

ORIGINAL RESEARCH

PERIOPERATIVE MEDICINE

Prevalence of depression among cardiac patients within the general population in Saudi Arabia: a cross-sectional study

Khalid A. Alnemer ^{1*}, Osama Mushabbab AlAhmari ², Anas Bassam Barnawi ³

Authors' affiliation:

1. Khalid A. Alnemer, Department of Internal Medicine, College of Medicine, Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia; Kaalnemer@imamu.edu.sa
2. Osama Mushabbab AlAhmari, College of Medicine, Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh 13317, Saudi Arabia; Email: osmuaw@gmail.com
3. Anas Bassam Barnawi, College of Medicine, Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh 13317, Saudi Arabia; Email: 0abobassam0@gmail.com

Correspondence: Dr. Khalid A. Alnemer, Email: Kaalnemer@imamu.edu.sa

ABSTRACT

Background & objective: Depression is well-known to be quite common among patients with cardiovascular diseases (CVD). Depression might affect a patient's outcomes negatively. This survey-based study aimed to assess the depressive status of known CVD patients in the general population of Saudi Arabia and its associated predictors.

Methodology: This is an online cross-sectional survey study conducted in Saudi Arabia in May 2025. Participants' demographic characteristics, such as age, gender, residency, marital status, education level, occupation, income level, and history of cardiovascular disease, were recorded. A previously validated questionnaire was utilized in this research to examine cardiac depression among patients with CVD. Logistic regression was employed to identify predictors of depression. The data were analysed using SPSS version 29. To evaluate the normality of the data, the Kolmogorov-Smirnov test was conducted. Given that the data satisfied the parametric assumptions, independent t-tests and analysis of variance (ANOVA) were executed as appropriate. The Tukey post-hoc test was utilized for multiple group comparisons, and the findings were assessed accordingly.

Results: The study included 396 cardiovascular patients. The total cardiac depression scale mean was 95.01 ± 30.65 out of 182, which demonstrates a moderate level of depression (52.2% of the maximum score). The multivariate logistic regression analysis revealed that patients with a master's degree had significantly lower odds of depression compared to those with only primary education (OR = 0.11, 95% CI: 0.02–0.63, P = 0.013). Additionally, living in the Qasim region of the country was associated with a lower risk of depression (OR = 0.25, 95% CI: 0.07–0.87, P = 0.02). These findings suggest that higher education and specific regions may serve as protective factors against depression in cardiovascular patients.

Conclusion: Depression is common across patients with CVD. Healthcare professionals are advised to monitor the mental status of CVD patients. due to its crucial role in enhancing their adherence to their therapy and ultimately improving their cardiac outcomes.

Abbreviations: AHA: American Heart Association, CDS: Cardiac Depression Scale, CVD: cardiovascular disease,

Keywords: Cardiovascular diseases; Depression; Heart diseases; Mental status

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1. INTRODUCTION

Depression is a neuropsychological disorder characterized by some symptoms including feeling out of mood, loss the passion and motivation toward things, changes in eating habits either decrease or increase in appetite, insomnia or spend a lot of time in sleeping, exhaustion, movement changes either increasing or decreasing, individual feeling bad toward her or himself, inability to concentrate, loss of self-confidence, and thinking about suicidal ideas.¹ Previous literature highlighted the high prevalence of depression across different populations and its association with today's lifestyle.²⁻⁵

According to the American Heart Association (AHA), the prevalence of psychological disorders such as depression and anxiety among patients with heart events was found to be 40%, especially in patients with Ischemic brain attack. In addition to that, there is a link between depression and cardiovascular diseases, as depression increases the probability of having cardiac diseases. Thus, there is a reciprocal relationship between depression and cardiac events, as each is a risk factor for the other.⁶

Cardiac diseases are among the most prevalent diseases around the world, and four years ago, the number of deaths that occurred because of these diseases exceeded 900,000 cases in the United States of America (USA).⁷ Moreover, depression is known to cause functional impairment to the patient, and it has been found that this is associated with cardiovascular diseases among the American population.^{8,9} Among cardiac events, the most common cases that suffer from depression are patients who have experienced ischemic heart disease and coronary thrombosis.^{10,11}

The earlier studies illustrate that the relationship between depression and heart diseases is related to that the person who is suffering from depression may resort to some things that can lead to the deterioration of his condition, such as drug abuse, drinking alcohol, not exercising, and not following a healthy diet. Furthermore, depression can be a risk factor for non-adherence to medications because it causes disability and consequently, this may decrease the ability to do daily activities due to its effect it on patient behaviors. As a consequence, this leads to worsening of the heart condition and deterioration of the health of blood vessels. For instance, a person suffering from depression is in a dangerous condition because this will reflect on their heart, which may sometimes lead to death.^{12,13}

One of the risks of untreated depression in a patient with cardiovascular disease is a reduced quality of life, which can result in a reduced survival rate.¹⁴ Because

depression is often linked to heart disease, the AHA recommended the necessity of assessing the patient for any signs or symptoms of depression routinely to minimise the mortality rate related to this disorder.¹⁵

Previous studies have shown that giving antidepressant medications to patients suffering from depression and heart disease at the same time contributes significantly to improving the patient's quality of life, increasing his commitment to treatment, improving his lifestyle, which is reflected in the heart condition and mental health, and reducing the complications of heart disease.¹⁶⁻¹⁹

In this article, we discussed the prevalence of depression among patients with cardiovascular diseases (CVD), and its impact on the quality of life of these patients, with a focus on the importance of supporting their cardiac and psychological health. This study aimed to assess the depressive status of CVD patients and its associated predictors.

2. METHODOLOGY

This was an online cross-sectional survey study that was conducted in Saudi Arabia in May 2025. The study population consisted of patients diagnosed with CVD from the general public, 18 years or older, and residing in Saudi Arabia. Both male and female participants were enrolled without any exclusion criteria related to their sociodemographic attributes.

The research employed a convenience sampling strategy to solicit participation from the community of CVD patients within the general public and to complete the questionnaire instrument. We used social media sites (WhatsApp and Facebook) to recruit and invite study participants. It allowed us to encompass patients from diverse demographic backgrounds.

2.1. Questionnaire tool

A previously validated questionnaire was utilized in this research to examine cardiac depression among patients with CVD in Saudi Arabia.^{20,21} The questionnaire tool examined participants' demographic characteristics such as age, gender, residency, marital status, education level, occupation, income level, and history of cardiovascular disease. Moreover, it examined the prevalence of depression among CVD patients using the Cardiac Depression Scale (CDS).

The CDS is a self-report tool designed to evaluate depression symptoms in cardiac patients. The instrument

consists of 26 items, each evaluated on a 7-point Likert scale from 1 ("Strongly disagree") to 7 ("Strongly agree"), with seven items reverse-scored to mitigate response bias. The following items were reverse-coded: 4, 12, 14, 19, 20, and 23. The CDS assesses various aspects of depression, including affect, anhedonia,

cognitive function, anxiety, sleep disruptions, suicidal thoughts, and despair. Psychometric assessments have revealed the scale's robust internal consistency, with Cronbach's alpha coefficients between 0.88 and 0.92, and substantial test-retest reliability ($r = 0.79$).²⁰ The total scores for the scale range from 26 to 182, with elevated scores signifying more severe depression symptoms. Proposed cut-off scores for categorizing depression severity indicate that scores exceeding 95 signify significant depression with excellent sensitivity and specificity, and scores above 100 denote severe depression. The questionnaire tool was piloted on a group of the targeted study population to confirm its clarity and comprehensibility. Besides, the internal reliability of the questionnaire tool was examined using Cronbach's alpha test, which measured 0.796, and showed good reliability.

2.2. Ethical approval

Ethical approval for this research was obtained from Al-Imam Muhammad Ibn Saud Islamic University Institutional Review Board (Project number: 803/2025). Participants were informed that completing the questionnaire is considered informed consent for participation.

2.3. Statistical analysis

The data were analysed using SPSS version 29. The demographic features of the study population were illustrated using descriptive statistics, including means and standard deviations for continuous variables, as well as frequencies and percentages for categorical variables. To evaluate the normality of the data, the Kolmogorov-Smirnov test was conducted. Given that the data satisfied the parametric assumptions, independent t-tests and analysis of variance (ANOVA) were executed as appropriate. The Tukey post-hoc test was utilized for multiple group comparisons, and the findings were assessed accordingly. The median score of the cardiac depression scale, 97, served as the cut-off point to categorize patients into two groups for subsequent study.

Logistic regression was employed to identify predictors of depression, as evidenced by elevated values on the scale. Odds ratios (OR) and 95% confidence intervals (CI) were shown. A p-value less than 0.05 is deemed significant.

3. RESULTS

The study included 396 cardiovascular patients, comprising 273 males (68.9%). Most participants were married (289, 73.0%). Regarding age, the largest group was aged 41-50 years (123, 31.1%). In terms of education, 205 participants (51.8%) held a bachelor's degree (Table 1).

Table 1: Sociodemographic characteristics of cardiac patients participating in the study

Variables		N (%)
Gender	Female	123 (31.1)
	Male	273 (68.9)
Marital status	Single	86(21.7)
	Married	289 (73.0)
	Divorced	16 (4.0)
	Widowed	5 (1.3)
Age (years)	18-30	64 (16.2)
	31-40	61 (15.4)
	41-50	123 (31.1)
	51-60	98 (24.7)
	61-	50 (12.6)
Education level	Primary	12 (3.0)
	Middle	23 (5.8)
	Secondary	111 (28.0)
	Bachelor	205 (51.8)
	Master	33 (8.3)
	PhD	12 (3.0)
Living area	Riyadh	165 (41.7)
	Mekka	91 (23.0)
	Sharqiya	45 (11.4)
	Madinah	21 (5.3)
	Jazan	10 (2.5)
	Aseer	22 (5.6)
	Qasim	15 (3.8)
	Hail	8 (2.0)
	Tabuk	7 (1.8)
	Najran	5 (1.3)
	Jouf	4 (1.0)
	North border	3 (0.8)

3.1. Depression score stratified by sociodemographic variables

The total cardiac depression scale mean was 95.01 ± 30.65 out of 182, which demonstrates a moderate level of depression (52.2% of the maximum score). Table 2 presents the mean depression scores across different sociodemographic groups among cardiovascular patients. Female patients had significantly higher depression scores (99.59 ± 29.87) than males (93.03 ± 30.83) ($P = 0.04$). Marital status also showed a significant difference ($P = 0.006$), with widowed individuals reporting the highest scores (125.00 ± 36.42), followed by divorced ones (111.31 ± 36.40). Depression scores differed significantly by education level ($P = 0.01$), with the highest scores among those with only primary education (111.08 ± 31.97) and the lowest among those with a master's degree (81.24 ± 31.76) (Table 2).

A significant number of participants reported distressing symptoms. For instance, 314 participants (79.3%) strongly agreed with the statement "Dying is the best solution for me", reflecting high emotional distress. Similarly, 179 participants (45.2%) strongly disagreed with "I may not recover completely", suggesting hopelessness. Positive perceptions were also noted: 110 participants (27.8%) strongly agreed with "I feel independent and in control of my life", and 96 (24.4%) strongly agreed with "I feel in good spirits". Additionally, 129 participants (32.6%) strongly agreed with the negative perception "I am not the person I used to be", reflecting a shift in self-identity, Table 3.

3.2. Predictors of depression

The multivariate logistic regression analysis revealed that patients with a master's degree had significantly lower odds of depression compared to those with only primary education (OR = 0.11, 95% CI: 0.02–0.63, $P = 0.013$). Additionally, living in the Qasim was associated with a lower risk of depression (OR = 0.25, 95% CI: 0.07–0.87, $P = 0.02$). These findings suggest that higher education and specific regions may serve as protective factors against depression in cardiovascular patients (Table 4).

4. DISCUSSION

The current study aims to determine the prevalence of depression among cardiac patients in Saudi Arabia, and what are the risk factors that may increase the incidence of it among them. In our study, cardiac patients demonstrated a moderate level of depression with a mean score of 95.01 ± 30.65 out of 182 (52.2% of the maximum score). Depression has frequently existed in cardiac

Table 2: Depression score by sociodemographic variables among cardiovascular patients

Variables		Depression score	P value
Gender	Female	99.59 ± 29.87	0.04
	Male	93.03 ± 30.83	
Marital status	Single	98.60 ± 26.39	0.006
	Married	92.59 ± 30.90	
	Divorced	111.31 ± 36.40	
	Widowed	125.00 ± 36.42	
Age (years)	18-30	92.92 ± 21.82	0.68
	31-40	96.03 ± 34.75	
	41-50	98.02 ± 25.67	
	51-60	93.87 ± 37.03	
	61-	91.70 ± 32.89	
Education level	Primary	111.08 ± 31.97	0.01
	Middle	105.17 ± 28.00	
	Secondary	97.41 ± 28.94	
	Bachelor	94.10 ± 30.40	
	Master	81.24 ± 31.76	
	PhD	92.33 ± 39.16	
Living area	Riyadh	96.69 ± 30.75	0.08
	Mekka	92.97 ± 26.43	
	Sharqiyah	100.47 ± 32.25	
	Madinah	89.00 ± 31.83	
	Jizan	81.80 ± 35.90	
	Aseer	88.05 ± 31.58	
	Qasim	83.20 ± 20.71	
	Hail	117.50 ± 37.04	
	Tabuk	107.14 ± 43.09	
	Najran	116.60 ± 29.70	
	Jouf	76.50 ± 31.94	
North border	86.33 ± 46.14		

Data presented as mean \pm SD. $P < 0.05$ is considered as significant

patients, as it affects the patient's lifestyle and, as a result, this can influence their daily behaviors. Many studies have shown that more than half of this population met the criteria of a depression diagnosis.^{22,23} This result from our study was very consistent with several previous studies such as a study conducted in Saudi Arabia on people suffering from CVDs to assess the occurrence of depression among them, using the Patient Health Questionnaire-9 (PHQ-9), it was noted that there was a large number of those affected who suffered from

Table 3: The Cardiac Depression Scale items							
Item	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
"I have dropped many of interests and activities"	86 (21.7)	37 (9.3)	55 (13.9)	80 (20.2)	56 (14.1)	30 (7.6)	52 (13.1)
"My concentration is as good as it ever was **"	42 (10.6)	30 (7.6)	59 (14.9)	83 (21.0)	69 (17.4)	50 (12.6)	63 (15.9)
"I can't be bothered doing anything much."	70 (17.7)	41 (10.4)	60 (15.2)	67 (16.9)	55 (13.9)	49 (12.4)	54 (13.6)
"I get pleasure from life at present**"	39 (9.8)	31 (7.8)	38 (9.6)	84 (21.2)	69 (17.4)	42 (10.6)	93 (23.5)
"I am concerned about the uncertainty of my health."	91 (23.0)	40 (10.1)	53 (13.4)	44 (11.1)	53 (13.4)	39 (9.8)	76 (19.2)
"I may not recover completely"	179 (45.2)	42 (10.6)	37 (9.3)	50 (12.6)	38 (9.6)	26 (6.6)	24 (6.1)
"My sleep is restless and disturbed."	61 (15.4)	51 (12.9)	44 (11.1)	56 (14.1)	52 (13.1)	51 (12.9)	81 (20.5)
"I am not the person I used to be."	51 (12.9)	34 (8.6)	41 (10.4)	43 (10.9)	49 (12.4)	49 (12.4)	129 (32.6)
"I wake up in the early hours of the morning and cannot get back to sleep."	37 (9.3)	29 (7.3)	49 (12.4)	85 (21.5)	53 (13.4)	54 (13.6)	89 (22.5)
"I feel like I am living on borrowed time"	127 (32.1)	50 (12.6)	34 (8.6)	63 (15.9)	51 (12.9)	35 (8.8)	36 (9.1)
"Dying is the best solution for me."	314 (79.3)	19 (4.8)	9 (2.3)	25 (6.3)	4 (1.0)	7 (1.8)	18 (4.5)
"I feel in good spirits**"	41 (10.4)	25 (6.3)	34 (8.6)	69 (17.4)	57 (14.4)	74 (18.7)	96 (24.2)
"The possibility of sudden death worries me."	105 (26.5)	38 (9.6)	37 (9.3)	73 (18.4)	45 (11.4)	32 (8.1)	66 (16.7)
"There is only misery in the future for me."	152 (38.4)	60 (15.2)	50 (12.6)	51 (12.9)	38 (9.6)	20 (5.1)	25 (6.3)
"My mind is as fast and alert as always **"	44 (11.1)	39 (9.8)	54 (13.6)	91 (23.0)	47 (11.9)	65 (16.4)	56 (14.1)
"I get hardly anything done."	75 (18.9)	63 (15.9)	51 (12.9)	73 (18.4)	65 (16.4)	36 (9.1)	33 (8.3)
"My problems are not yet over."	62 (15.7)	65 (16.4)	63 (15.9)	82 (20.7)	51 (12.9)	29 (7.3)	44 (11.1)
"Things that I regret about my life are bothering me."	60 (15.2)	47 (11.9)	43 (10.9)	68 (17.2)	56 (14.1)	48 (12.1)	74 (18.7)
"I gain just as much pleasure from my leisure activities as I used to**"	68 (17.2)	56 (14.1)	65 (16.4)	65 (16.4)	49 (12.4)	41 (10.4)	52 (13.1)
"My memory is as good as it always was**"	42 (10.6)	43 (10.9)	68 (17.2)	62 (15.7)	61 (15.4)	60 (15.2)	60 (15.2)
"I become tearful more easier than before"	91 (23.0)	57 (14.4)	39 (9.8)	66 (16.7)	41 (10.4)	42 (10.6)	60 (15.2)
"I seem to get more easily irritated by others than before."	56 (14.1)	46 (11.6)	51 (12.9)	53 (13.4)	59 (14.9)	64 (16.2)	67 (16.9)
"I feel independent and in control of my life**"	30 (7.6)	26 (6.6)	41 (10.4)	70 (17.7)	53 (13.4)	66 (16.7)	110 (27.8)
"I lose my temper more easily nowadays."	50 (12.6)	48 (12.1)	47 (11.9)	69 (17.4)	67 (16.9)	51 (12.9)	64 (16.2)
"I feel frustrated."	98 (24.7)	46 (11.6)	44 (11.1)	69 (17.4)	52 (13.1)	42 (10.6)	45 (11.4)
"I am concerned about my capacity for sexual activity."	140 (35.4)	27 (6.8)	35 (8.8)	54 (13.6)	36 (9.1)	40 (10.1)	64 (16.2)

*Data presented as n (%); Items marked with * are reverse-coded.*

depression, where the results were ranged from 14.46, 7.23, 2.41 for mild, moderate, and severe depression respectively.²⁴ In Palestine, the result revealed that

people with heart disease were exposed to high levels of anxiety and depression. Depression in this study was measured using the CDS, and the findings showed that a

Table 4: Predictors of depression among CVD patients			
Variable		OR (95% CI)	P value
Gender	Female	Reference	
	Male	0.74 (0.44–1.24)	0.249
Marital status	Single	Reference	
	Married	0.80 (0.39–1.62)	0.527
	Divorced	2.44 (0.61–9.79)	0.209
	Widowed	1.54 (0.11–21.51)	0.748
Age (years)	18-30	Reference	
	31-40	2.14 (0.90–5.11)	0.086
	41-50	1.97 (0.84–4.64)	0.120
	51-60	1.49 (0.59–3.73)	0.398
	61-	1.12 (0.40–3.13)	0.836
Education level	Primary	Reference	
	Middle	0.61 (0.11–3.59)	0.589
	Secondary	0.31 (0.06–1.47)	0.140
	Bachelor	0.25 (0.05–1.16)	0.077
	Master	0.11 (0.02–0.63)	0.013
	PhD	0.30 (0.05–2.01)	0.215
Living area	Riyadh	Reference	
	Mekka	0.57 (0.33–0.98)	0.043
	Sharqiyah	0.91 (0.45–1.83)	0.787
	Madinah	0.49 (0.19–1.29)	0.149
	Jizan	0.29 (0.07–1.21)	0.089
	Aseer	0.54 (0.20–1.44)	0.219
	Qasim	0.25 (0.07–0.87)	0.029
	Hail	0.86 (0.18–4.20)	0.852
	Tabuk	1.76 (0.31–9.84)	0.523
	Najran	5.05 (0.50–51.51)	0.172
	Jouf	0.26 (0.02–2.66)	0.254
	North border	0.48 (0.04–5.54)	0.556

Data presented Odds Ratio (Confidence Interval); P 0.05 considered as significant

large number of patients who suffered from depression were moderate to severe.²⁵ Similarly, in Jordan, a study done on people with coronary artery disease found that they had symptoms of depression according to the PHQ-9, with most of them suffering from moderate to severe depression.²⁶

Our study also concluded that female patients had significantly higher depression scores (99.59 ± 29.87) than males (93.03 ± 30.83) ($P = 0.04$). This is

unsurprising because females are exposed to many changes, including hormonal changes such as menopause, menstrual period, pregnancy, labour, and other conditions, which make them more susceptible to any stress, anxiety, or depression than males. Also, estrogen is kept in change during the month of female life cycle, and this hormone is the most essential hormone that is responsible for the regulation of mood inside females' bodies.²⁷ Many studies have shown that females are more likely to suffer from depression than males, especially females with coronary heart disease. This was also proven by two studies in Palestine and Saudi Arabia, where the females had a higher rate than males of experiencing depression when they were diagnosed with heart disease.²⁸⁻³⁰

In addition to that, our study observed that marital status also showed a significant difference ($P = 0.006$), with widowed individuals reporting the highest scores (125.00 ± 36.42), followed by divorced (111.31 ± 36.40). And from a social perspective, it has been observed that patients whose marital status is divorced or widowed have a higher chance of developing depression than those who are married.^{31,32} In the direct relation between the health of the heart and social state, one study was consistent with our study result and found that marital status can affect cardiovascular health, as married people are less likely to develop these diseases than unmarried people.³³

Depression can deteriorate according to the educational level of the patients; in the current study, depression scores differed significantly by education level ($P = 0.01$). Cardiac patients with the highest scores were among those with only primary education (111.08 ± 31.97) and the lowest among those with a master's degree (81.24 ± 31.76). This was aligned with a study aimed to examine the relationship between the level of education and cases of depression, it was noted that education greatly affects the severity of depression, as people with higher education were noted to suffer from anxiety and depression less than those who were exposed to only primary education. This indicates that people with higher education have a better quality of life and protection against depression compared with those who were exposed to low level of education.³⁴

5. LIMITATIONS

This study has limitations. Self-administered survey study design is prone to reporting and recall bias. Furthermore, cross-sectional online survey studies have limited generalizability and the ability to examine causality across the study variables. Therefore, the study findings should be interpreted carefully.

6. CONCLUSION

Depression is common among patients with cardiovascular diseases. Healthcare professionals are advised to monitor the mental status of CVD patients due to its crucial role in enhancing their adherence to their therapy and ultimately improving their cardiac outcomes.

7. Data availability

The numerical data generated during this research are available from the authors.

8. Conflict of interest

All authors declare that there was no conflict of interest.

9. Funding

The study utilized the hospital resources only, and no external or industry funding was involved.

10. Authors' contribution

KAA: Conceptualization, investigation, methodology, resources, validation, writing- original draft, writing – review and editing.

OMA, ABB: investigation, resources, writing- original draft, writing – review and editing

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