Research Article   **Hybrid Open Access**

Prevalence and Associated Factors of Depression among Coronary Artery Disease Patients in Prince Sultan Cardiac Centre in Qassim, Saudi Arabia

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Abstract

Background: Patients with myocardial infarction history are more likely to suffer from depression which significantly impacts their health and mortality. We looked at depression and memory function concerning one another because they are linked. We wanted to find out how many patients had depression, memory loss, or both, as well as what factors were associated with each outcome.

Methods: This study was conducted among patients with Coronary Artery Disease (CAD) admitted or visited Prince Sultan Cardiac Centre (PSCC) in King Fahad Specialist Hospital (KFSH) in Al- Qassim province, Saudi Arabia from 2021 to 2022. This cross-sectional study was conducted after acquiring ethical approval from the institutional review board and a total of 275 patients were recruited for the study. Data were analyzed using Statistical Package for Social Science (SPSS).

Results: The results of our study showed no relationship between stress and gender of the study sample and no relationship between the patient's age and the type of heart disease he suffers from. Patient Depression status showed 65.5% of participants reported no to little interest or pleasure in doing things, and feeling down depressed or hopeless showed the response of Not at all in 73.5% of participants.

Conclusion: Depression and coronary artery disease are both common illnesses. Both significantly reduce the patient's quality of life and place a large financial strain on the public purse. In CAD patients, anxiety and depression are strongly linked.

Keywords: Coronary artery disease • Depression • Inflammation • Myocardial infarction • Prevalence

Introduction

Coronary Artery Disease (CAD) with the presence of atherosclerosis and inflammation is a global health challenge [1]. It is a compromised flow of blood to the heart, which can lead to some mental health problems. Depression, Anxiety, and Coronary Heart Disease (CHD) are likely to be linked with each other. It is considered a principal reason behind (Loss of Disability-Adjusted Life Years-DALYs) and mortality worldwide [2]. CHD may be associated with depression, anxiety, or both. Many studies have shown a strong correlation between these common diseases [3-5].

According to the American Heart Association (2011-2014), only in America 16.5 million people aged more than twenty years have CHD with an incidence rate of 6.3% [6]. In Lower and Middle-Income Countries (LMICs), studies reported approx. 129 million DALYs and seven million mortalities due to CAD [7]. A recent meta-analysis reported (44.6%) pooled global prevalence of CHD with a 95% Confidence Interval (CI) (36.0%-53.6%) and odds ratio (or) (1.33; 95% CI (1.21%-1.45%, p<0.0001) [8]. In the Middle East and Northern Asia (MENA), region prevalence of CHD was reported at 5.5% in Saudi Arabia, 10.42% in India, and 13.4% in Lebanon with an average CAD global prevalence of 5%-8% [9-11].

Recent advancements in health sciences further explored CHD pathophysiology from simplistic atherosclerosis development due to the accumulation of cholesterol leading to occlusion; to the involvement of chronic inflammatory and immune responses in destabilization and formation of plaque irrespective of cholesterol levels [12]. The presence of low-grade chronic inflammation in myocardial infarcted patients leads to poor prognosis and associated risk of chronic depression. This involves factors such as regulation of the neuro cardiac axis, circadian rhythms, chronic stress and loss of social and emotional well-being which could lead to stress-prompted myocardial ischemia [13]. During stress, increase release of catecholamine and peripheral glucocorticoid is observed due to activation of the adrenal-hypothalamic-pituitary axis and sympathetic stimulation which potentiate the risk of heart failure [14].

During the depression, arrhythmias due to apoptotic pathway elevation in cardiac myocytes and cardiac wall contractility are mostly associated with altered autonomic activity due to an activated sympathetic nervous system leading to Cardio Vascular Disease (CVD) [15]. In diagnosed patients of depression, the relative risk of CAD has reported 1.09 and the mean difference in depression score was (1.9 (95% CI: 1.5-2.4; <0.0001) in patients with CHD [16,17]. In individuals who had not previously been depressed, about 30% are now diagnosed with depression following Myocardial Infarction (MI), showing a post-MI increased risk of depression [18]. In patients with CAD, the depression rate was reported 19%-47%, compared to 4-7 percent in the overall population. Depression and CAD are the two most prevalent ailments that negatively impact the quality of life and mortality [19]. Therefore, American Heart Association (AHA) in 2014 reported a closed association between MI prognosis and depression symptoms and marked depression as a "Primary independent risk factor in

patients with acute coronary syndrome" [20].

Studies have reported a possible association between the loss of memory and depression in MI patients, as loss of memory in post-MI patients requires future detailed investigations [21]. Autobiographical memory functions can be 'overgeneralized' and less specific in the wake of traumatic or stressful life events [22]. Depression following an MI event is often accompanied by memory retrogression, as an "over general autobiographical memory" may signal a person's proclivity towards depression. Follow-up assessment reported cases with more generalized recollections such as scarcer individual reminiscences were more prone to depression [23]. Approximately 75% of patients in hospitals with Acute Myocardial Infarction (AMI) experience minor depression episodes in different forms, and 15% report serious depression in Cardio Vascular Disease (CVD) patients [24]. The medical emergency repercussions can initiate and trigger various psychological responses. An acute coronary event, ailment or procedure that one believes to retain intimidation patients' well-being and life, is commonly activated for depressive moods [25].

World Health Organization in 2020 forecasted cardiovascular disorders and depression as predominant causative factors for disability-adjusted years of life. The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) also predicted 25% development of depression symptoms in long-term health problems [26]. Keeping into consideration the raising global prevalence of depression and cardiac disorders in the last decades, researchers are keen to establish a potential correlation between the two conditions. The global burden of disease continues to grow due to each disorder. In patients with cardiac issues, well-documented risk factors for depression have been established, some of which are inconsistent. Depression is more likely to occur in patients younger than sixty-five-year age, women, and those with a history of depressive episodes before diagnosis with CVD. Social exclusion and history of Acute Coronary Syndrome (ACS) are risk factors for depression in ACS patients [27].

The study results would be significant as it provides baseline data about the prevalence of depression among ischemic heart disease patients in PSCC, Buraydah, Qassim region. Although there has been previous evidence of depression prevalence, only a few studies have targeted the Qassim region in Saudi Arabia. This study will be the first one to be conducted among ischemic heart disease patients in PSCC Buraydah, Qassim region.

Study objectives

The study's primary objective is to assess the prevalence of CAD patients who have anxiety and/or depression in PSCC and the secondary objective is to examine: It includes

- Risk factors contribute to developing such psychological problems in CAD patients.
- Find out the association between these psychological problems with the long-term outcome of CAD.
- To seek early diagnosis and interventions to reduce negative and serious outcomes.

Research hypothesis

THo: There is no prevalence of depression among patients with coronary artery disease.

H1: There is a high prevalence of depression among patients with coronary artery disease.

Materials and Methods

Study setting and participants

This study was conducted among patients with CAD admitted or visited Prince Sultan Cardiac Centre (PSCC) in King Fahad Specialist Hospital (KFSH) in Al- Qassim province, Saudi Arabia from 2021 to 2022.

Study design

This cross-sectional study was conducted after acquiring ethical approval from the Institutional Review Board. A total of 275 patients were recruited for the study using the confidence limits of 95%, and the proportion of psychiatric disorder among CHD patients of 25% "based on literature review" and a degree of precision of 5%. The patients were enrolled using a purposive sampling technique. After the dropout of 75 patients, the study included a final of 200 participants. The study included all patients with CAD, both genders, aged above 20 years and willing to participate in the study. All patients less than 20 years of age, patients with severe medical illness and unstable patients were excluded.

Data extraction

After recruitment, two independent researchers explained the research study including objectives, methodology, risks, and benefits, seek informed consent, and verified the current health status of each patient those who agreed to fill out the questionnaire participated in the study. This information was added to our data spreadsheet. After identification of the eligible medical record, all required variables were extracted and coded into a data spreadsheet. The selected participant was also provided with a written questionnaire in the local language in order to fill each part separately. We will also ask each participant to write his/her phone number to contact them later to confirm the data and for follow-up.

Research instrument

The study used the "Patient Health Questionnaire 9" (PHQ9) for depression and "The Patient Health Questionnaire-Generalized Anxiety Disorder 7" (PHQ-GAD7) to assess anxiety. These validated tools were reported as an effective method to evaluate depression and anxiety symptoms. The Arabic version was utilized for the data collection [28]. The study was conducted on patients that were treated in outpatient clinics. The PHQ9 screening tool based on DSM-IV criteria consisted of nine items to examine depression symptoms on a four-point scale (0,1,2,3) and scored in the range of zero to twenty-seven. The severity of depressive symptoms on the scale was categorized with the following scores mild depression (5 to 9), moderate depression (10 to 14), moderately severe depression (15 to 19) and severe depression (≥ 20) [29]. Another used scale was The Patient Health Questionnaire-Generalized Anxiety Disorder 7" (PHQ-GAD7), which is a self-rated seven-item scale with a total score of less than ten indicating generalized anxiety disorder [30].

Statistical analysis

Statistical Package for Social Science (SPSS) version-22, IBM product Chicago- USA was used for statistical analysis. All categorical data including gender, nationality and presence of either depression, anxiety or both among Ischemic Heart Disease (IHD) patients were presented as frequencies and percentages. Point prevalence of depression and anxiety in IHD was calculated as the number of confirmed depressed or anxious GAD patients per 10000 the number of IHDs at Prince Sultan Cardiac Center (PSCC) in King Fahad Specialist (KFSH) of Al- Qassim region of Saudi Arabia. Bivariate analysis was performed to evaluate the significance of characteristics of depression among IHD. Logistic regression analysis was performed to find possible predictors of depression as a comorbidity of IHD. P-value ≤ 0.05 was considered a statistically significant result. A multivariate logistic regression test was used to determine the relationship among the (socio-demographic, clinical and lifestyle) in association with depression and/or anxiety. The prevalence of clinically significant depression and the prevalence of non-minimal depression. The study also calculated the association of depression with sex, employment status, hypertension, stressful life feelings of depression, and regular exercise. In addition, the association of age, ethnicity, education level, income, or religious affiliations using the appropriate statistical tests.

Results

In this study, 200 patients were included; 162 participants were males (81%) and 38 were female (19%). 49.5% of participants were aged greater than 60 years, 33.5% were (50-60), 13.5% were (40-50), and 0.5% were (20-30). The majority (95%) were Saudi nationals and 95% of participants were married, 2.5% were Widowed, 1.5% were Divorced, and 1% were Single. Elementary Educational Level was reported highest (30.5%) followed by high school (23.5%). 47.5% of participants were retired, 28% were unemployed, and 24.5% were employed. The socio-economic status represented 53% of participants earning between 5000-15000, 27% were <5000, and 20% were >15000 as shown in Table 1.

Table 1. Study of participant's characteristics.

Variables	Frequency	Percentage
Gender		
Male	162	81%
Female	38	19%
Total	200	100%
Age category		
20-30	1	0.5
30-40	6	3
40-50	27	13.5
50-60	67	33.5
>60	99	49.5
Total	200	100
Nationality		
Saudi	190	95
Non-Saudi	10	5
Total	200	100
Marital status		
Single	2	1
Married	190	95
Divorced	3	1.5
Widowed	5	2.5
Total	200	100
Educational level		
Illiterate	35	17.5
Elementary	61	30.5
High school	47	23.5
Bachelor	42	21
Postgraduate	15	7.5
Total	200	100
Occupation		
Employed	49	24.5
Unemployed	56	28
Retired	95	47.5
Total	200	100
Socioeconomic status		
<5000	54	27
5000-15000	106	53
>15000	40	20
Total	200	100

In Table 2, baseline medical and surgical history was reported. 44.5% of participants were Genera Activity Level of Somewhat active, 35.5% were Active, 19% were Not active at all, and 1% were very active. Body Mass Index (BMI) was >=30 in 42.5%, in the range of 29.9-25 in 41.5%, <25, and 1.5% in 13.5% of participants. 51.5% reported no adequate walking. In the cigarette smoking category, 56% responded to never smoking, 29% were past smokers, and 15% were current smokers. Stress was reported as No in 75% and a history of comorbidities was reported as yes in 95%. In the type of CAD category, IHD was found in 61.5%, 30.5% were MI, and 8% were angina pectoris. 98% of patients were on medication and 66% of surgical interventions were PCI0. A family history of CAD or IHD was reported not in 57.5% of patients. Family history of the psychiatric disease was recorded as no in 79.5%.

Table 2. Study of participant's clinical characteristics.

Variables	Frequency	Percentage
General activity level		
Not active at all	38	19
Somewhat active	89	44.5
Active	71	35.5
Very active	2	1
Total	200	100
BMI category		
>=30	85	42.5
29.9-25	83	41.5
<25	27	13.5
4	3	1.5
Total	198	99
Adequate walking		
No	103	51.5
Yes	97	48.5
Total	200	100
Cigarette smoking		
Never smoking	112	56
Past smoker	58	29
Current smoker	30	15
Total	200	100
Stress		
No	150	75
Yes	50	25
Total	200	100
History of comorbidities		
No	10	5
Yes	190	95
Total	200	100
Type of CAD		
Angina pectoris	16	8
MI	61	30.5
IHD	123	61.5
Total	200	100
Medications used		
No	4	2
Yes	196	98
Total	200	100

Surgical interventions		
No surgical intervention	23	11.5
PCI	132	66
CABG	22	11
Combined (PCI+CABG)	22	11
Other (non-cardiac)	1	0.5
Total	200	100
Family history of CAD or IHD		
No	115	57.5
Not sure	13	6.5
Yes	72	36
Total	200	100
Family history of psychiatric disease		
No	159	79.5
Not sure	26	13
Yes	4	2
Depression	4	2
Anxiety	7	3.5
Total	200	100

Patient Depression status was demonstrated in Table 3. 65.5% of participants reported no to little interest or pleasure in doing things, and feeling down depressed or hopeless showed the response Not at all in 73.5% of participants. In trouble falling or staying asleep or sleeping too much, 65% responded Not at all. The majority (55%) were Feeling tired or having little energy (Not at all). 79.5% reported Not at all to Poor appetite or overeating. Feeling bad about self-category reported Not at all with 82%. The majority were Trouble concentrating of Not at all with 74%, 14.5% were Several days, 7% were More than half the days, and 4.5% were Nearly every day. The majority were Moving problems of Not at all with 89%, 6% were More than half the days, 3% were Nearly every day, and 2% were Several days.

Table 3. Depression scale for study participants.

Variables	Frequency	Percentage
Less interest or pleasure in doing things		
Not at all	131	65.5
Several days	28	14
More than half the days	28	14
Nearly every day	13	6.5
Total	200	100
Feeling down depressed or hopeless		
Not at all	147	73.5
Several days	19	9.5
More than half the days	23	11.5
Nearly every day	11	5.5
Total	200	100
Trouble falling or staying asleep or sleeping too much		
Not at all	130	65
Several days	23	11.5
More than half the days	15	7.5
Nearly every day	32	16
Total	200	100

Feeling tired or having less energy		
Not at all	110	55
Several days	32	16
More than half the days	42	21
Nearly every day	16	8
Total	200	100
Poor appetite overeating		
Not at all	159	79.5
Several days	20	10
More than half the days	10	5
Nearly every day	11	5.5
Total	200	100
Feeling bad about self		
Not at all	164	82
Several days	7	3.5
More than half the days	17	8.5
Nearly every day	12	6
Total	200	100
Trouble concentrating		
Not at all	148	74
Several days	29	14.5
More than half the days	14	7
Nearly every day	9	4.5
Total	200	100
Moving problems		
Not at all	172	86
Several days	16	8
More than half the days	6	3
Nearly every day	6	3
Total	200	100
Death rate		
Not at all	178	89
Several days	4	2
More than half the days	12	6
Nearly every day	6	3
Total	200	100

We observed a relationship between stress and gender in Table 4 and the results showed no relationship between stress and gender in the study sample.

Table 4. Correlation between participant's gender and stress.

		Gender	Stress
Gender	Pearson correlation	1	-0.015
	Sig. (2-tailed)		0.836
	N	200	200
Stress	Pearson correlation	-0.015	1
	Sig. (2-tailed)	0.836	
	N	200	200

We observed a relationship between age and type of heart disease in Table 5 and results showed no relationship between the patient's age and the type of heart disease.

Table 5. Correlation between participant's age and type of heart disease.

		Age no	Type of CAD
Age no	Pearson correlation	1	0.122
	Sig. (2-tailed)		0.378
	N	54	54
Type of CAD	Pearson correlation	0.122	1
	Sig. (2-tailed)	0.378	
	N	54	200

Discussion

The results of our study demonstrated the prevalence of depression among MI patients was estimated to be close to 30%, which is high, thus the null hypothesis was rejected. It is also in line with previous studies that found depression in 20-40% of MI patients [31,32]. A meta-analysis showed depression pooled a prevalence of 28.70% in patients with MI (95% CI: 22.39-35.46%) [33]. Estimates vary depending on the tools and terminology used to evaluate the severity of the condition. In a study involving 14,326 patients, significant depression was diagnosed in 19.8 percent using interviews, but the Beck Depression Inventory score and the Hospital Anxiety and Depression Scale (HADS) depression was estimated to be 31 percent and 15 percent, respectively [34]. In an 8-year study of individuals, 10% had a single episode; 19% had intermittent depression; and 11% had persistent depression. Women are more likely to suffer from depression in patients with MI than men, according to most research [35].

The majority of the study sample showed no interest in doing some things, they did not feel depressed or hopeless (73.5%), they did not find it difficult to sleep for a long time (65%), and they did not feel a little tired when exercising little energy by 55% Also, they do not have a great appetite or weakness in it by 79.5%, and they do not feel bad about themselves by 82%, and they do not have a problem concentrating by 74%, and they do not have movement problems by 86%, 89% have no desire to die.

Physical activity level is known to be connected with cardiovascular disease prognosis and is suggested as part of rehabilitation after a cardiovascular event [36,37]. Physical activity has also been linked to lower levels of depression in patients with coronary artery disease, as well as increased exercise capacity before and after cardiac rehabilitation programmes [38]. Exercising after an MI has been proven to improve survival time and minimize depression symptoms and psychological stress in clinical trials [39]. Patients with coronary heart disease who participate in cardiac rehabilitation have reported similar benefits in terms of depression and overall survival. Future research should focus on enhancing adherence to cardiac rehabilitation programs, as there is substantial evidence that physically active patients have less depression and better prognosis [40].

Our study has a limitation in that it included limited data and selection of participants in an outpatient clinic. The study was only conducted in the Qassim region of KSA, however, our study provides baseline data for future studies.

Conclusion

In conclusion, Depression and coronary artery disease are both common illnesses. Both significantly reduce the patient's quality of life and place a large financial strain on the public purse. In CAD patients, anxiety and depression are strongly linked. A combination of psychiatric visits by specialists and assessments by cardiovascular nurses is therefore recommended to identify depressive disorders in these patients.

Declarations

Consent for publication

Not applicable.

Availability of data and materials

The data will be available for review from the corresponding author on request.

Competing interests

The author declares no competing interests.

Funding

Acknowledgment

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