various physical and emotional symptoms are associated with CVD which may limit the activities of daily life.[9] The psychological related problems have a direct effect on the progression of CVDs and these disorders are an added burdensome for managing. It was observed that the Depression, Anxiety and Stress have been worsening the prognosis and quality of life in patients with CVD's. We have performed a prospective observational study in Cardiology ward of Mahatma Gandhi Memorial Hospital (MGMH), Warangal, India for identifying the influence of psychological factors on the disease progression and treatment strategies.

MATERIALS AND METHODS

Study Design

It is a prospective observational study conducted in the Cardiology wing of Mahatma Gandhi Memorial Hospital (MGMH), Warangal, Telangana, India on cardiovascular disease patients. The duration of the study is six months with approval from Institutional Review Board; Ethics Committee (IHEC) - IHEC/VCOP/PHARM.D/2019-20/NCT09.

Subjects and Methods

The sample includes 961 patients with different cardiovascular diseases. Data collection tools were questionnaires. Initially, demographic details of the patient were collected which includes age, gender, family history, social status, weight, height, comorbidities, marital status, disease diagnosed. Standardized questionnaires: Cardiac Depression Scale (CDS) is used to assess depression in adult cardiac population. CDS exhibited a strong reliability and validity.[10] The questionnaire consists of 26 statements and the response for each statement is scored on a Seven-point Likert type scale which ranges from 1 (strongly disagree) to 7 (strongly agree). The scores for 7 statements (2, 4, 12, 15, 19, 20, 23) are obtained by reversing the scores 1=7, 2=6, 3=5, 4=4, 5=3, 6=2, 7=1. Total CDS score is obtained by summing all the 26 items. Score 90-100 is indicated for mild depression and 100 or above indicates severe depression.[11] Generalized anxiety disorder scale (GAD-7) is self-report measure for assessing anxiety, GAD-7 has a good reliability and procedural validity.[12] It includes 7 items, each item ranges from 0-3 and to provide a total score all the scores of the 7 items are summed. The range for minimal anxiety is 0-4, mild anxiety is 5-9, moderate anxiety is between 10 to 14 and 15-21 designates severe anxiety. Life Change Index Scale (The Stress Test) is used for assessing the stress and it includes events. Impact scores was considered if the event has occurred more than once, multiply the number with occurrence of event. Sum all the scores and the score more than 300 indicates about 80% of probability of illness in nearby future, scores 150-299 designates about 50% of possibility of illness in immediate future and score less than 150 designates about 30% of likelihood of disease in near future.[13]

Inclusion and Exclusion Criteria

Patients of age 18 to 90 years, diagnosed with cardiovascular diseases. Patients below 18 years of age if they are diagnosed with depression and anxiety before the diagnosis of CVDs.

RESULTS

961 patients diagnosed with various cardiovascular diseases are recruited in the study, of which 101 (10.6%) subjects have Angina, 476 (49.5%) patients diagnosed with Acute coronary syndrome (NSTEMI, STEMI, Unstable angina), 141 (14.6%) diagnosed with Congestive heart failure, 116 (12%) with Dilated cardiomyopathy, 52 (5.5%) and 75 (7.8%) diagnosed with Rheumatic heart disease and Atrial fibrillation respectively (Figure 1a). Among 961 patients, 650 (68%) of them are males and 311 (32%) subjects are females. Greater number of patients 458 (47.6%) are of age 61-80 years and 326 (33.9%) are of 41- 60 years' age (Table 1). Majority of the patients diagnosed with various CVDs had no family history (57.3%).

Among 961 patients, majority of the patients are Married (75.7%) and (9.9%) are unmarried, divorced (8.8%), and widowed (5.4%).

In our study, majority of the patients affected by CVDs have a social history of smoking tobacco and alcohol abuse. Majority of the patients have Hypertension (HTN) as comorbidity in almost all the CVDs considered Angina (25%), NSTEMI (62%), STEMI (72%), CHF (54%), DCM (36%), RHD (15.3%) and majority of patients with STEMI and UA had Diabetes Mellitus (Figure 1b). Considering the BMI (Body Mass Index) maximum number of patients 272 (28.3%) are of Normal weight (NW), 258 (26.8%) of them are Overweight (OW) and 204 (21.2%), 158 (16.4%), 39(4%), 30 (3.1%) belonged to Obesity Class I, Obesity Class II, Underweight and Extreme Obesity Class III (E.O) respectively.

Distribution of Depression based on severity in various CVDs

The sample includes 101 subjects with Angina off which 61 (60.3%) had mild depression, 25 (24.7%) had severe depression and remaining 15 (14.8%) had no depression (Figure 2). The sample includes 476 subjects with ACS, of which 135 (28.3%) had mild depression, 149 (31.3%) had severe depression and remaining 192 (40.3%) had no depression (Table 2).

The sample includes 141 subjects with Congestive heart failure, of which 50 (35.4%) had mild depression and 91 had severe depression (64.5%) (Figure 2). The sample includes 116 subjects with Dilated Cardiomyopathy of which 32 (27.5%) had mild depression, 59 (50.8%) had severe depression and 25 (21.5%) had no depression (Figure 2). The sample includes 52 subjects with Rheumatic Heart Disease of which 10 (19.2%) had mild depression, 9 (17.3%) had severe depression and 33 (63.4%) had no depression (Figure 2). The sample includes 75 subjects with Atrial Fibrillation off which 26 (34.6%) had mild depression, 42 (56%) had severe depression and 7 (9.3%) had no depression (Figure 2).

Distribution of Anxiety in various CVDs

In 101 angina patients, 12 (11.8%) off them have Minimal anxiety, 45 (44.5%) have mild anxiety, 29 (28.7%) have moderate anxiety and 15 (14.8%) have severe anxiety. In 476 subjects with ACS, 92 (19.3%) have minimal anxiety, 106 (22.2%) have mild anxiety, 132 (27.7%) have moderate anxiety, and 146 (30.6%) have severe anxiety (Table 3).

In 141 patients with Congestive Heart Failure, 12 (8.5%) have minimal anxiety, 30 (21.2%) have mild anxiety, 41 (29%) have moderate anxiety, 58 (41.3%) have severe anxiety (Figure 3a). In 116 patients with Dilated Cardiomyopathy, 33 (28.4%) have minimal anxiety, 27 (23.2%) have mild anxiety, 34 (29.3%) have moderate anxiety and 22 (18.9%) have severe anxiety (Figure 3a). In 52 patients with Rheumatic Heart Disease, 20 (38.4%) have minimal anxiety, 18 (34.6%) have mild anxiety, 12 (23%) have moderate anxiety and 2 (3.8%) have severe anxiety (Figure 3a). In 75 patients with Atrial Fibrillation, 4 (5.3%) have minimal anxiety, 27 (36%) have mild anxiety, 14 (18.6%) have moderate anxiety and 30 (40%) have severe anxiety (Figure 3a).

Distribution of Stress based on likelihood of developing an illness in near future in various CVDs

In 101 patients with angina 48 (47.5%) have a 30% possibility of an illness in nearby future, 49 (48.5%) and 04 (3.9%) have a 50% and 80% probability of a disease in nearby future respectively. In 476 patients with ACS, 215 (45.1%) have 30% chances of an illness in nearby future, 216 (45.3%) and 45 (9.4%) have a 50% and 80% probability of an illness in nearby future respectively (Figure 3b).

In 141 patients with CHF, 73 (51.7%) have a 30% chance of an illness in nearby future, 64 (45.3%) and 04 (2.8%) have a 50% and 80% possibility of an illness in nearby future respectively. In 116 patients with DCM, 50 (43.1%) have a 30% probability of an illness in immediate future, 46 (39.6%) and 20 (17.2%) have a 50% and 80% probability of an illness in nearby future respectively. In 52 patients with RHD, 28 (53.8%) have a 30% probability of an illness in nearby future, 19 (36.5%) and 05 (9.6%) have a 50% and 80% probability of an illness in nearby future respectively. In 75 patients with AF, 35 (46.6%) have a 30% possibility of an illness in nearby future, 32 (42.6%) and 08 (10.6%) have a 50 and 80% possibility of an illness in nearby future respectively.

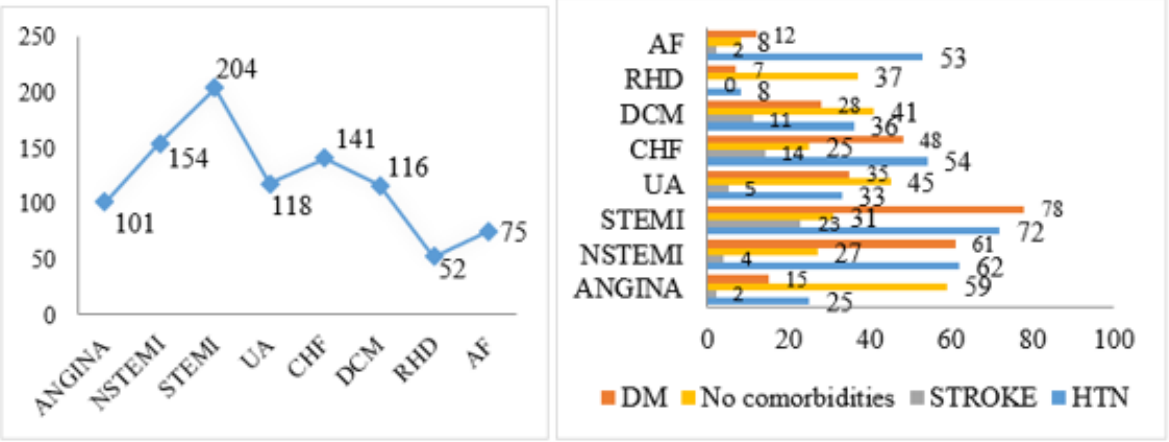

Figure 1: a) Distribution of sample based on various CVDs, b) Distribution of co-morbidities in subjects with various CVDs.

Table 1: Distribution of age in subjects with various CVDs.

CVDs	No. of Subjects (21-40 yrs)	No. of subjects (41-60 yrs)	No. of subjects (61-80 yrs)	No. of subjects (>80yrs)
Angina	28 (27.7%)	20(19.8%)	51(50.4%)	2(1.9%)
NSTEMI	2(1.2%)	36(23.3%)	101(65.5%)	15(9.7%)
STEMI	17(8.3%)	44(21.5)	130(63.7%)	13(6.3%)
Unstable Angina	16(13.5%)	48(40.6)	49(41.5)	5(4.2%)
CHF	19(13.4%)	84(59.5%)	36(25.5%)	2(1.4%)
DCM	17(14.6%)	70(60.3%)	27(23.2%)	2(1.7%)
RHD	36(69.2%)	14(26.9%)	2(3.8%)	0(0%)
Atrial fibrillation	3(4%)	10(13.3%)	62(82.6%)	0(0%)

Table 2: Distribution of Depression based on severity in Acute Coronary syndrome.

DEPRESSION	NSTEMI	Percentage	STEMI	Percentage	UA	Percentage
Mild	51	10.7%	46	9.6%	38	7.9%
Severe	15	3.1%	84	17.6%	60	12.6%

Table 3: Distribution of Anxiety based on severity in Acute Coronary Syndrome.

ANXIETY	NSTEMI	Percentage	STEMI	Percentage	UA	Percentage
Minimal	49	31.8%	26	12.7%	17	14.4%
Mild	28	18.1%	49	24.0%	29	24.5%
Moderate	35	22.7%	57	27.9%	40	33.8%
Severe	42	27.2%	72	35.2%	32	27.1%

Table 4: Distribution of Stress in Acute Coronary Syndrome.

Probability of an Illness in Nearby Future	NSTEMI	Percentage	STEMI	Percentage	UA	Percentage
30%	71	46.1%	94	46.0%	50	42.3%
50%	68	44.1%	90	44.1%	58	49.1%
80%	15	9.7%	20	9.8%	10	8.6%

DISCUSSION

Various population-based studies have identified a relation among the depression, anxiety, stress, and CVD.[14-16] The current patient sample studied have revealed the associations between anxiety disorders and CVD. It is still unclear whether both conditions are associated with CVD or these are generalized associations to adults.[17] In this study, among 961 patients, 650 (67.6%) were males and 311 (32.3%) were females. Men are more affected by the CVDs considered in this study (Angina, NSTEMI, STEMI, UA, CHF, DCM, RHD and AF) (Table 4). In our study, maximum number of patients affected by CVDs belonged to the age group between 61-80 yrs (47.6%), followed by 41-60 yrs (33.9%) with the exception of patients with RHD where maximum number of patients belonged to the age group between 21-40 yrs. Family history of CVDs was seen in 42.6% of patients. In our study 46.6% of population had a social history of smoking, 44.53% had a social history of Alcohol consumption. In this study, BMI is higher in males which is a modifiable risk factor in CVDs and most of them belonged to Normal weight (n=272) and Overweight (n=255). In our study, 35.6% of patients had a comorbidity of HTN, 29.5% of patients had a comorbidity of DM, 6.3% had a comorbidity of Stroke and 28.4% of patients had no comorbidities.

Depression was assessed using Cardiac Depression Scale with two outcomes; they are mild depression and severe depression.[18] From the study it is evident that mild depression was more prevalent than severe depression in patients diagnosed with Angina (60.3%), NSTEMI (10.7%), RHD (19.2%) and severe depression was more prevalent than mild depression in patients diagnosed with STEMI (17.6%), UA (12.6%), CHF (64.5%), DCM (50.8%) and AF (56%) this was corresponding with the study

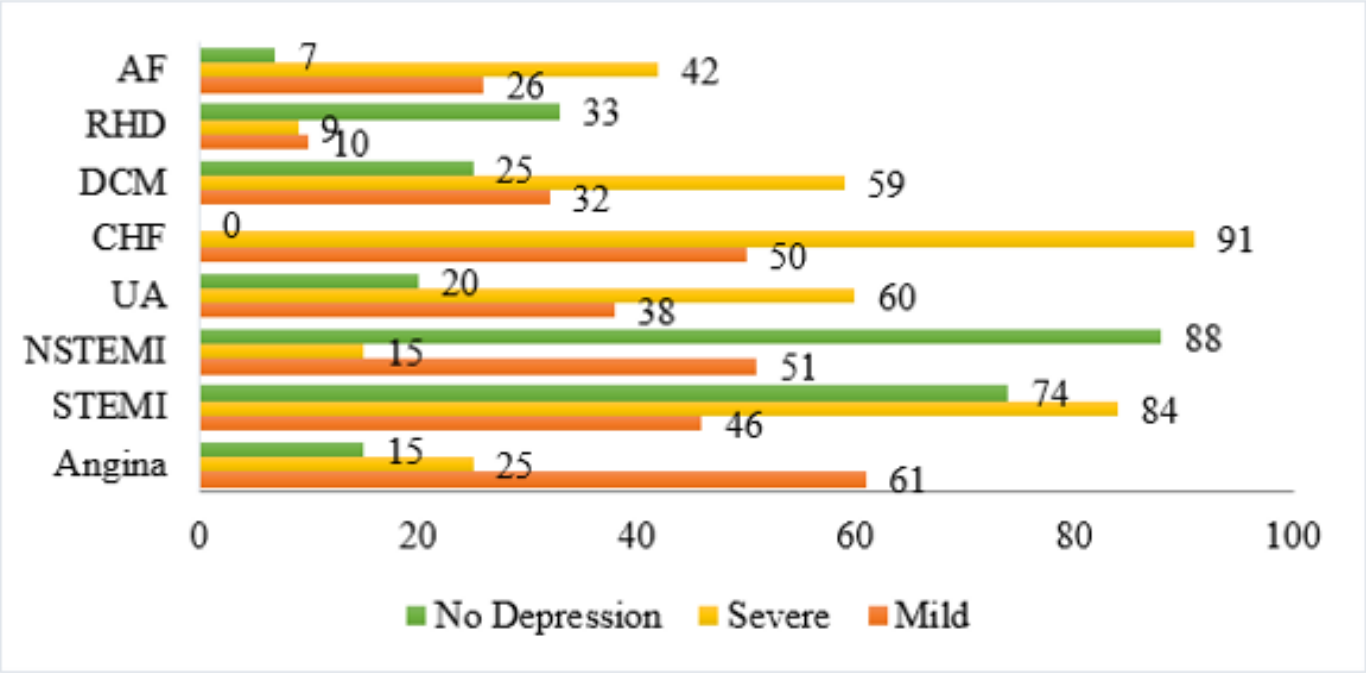

Figure 2: Distribution of severity of depression in various CVDs.

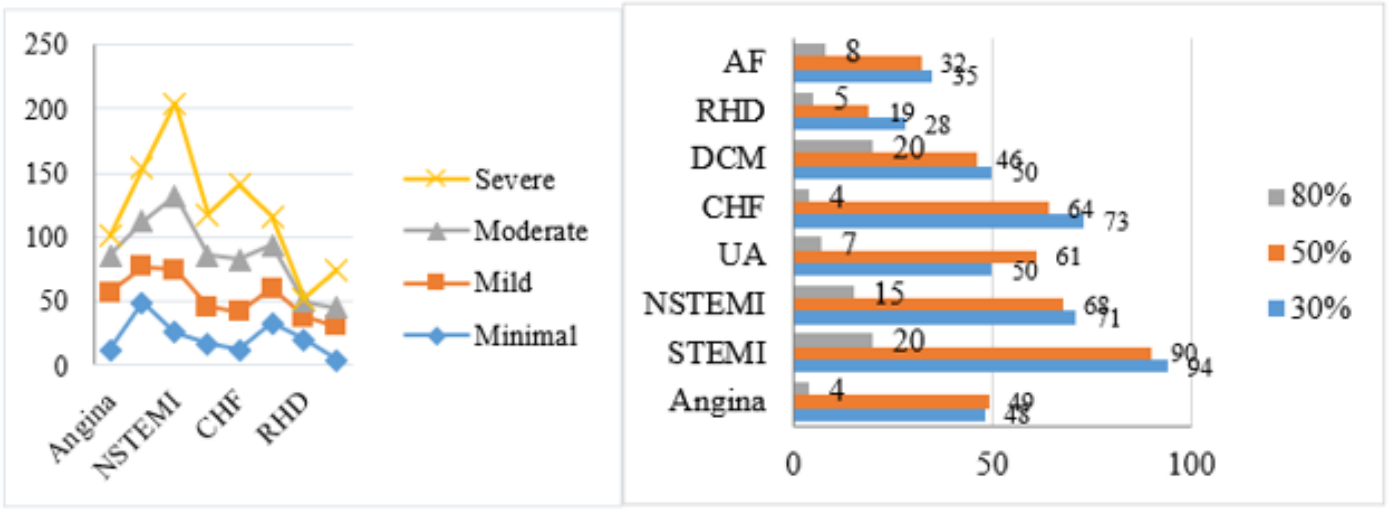

Figure 3: a) Distribution of severity of anxiety; b) Distribution of likelihood of developing an illness in near future.

regarding prevalence of depressive symptoms and treatment after ACS.[19] Anxiety was assessed using GAD 7 Scale with four prominent out comes they are mild, minimum, moderate, severe.[19] From the study it is clear that the prevalence of anxiety was minimum in NSTEMI (31.1%), RHD (38.4%) mild in Angina (44.5%) moderate in UA (33.8%) and DCM (29.3%) severe in STEMI (35.2%), CHF (41.3%), AF (40%) this corresponds with study regarding occurrence of anxiety in coronary patient with enhancement following cardiac rehabilitation and exercise training.[19] Stress was assessed using Life change index scale (The Stress Test). The current study states the prevalence of stress in the individuals who are 30% likely to develop cardiac problem was high in NSTEMI (46.1%), CCF (51.7%), DCM (43.1%), RHD (53.8%) and AF (46.6%). The prevalence of stress in patients who are 50% likely to develop cardiac problem was high in Angina (48.5%), UA (9.8%) stress was high in patients who were at 80% risk of developing STEMI (51.6%).

CONCLUSION

Psychological aspects are progressively being acknowledged as significant in studying the effects of management in patients by cardiac problems or CVDs. Depression, Anxiety and Stress is common in patients detected with cardiac diseases and are associated with inferior mental health related quality of life when not treated properly.

The study was conducted to assess the occurrence of anxiety, depression and stress in 961 patients that were considered for the study. The prevalence of psychological symptoms i.e., depression, anxiety and stress was assessed using relevant scales. The prevalence of depression (Mild depression-32.6%, Severe depression- 39%, No depression- 28.3%), Anxiety (Minimal anxiety-18%, Mild anxiety-26.3%, Moderate anxiety- 27.2%, Severe anxiety-28.4%) and Stress (30% likelihood of developing an illness in near future-46.7%, 50% likelihood of developing an illness in near future-44.3%, 80% likelihood of developing an illness in near future-8.9%). From the study it is clear that all these three psychological symptoms were almost equally prevalent in patients diagnosed with cardiac problems. Prevalence of Severe depression, severe anxiety and 30% likelihood of developing an illness in near future in patients diagnosed with various CVDs was 39%, 28.4%, 46.7% respectively.

Further studies are required to assess the prevalence of psychological distress and their reasons in patients diagnosed with CVD in order to draw a precise conclusion for identifying the psychological symptoms, underlying causes and providing appropriate treatment along with social support and improving the quality of life of patients of various CVDs.

ACKNOWLEDGEMENT

Authors are thankful to the Secretary and Correspondent, Viswambhara educational society, for giving us the opportunity to work and providing necessary facilities in carrying out this research work.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

1. Sanchis-Gomar F, Perez-Quilis C, Leischik R, Lucia A. Epidemiology of coronary heart disease and acute coronary syndrome. Ann Transl Med. 2016;4(13):256. doi: 10.21037/atm.2016.06.33, PMID 27500157.
2. Kasper D, Fauci A, Hauser S, Longo D, Jameson L, Loscalzo J. Harrison's principles of internal medicine. 19th ed. McGraw-Hill Education. 2015;266e-1.
3. Celano CM, Daunis DJ, Lokko HN, Campbell KA, Huffman JC. Anxiety disorders and cardiovascular disease. Curr Psychiatry Rep. 2016;18(11):101. doi: 10.1007/s11920-016-0739-5, PMID 27671918.
4. Cohen BE, Edmondson D, Kronish IM. State of the art review: Depression, Stress, Anxiety, and Cardiovascular Disease. Am J Hypertens. 2015;28(11):1295-302. doi: 10.1093/ajh/hpv047, PMID 25911639.
5. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5). 5th ed. Washington, DC: American Psychological Association; 2013.
6. Hare DL, Toukhsati SR, Johansson P, Jaarsma T. Depression and Cardiovascular Disease: a clinical review. Eur Heart J. 2014;35(21):1365-72. doi: 10.1093/eurheartj/eht462, PMID 24282187.
7. Whooley MA. Depression and cardiovascular disease: healing the broken-hearted. JAMA. 2006;295(24):2874-81. doi: 10.1001/jama.295.24.2874, PMID 16804154.
8. Vale SVale. Psychosocial stress and cardiovascular diseases. Postgrad Med J. 2005;81(957):429-35. doi: 10.1136/pgmj.2004.028977, PMID 15998817.
9. Komalasari R, Nurjanah MM, Yoche MM. Quality of life of people with cardiovascular disease: A descriptive study. Asian Pac Isl Nurs J. 2019;4(2):92-6. doi: 10.31372/20190402.1045, PMID 31259235.
10. Di Benedetto M, Lindner H, Hare DL, Kent S. Depression following acute coronary syndromes: a comparison between the Cardiac Depression Scale and the Beck Depression Inventory II. J Psychosom Res. 2006;60(1):13-20. doi: 10.1016/j.jpsychores.2005.06.003, PMID 16380305.
11. Kiropoulos LA, Meredith I, Tonkin A, Clarke D, Antonis P, Plunkett J. Psychometric properties of the cardiac depression scale in patients with coronary heart disease. BMC Psychiatry. 2012;12:216. doi: 10.1186/1471-244X-12-216, PMID 23199307.
12. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med. 2006;166(10):1092-7. doi: 10.1001/archinte.166.10.1092, PMID 16717171.
13. Holmes TH, Rahe RH. The social readjustment rating scale. J Psychosom Res. 1967;11(2):213-8. doi: 10.1016/0022-3999(67)90010-4, PMID 6059863.
14. Goodwin RD, Davidson KW, Keyes K. Mental disorders and cardiovascular disease among adults in the United States. J Psychiatr Res. 2009;43(3):239-46. doi: 10.1016/j.jpsychires.2008.05.006, PMID 18614179.
15. Hildrum B, Romild U, Holmen J. Anxiety and depression lowers blood pressure: 22-year follow-up of the population based HUNT study, Norway. BMC Public Health. 2011;11(1):601. doi: 10.1186/1471-2458-11-601, PMID 21797992.
16. Rowan PJ, Haas D, Campbell JA, Maclean DR, Davidson KW. Depressive symptoms have an independent, gradient risk for coronary heart disease incidence in a random, population-based sample. Ann Epidemiol. 2005;15(4):316-20. doi: 10.1016/j.annepidem.2004.08.006, PMID 15780780.
17. Ellis JJ, Eagle KA, Kline-Rogers EM, Erickson SR. Depressive symptoms and treatment after acute coronary syndrome. Int J Cardiol. 2005;99(3):443-7. doi: 10.1016/j.ijcard.2004.09.011, PMID 15771926.
18. Lavie CJ, Milani RV. Prevalence of anxiety in coronary patients with improvement following cardiac rehabilitation and exercise training. Am J Cardiol. 2004;93(3):336-9. doi: 10.1016/j.amjcard.2003.10.015, PMID 14759385.
19. Toussaint A, Hüsing P, Gumz A, Wingenfeld K, Härter M, Schramm E, *et al*. Sensitivity to change and minimal clinically important difference of the 7-item Generalized Anxiety Disorder Questionnaire (GAD-7). J Affect Disord. 2020;265:395-401. doi: 10.1016/j.jad.2020.01.032, PMID 32090765.

Cite this article: Damodar G, Raju SR, Reddy RA, Rao SNKG, Chakravarthi G. Prevalence of Anxiety, Depression and Stress in Patients with Cardiovascular Diseases: A Prospective Study in Cardiology Ward of Tertiary Care Hospital. J Young Pharm. 2023;15(1):161-6.