Depression in Nonhospitalized Jordanian Patients With Coronary Artery Disease

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ABSTRACT

Background: Patients with coronary artery disease (CAD) are likely to experience depression, which contributes to the burden of disease and is a risk factor for mortality. Patients in outpatient clinics in Jordan are not routinely screened for depression. Significant relationships among patient characteristics must be determined to ascertain the predictors of depression.

Purpose: The aims of this research were to assess the level of depression symptoms in nonhospitalized patients with CAD; to examine the relationships between depression and relevant sociodemographic, self-reported health history, and patient health perception variables; and to identify possible predictors of depression in Jordan.

Methods: This cross-sectional study recruited a convenience sample (N = 174) of nonhospitalized outpatients who had been diagnosed with CAD. Self-reported demographic, health history, and health perception information (independent variables) were provided by the participants. The depression scores (dependent variable) for the participants were assessed using the Cardiac Depression Scale. Data were analyzed using descriptive statistics, the chi-square test, Pearson’s correlations, and multiple linear regressions.

Results: Half of the participants reported mild to moderate depression, with 37% reporting severe depression. Predictors of depression included gender (being female), having a concomitant chronic disease, prior surgery, irregular exercise, impaired sexual activity, and self-perceived poor psychological health.

Conclusions/Implications for Practice: To improve patient outcomes, clinical personnel should screen patients with CAD for depression and offer a combined pharmaceutical and therapeutic treatment intervention. An easy-to-administer instrument to detect depression may be included in the standard patient checkup routine used in clinics. Several patient characteristics were found to significantly affect depression and health outcomes.

Key Words: Jordan, coronary artery disease, depression, health assessment, demographic predictors of depression.

Introduction

Coronary artery disease (CAD) is a worldwide health problem and the leading cause of mortality (World Health Organization [WHO], 2014). On the basis of WHO statistics, CAD affects 110 million people and is the cause of 8.9 million deaths annually. CAD causes 15.9% of deaths each year and is the most common cause of death globally (GBD 2015 Mortality and Causes of Death Collaborators, 2016). The prevalence of CAD is predicted to reach 23.6 million people worldwide in 2030 (WHO, 2017). CAD is the main cause of death in Jordan, where it is responsible for 19.8% of all deaths in the country (WHO, 2014). Seventy-five percent of CAD deaths occur in low- to middle-income countries because of increases in the prevalence of cardiovascular disease risk factors (Mehta, Wei, & Wenger, 2015; WHO, 2014).

Depression is a widely recognized problem in patients with CAD (O’Neil, 2013), with at least 14% of patients with CAD believed to experience depression, of which 20% experience minor depression (Blumenthal, 2008; Huffman, Celano, Beach, Motiwala, & Januzzi, 2013). A German study on depression in patients with coronary heart disease found that 22% of the participants had been diagnosed with depression (Konrad, Jacob, Rapp, & Kostev, 2016). Similarly, a Jordanian study found that 25% of patients who complained of physical illness had symptoms of depression (Hamdan-Mansour et al., 2014). Depression has been associated with increased morbidity, mortality, and healthcare costs and a lower quality of life (Celano & Huffman, 2011; May et al., 2017; Sher, Lolak, & Maldonado, 2010). One study in Taiwan found a 21% prevalence of depression and suggested that depression functions as an independent factor that worsens the quality of life of patients (Huang, Chi, Sousa, Wang, & Pan, 2011). According to WHO, depression is a global phenomenon that affects some 350 million people worldwide, is a major cause of disability, and contributes greatly to the economic burden of disease (WHO, 2016).
Depression is a risk factor for ischemic heart disease (May et al., 2017). However, the burden of depression has been widely underestimated (Charlson et al., 2013). A study conducted in Canada found depression among patients with CAD to be higher than in the normal population and identified depression as a potential predictor of otherwise healthy individuals developing CAD (Frasure-Smith & Léspérance, 2010). Konrad et al. (2016) studied CAD as a predictor of depression, and Bayat et al. (2011) identified CAD as a predictor of depression in a large scale, cross-sectional study in Iran.

A literature review that investigated the relationship between CAD and depression suggests a bidirectional relationship, with CAD a risk factor for depression and depression a risk factor for CAD (Khawaja, Westermeyer, Gajwani, & Feinberg, 2009). The findings in the literature suggest that depression is a serious problem in patients with CAD and that the relationship between CAD and depression should be examined further (O’Neil, 2013).

In one Jordanian study, 25% of patients (n = 850) who complained of physical illnesses also showed symptoms of depression (Hamdan-Mansour et al., 2014). The authors noted that, among patients with CAD, 30% had mild depression and 29.3% had moderate-to-severe depression. Moreover, CAD was highly correlated with gender and employment status. However, patients with cancer reported the highest mean level of depression, followed by patients with more than one disease (e.g., diabetes mellitus and CAD). The authors also noted that having one or more chronic illness was stressful and that stress may affect how patients manage their diseases. In addition, psychosocial status may be a factor in compliance behavior, which in turn may affect patient health outcomes (Hamdan-Mansour et al., 2014).

The findings of the several studies worldwide that have investigated the risk factors for depression in patients with CAD suggest that being female, having a history of cardiac catheterization, and having other concomitant chronic diseases increase the risk of depression in this population (Huffman et al., 2013; Khawaja et al., 2009; Konrad et al., 2016; May et al., 2017). Other studies have claimed that erectile dysfunction increases risk of depression in patients with CAD (Clouse et al., 2003; Vlachopoulos, Jackson, Stefanadis, & Montorsi, 2013). The conclusions of an Irish study stated that the perception of psychological well-being among patients with heart failure has not been sufficiently examined (Morgan, Viliers-Tuthill, Barker, & McGee, 2014), noting that a regression analysis (n = 91) showed that patients’ perception of illness versus well-being accounted for a larger proportion of variance in depression than either sociodemographic characteristics or functional status. Furthermore, the authors suggested that the negative perceptions of patients affected health outcomes and increased the risk of health complications (Morgan et al., 2014). Physical activities play an important role in reducing the risk of depression in the general population and among patients with CAD (Peterson, Charlson, Wells, & Altemus, 2014). Finally, another study suggested that older patients with CAD face a higher risk of developing depression than younger patients with CAD (Konrad et al., 2016). The relationship between the sociodemographic and clinical characteristics of patients with CAD, respectively, and depression remains unclear in the literature and therefore requires further study and clarification.

**Depression Screening for Patients With Coronary Artery Disease**

A number of widely used screening tools for depression are available. The Beck Depression Inventory-II (Beck, Steer, & Brown, 1996) was previously used in a study in Jordan to detect depression among patients diagnosed with physical illnesses (Hamdan-Mansour et al., 2014). The American Heart Association recommends the use of a two- and nine-item Patient Health Questionnaire, although its validity as a screening tool remains unclear and no evidence currently supports the use of this tool to improve cardiac patients’ outcomes (Huffman et al., 2013). Neither of the aforementioned two instruments has been used directly on cardiac patients. The Cardiac Depression Scale (CDS; Hare & Davis, 1996) has been used to assess depression in cardiac patients in Iran, with results showing the CDS to be a reliable and sensitive tool in this population (Gholizadeh et al., 2010; Kiropoulos et al., 2012). On the basis of this experience, the CDS was used in this study to screen for depression.

Limited medical resources necessitate the prioritization of medical expenditures on the leading causes of death and disabilities. Jordan has an advanced healthcare system and is a major international destination for medical tourism. However, the focus of the healthcare system on the physical aspects of disease to the detriment of the psychological aspects is evident from the small budget devoted to mental health. The general lack of awareness among nurses in Jordan of the importance of assessing depression in patients with CAD likely prolongs hospitalization and increases treatment costs. Thus, predictors of depression in patients with CAD should be considered in future intervention programs.

Depression has been studied in patients with CAD in many Western countries, but few studies have been conducted in Arab countries such as Jordan. Only one Jordanian study in this category, a study on depression in patients with physical illnesses, including coronary vascular disease, was identified in the literature (Hamdan-Mansour et al., 2014).

This study aimed to assess level of depression symptoms in outpatients with CAD and to examine the relationships between depression and various sociodemographic, self-reported health history, and patient health perception variables to identify possible predictors of depression in this patient population in Jordan.

**Methods**

**Design and Sample**

A cross-sectional design was used to conduct a one-time assessment of depression and of self-reported health history.
in a convenience sample of nonhospitalized patients with coronary heart disease attending an outpatient clinic in a Jordanian hospital. Medical records were examined to identify patients who met the inclusion criteria, which included (a) ≥ 18 years old and (b) a diagnosis of CAD for at least 6 months before data collection. The exclusion criteria included (a) previous diagnosis of depression or psychiatric disease, (b) showing symptoms of cognitive impairment, and (c) and currently taking antidepressant medications. Patients typically presented at the clinic with chest pain, electrocardiogram changes, and elevated troponin and other cardiac enzymes.

Using G* Power software, a minimum sample of 169 was estimated as necessary to identify statistically significant relationships of moderate magnitude (p < .05). The number of participants for this study was set at 250 to allow for potential withdrawals and for incomplete questionnaires.

**Measures**

The instruments used for data collection were self-administered in the clinic. Three of the data collection forms were developed by the author, and one was the Arabic version of a widely used scale. The data collection forms are listed hereinafter.

**Sociodemographic data form**

This form was used to collect information on the gender, marital status, professional status, education status, family monthly income, and health insurance status of the participant.

**Health history form**

This form was used to collect information on the clinical characteristics and medical/surgical history (e.g., comorbidities, cardiac catheterization history, duration of cardiac disease, medication compliance, smoking status, and physical exercise habits) of the participant.

**Health perception form**

This form was used to collect self-rated information on physical, psychological, and sexual health since developing a coronary problem. Items are scored using a 5-point scale, with 1 = excellent and 5 = weak.

**The Cardiac Depression Scale**

The questionnaire, developed by Hare and Davis (1996) in Australia to measure depression of individuals with cardiac diseases, is a 26-item or six-subscale tool with a developer-reported Cronbach’s α of .9. An instrument validation study by Kiropoulos et al. (2012) reported internal consistency α coefficients for the six subscales (from .62 to .82) and found the instrument to be reliable for assessing depression in cardiac patients. Permission to use and translate the Arabic version of the CDS was pilot tested on 20 cardiac patients and found to be clear and understandable, with a Cronbach’s α coefficient of .89.

**Data Collection**

Data collection was conducted from August to September 2015. After obtaining university and hospital approval, the hospital director gave permission to collect data. The purpose of the study was explained to the head nurse and the physician of the cardiac outpatient clinic, and permission was received to review the relevant medical records in the outpatient clinic. Patients who met the inclusion criteria were then identified, and potential participants were sent a cover letter with information sheets and a reply envelope. Those who returned the completed information form were met by the principal investigator and her assistants, who answered their potential participant concern questions and explained policies regarding protecting participant rights. Participants completed the questionnaires after providing verbal and written consent. Participants completed the instruments while in the waiting room of the hospital clinic and returned them to a research team member. The principal investigator and her assistants were available to answer any questions.

**Ethical Consideration**

The Jordan University of Science and Technology Institutional Review Board approved this study (216-2013). Data collection began after a patient provided written informed consent to participate. Before obtaining the consent form, the researcher explained the purpose, method, and process of this study to patients. Patients were assured that participation status would not affect the services they received at the clinic, that they had the right to withdraw at any time, and that individual responses would be kept confidential.

**Statistical Analysis**

SPSS for Windows Version 19.0 (IBM, Armonk, NY, USA) was used to obtain descriptive and correlational values. Relationships between sociodemographic characteristics and depression scores were determined using chi-square analysis and determining Pearson’s r correlation coefficients. In addition, multiple linear regressions were used to identify the significant predictors of depression in the sample. In this study, “depression predictors” refer to all demographic, health history, and self-perceived health (physical, psychological, and sexual) variables that potentially predict depression, whereas “clinical characteristics” refer to both health history and health perception variables. Statistical advice was reached to make all multiple linear regressions’ test requirements achieved before data analysis.
**Results**

**Participant Characteristics**

Of the 250 patients who met the inclusion criteria, 40 declined to participate and 36 patients returned incomplete questionnaires, leaving 174 patients who were enrolled as participants. The mean age of participants was 58.6 years (SD = 10.2), and 134 (77%) were married. Half of the participants were male (n = 90, 51.7%) and unemployed (n = 87, 50%). Most were literate (n = 146, 84%), and almost two thirds reported having a moderate family monthly income (n = 108, 62.1%). Sociodemographic data are shown in Table 1.

**Health History**

Most of the participants reported having a concomitant chronic disease (typically diabetes or hypertension; n = 157, 90.2%) and having undergone a cardiac catheterization procedure (94.2%). A small number (n = 19, 10.9%) reported receiving five or more cardiac catheterization procedures. Half had a history of prior surgery (n = 97, 55.7%; mostly appendectomies and gall bladder stone removals), and 25.9% (n = 45) reported smoking cigarettes, with 62% of this number (n = 28) smoking at least one pack per day.

Nearly all of the participants (n = 170, 97.7%) complied with their medical prescriptions, and almost two thirds (n = 112, 64.4%) reported experiencing a shocking or stressful event during the last year such as the death of a family member or an acute health problem. Frequency and percentage data are shown in Table 2. Although some of the patients self-reported that they had depression and anxiety and had taken related medications (see Table 2), their files did not corroborate this information. However, because their family members confirmed the depression or anxiety to be a short episode of sadness because of bereavement, these data were included in the analysis.

**TABLE 1.**

**Frequency Distribution of the Sociodemographic Variables (N = 174)**

| Variable                     | n   | %   |
|------------------------------|-----|-----|
| Age (M and SD)               | 58.6| 10.2|
| Gender                       |     |     |
| Male                         | 90  | 51.7|
| Female                       | 84  | 48.3|
| Marital status               |     |     |
| Single                       | 10  | 5.2 |
| Married                      | 134 | 77.0|
| Divorced                     | 3   | 1.7 |
| Widowed                      | 27  | 15.5|
| Educational level            |     |     |
| Illiterate                   | 28  | 16.1|
| Can read and write           | 28  | 16.1|
| Secondary degree or less     | 60  | 34.5|
| More than secondary degree   | 58  | 33.3|
| Employment status            |     |     |
| Working                      | 49  | 28.1|
| Retired                      | 38  | 21.8|
| Unemployed                   | 87  | 50.0|
| Monthly income               |     |     |
| Low                          | 58  | 33.3|
| Moderate                     | 108 | 62.1|
| High                         | 8   | 4.6 |
| Health insurance             |     |     |
| Yes                          | 133 | 76.4|
| No                           | 41  | 23.6|

*Note. Age range: 38–81 years.*

**Health Perceptions**

About half of the participants rated their physical health as less than good (n = 97, 55.74%), and 14.4% (n = 25) rated their health as excellent or very good. Less than half (n = 77, 44.3%) perceived their psychiatric or mental health to be less than good (fair or weak). Although 29 participants did not respond to the query on sexual behavior, almost two thirds of the patients reported that having a coronary disease affected their sexual activity (n = 121, 69.5%). The most prevalent problem noted was erectile dysfunction (n = 33, 19.0%).

**Depression Symptoms**

The CDS was found to be valid and reliable in this study (Cronbach’s α = .75). The total CDS mean score was 91.9 (SD = 26.5), indicating a mild/moderate level of depression. Using the frequency distribution of depression symptoms as measured by CDS, approximately half of the participants reported depressive symptoms (n = 93, 53.4%), with a relatively small number reporting mild/moderate depression (n = 31, 17.8%) and a larger number (n = 62, 35.6%) reporting severe depressive symptoms (see Table 3).

**Relationship Between Depression and Sociodemographic and Clinical Characteristic Variables**

The results of chi-square analyses are shown in Table 4. A significant difference was found for gender (χ² = 4.66, p = .03), with more female patients (51.7%) showing depressive symptoms than male patients. CDS total scores were categorized as “no depression” (<90), “mild/moderate depression” (90–99), and “severe depression” (>100). A relationship was found between having concomitant chronic diseases and having a CAD diagnosis (90.2%; χ² = 8.40, p = .004) and between previously having surgery and having a CAD diagnosis (55.7%; χ² = 6.20, p = .01). Moreover, a significant difference was found for exercise (χ² = 9.90, p < .001), with nonregular exercisers reporting higher depression scores (proportion: 60.5%). In addition, a relationship was found...
for influence of impaired sexual activity (proportion: 69.8%; \( \chi^2 = 8.40, p < .001 \)). The participants who reported that heart disease affected their sexual activity had higher depression scores. No significant relationships were found between CAD diagnosis and other sociodemographic, health history, or physical and psychological health perception variables.

In terms of self-rated health, Pearson \( r \) correlation results showed a statistically negative relationship between depression and perceived physical health (\( r = -.28, p < .001; \) small relationship) and perceived psychological health (\( r = -.48, p < .001; \) medium relationship; Pallant, 2003). A negative relationship was noted because the health perception scores were reversed, with 1 corresponding to excellent and 5 corresponding to weak. Thus, participants who perceived their physical or psychiatric health as fair or weak registered higher depression scores than those who perceived their health as very good or excellent.

### Predictors of Depression
The statistically significant predictors of depression identified in this study include weak/fair self-rated psychological health, impaired sexual activity, one or more prior surgeries, being female, and lack of regular exercise (\( F = 20.2, p < .001 \), adjusted \( R^2 = .36, p < .05 \); Table 5). The regression model explained 36% of the variance in depression severity.

### Discussion
This study aimed to assess depression symptoms in Jordanian outpatients with CAD and to describe the relationships

| Variable | \( n \) | % |
|----------|---------|---|
| Shocking/stressful event within last year | 44 | 25.3 |
| Family member death | 26 | 14.9 |
| Family member travelling | 18 | 10.3 |
| Problem with relatives | 7 | 4.0 |
| Other | 17 | 9.9 |
| Nothing | 62 | 35.6 |

*Self-reported.

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**TABLE 2.**
*Frequency Distribution of the Self-Reported Health History of the Patients (N = 174)*

| Variable | \( n \) | % |
|----------|---------|---|
| Chronic disease | | |
| No chronic diseases | 17 | 9.8 |
| Hypertension (HTN) | 24 | 13.8 |
| Diabetes mellitus (DM) | 9 | 5.2 |
| DM and HTN | 34 | 19.5 |
| DM and HTN and hyperlipidemia | 20 | 11.5 |
| DM and HTN and heart failure | 16 | 9.2 |
| Other (e.g., cancer, thyroid disease) | 54 | 31.0 |
| Coronary catheterization history | | |
| Yes | 164 | 94.2 |
| No | 10 | 5.8 |
| Frequencies of coronary catheterization | | |
| No previous catheterization | 10 | 5.8 |
| 1–2 times | 105 | 60.3 |
| 3–4 times | 40 | 23.0 |
| 5–6 times | 11 | 6.3 |
| > 6 times | 8 | 4.6 |
| Surgical history | | |
| Yes | 97 | 55.7 |
| No | 77 | 44.3 |
| Smoking history | | |
| Yes | 45 | 25.9 |
| No | 129 | 74.1 |
| Coronary heart disease (duration; years) | | |
| 6 months to < 1 | 34 | 19.5 |
| 1–5 | 96 | 55.2 |
| 6–10 | 23 | 13.2 |
| > 10 | 21 | 12.1 |
| Previous diagnosis of depression\(^a\) | | |
| Yes | 8 | 4.6 |
| No | 166 | 95.4 |
| Previous diagnosis of anxiety\(^a\) | | |
| Yes | 11 | 6.3 |
| No | 163 | 93.7 |
| Previous use of antidepressant medication\(^a\) | | |
| Yes | 9 | 5.2 |
| No | 165 | 94.8 |
| Previous use of antianxiety medication\(^a\) | | |
| Yes | 8 | 4.6 |
| No | 166 | 95.4 |
| Current medication compliance | | |
| Yes | 170 | 97.7 |
| No | 4 | 2.3 |
| Regular exercise | | |
| Yes | 69 | 39.5 |
| No | 105 | 60.5 |
| Sexual activity since diagnosis | | |
| Affected | 121 | 69.8 |
| Not affected | 53 | 30.2 |

(continues)
between depression and various sociodemographic, self-reported health history, and patient health perception variables. Furthermore, this study identified those variables that predicted depression in the sample. Half of the participants reported mild-to-moderate depression, and nearly one third reported severe depression. Being female and having one or more concomitant chronic diseases were two of the clinical predictors of depression identified in this study. The following section presents detailed information about the levels of depression, associated factors, and possible predictors identified in this study.

**Level and Severity of Depression Symptoms**

About 30% of the patients with CAD in Hamdan-Mansour et al. (2014) were affected by mild to moderate levels of depression. In this study, only 17.8% of participants were reported to be in the mild-to-moderate range. However, the percentage of participants reporting in the high range in this study exceeded that found by Hamdan-Mansour and colleagues (35.6% vs. 30%, respectively). This may be because the earlier study included patients with any physical illness (e.g., respiratory diseases, CAD, cancer), whereas this study focused exclusively on patients with CAD. Echoing this study, a study of patients with stable/unstable angina and myocardial infarction found a similarly high incidence (31%–45%) of “significant” depression (Huffman et al., 2013), and a study in Iran found that 65.9% of participants reported depressive symptoms 24 months after experiencing a myocardial infarction (Hosseini et al., 2011). In a meta-analysis of patient data, depression was identified as a risk factor for mortality, although the authors noted that the severity of depression lessened over time because of patient adjustment (Meijer et al., 2013).

In terms of total CDS scores (summed across 26 items using a 7-point agreement scale), the overall mean was in the mild-to-moderate range (91.9 ± 26.5, range: 26–182), which is higher than the mean score of the original CDS study in Australia (80.3 ± 27.8; Hare & Davis, 1996) and less than the mean reported in an Iranian study (101.37 ± 25.72; Gholizadeh et al., 2010). The higher scores for those studies conducted in Middle Eastern countries than in Australia may be attributable to political, socioeconomic, and cultural differences.

**TABLE 4. Chi-Square Analysis of Relationship Between Depression Scores and Selected Sociodemographic and Clinical Characteristics (N = 174)**

| Variable                          | n   | %   | χ²  | df | p   |
|----------------------------------|-----|-----|-----|----|-----|
| Gender                           | 4.66| 1   | .030|    |     |
| Female                           | 90  | 51.7|     |    |     |
| Male                             | 84  | 48.3|     |    |     |
| Marital status                   | 0.89| 1   | .340|    |     |
| Married                          | 164 | 94.3|     |    |     |
| Not married                      | 10  | 5.7 |     |    |     |
| Educational status               | 4.20| 1   | .500|    |     |
| Low                              | 116 | 66.7|     |    |     |
| High                             | 58  | 33.3|     |    |     |
| Working status                   | 1.16| 1   | .280|    |     |
| Work                             | 87  | 50.0|     |    |     |
| Not working                      | 87  | 50.0|     |    |     |
| Presence of health insurance     | 0.06| 1   | .870|    |     |
| Yes                              | 133 | 76.4|     |    |     |
| No                               | 41  | 23.6|     |    |     |
| Chronic diseases                 | 8.40| 1   | .004|    |     |
| Yes                              | 157 | 90.2|     |    |     |
| No                               | 17  | 9.8 |     |    |     |
| Previous coronary catheterization| 0.00| 1   | .940|    |     |
| Yes                              | 164 | 94.2|     |    |     |
| No                               | 10  | 5.8 |     |    |     |
| Surgical history                 | 6.20| 1   | .010|    |     |
| Yes                              | 97  | 55.7|     |    |     |
| No                               | 77  | 44.3|     |    |     |
| Smoking                          | 0.13| 1   | .700|    |     |
| Yes                              | 45  | 25.9|     |    |     |
| No                               | 129 | 74.1|     |    |     |
| Last month’s cardiac hospitalization | 0.99| 1   | .300|    |     |
| Yes                              | 79  | 45.4|     |    |     |
| No                               | 95  | 54.6|     |    |     |
| Coronary heart disease duration  | 1.48| 1   | .200|    |     |
| 6 months to ≤ 5 years            | 130 | 74.7|     |    |     |
| > 5 years                        | 44  | 25.3|     |    |     |
| Regular exercise                 | 9.90| 1   | < .001|    |     |
| Yes                              | 69  | 39.7|     |    |     |
| No                               | 105 | 60.3|     |    |     |
| Sexual activity since diagnosis   | 8.40| 1   | < .001|    |     |
| Affected                         | 121 | 69.8|     |    |     |
| Not affected                     | 53  | 30.2|     |    |     |

*Note. Clinical characteristics refer to health history and patient physical and psychological health perception variables.

*p < .05.

**TABLE 5. Multiple Linear Regression to Test the Significant Predictors of Depression According to Selected Sociodemographic and Clinical Characteristics (N = 174)**

| Variable                        | β   | p   | R²  | F   |
|---------------------------------|-----|-----|-----|-----|
| Psychological health self-evaluation | −.36| < .001| .36 | 20.20|
| Regular exercises               | .20 | .001| .36 | 20.20|
| Sexual activity affected         | .32 | < .001| .36 | 20.20|
| Gender                          | .16 | .010| .36 | 20.20|
| Surgical history                | .14 | .020| .36 | 20.20|

*Note. Clinical characteristics refer to health history and patient physical and psychological health perception variables.*
Relationships Between Sociodemographic Variables and Depression

This study revealed significant relationships between depression and the sociodemographic variables of gender (being female), concomitant chronic diseases (having one or more), surgical history (previous surgeries), exercise (lacking regular exercise), and sexual activity (impaired). The relatively higher depression scores for women in this study may be because of the traditional role of Jordanian women as responsible for their family, which is often a source of stress. Moreover, in Jordanian culture, the actions of women are more likely to be criticized than those of men. In addition, having one or more chronic diseases in addition to CAD and one or more prior surgeries may affect patients negatively and inhibit the effective management of their diseases.

In this study, patients who self-reported as not exercising regularly had higher depression scores than those who did. Physical inactivity and lack of regular exercise have been shown to affect depression, with a long-term, large-scale study on outpatients with cardiac diseases in the United States concluding that lack of exercise is a mediator between depression and negative coronary heart disease outcomes (Whooley et al., 2008). Furthermore, physical activity is recognized as a positive influence on both mental and physical health as well as a means of relieving stress, which promotes good health and positive behavioral outcomes (WHO, 2011).

Associations have been found among depression, CAD, and sexual health. One review noted that, although depression contributes to impaired sexual activity in patients with heart disease and often results in erectile dysfunction or fear of heart attack during performance, further research is needed, especially in women and older adults (Nascimento et al., 2013).

Many studies have reported that being unmarried and unemployed increase the risk of depression in patients with CAD (Al-Abbudi, Lami, & Wady, 2018; Bjørnnes et al., 2018; Eng et al., 2011). A study conducted by Al-Abbudi et al. (2018) at an outpatient clinic and sharing the same purpose as this study found a significant relationship between depression and marital status (being unmarried), employment (not having a job), and education (being illiterate; Al-Abbudi et al., 2018). However, this study found no significant relationship between depression and these three variables. One possible explanation for this discrepancy is that the entire sample in this study was educated, with around half reporting a low level of education. Another possible explanation is the faith in God in this study professed by participants of all educational levels, which may help them acquiesce to their current condition as “God’s will.”

This study found no significant relationship between age and depression, which contrasts with the finding in Konrad et al. (2016) that older patients with CAD faced a higher risk for depression than their younger peers. The more regular participation of older people than younger people in religious activities in Muslims countries such as Jordan may help older people in these countries accept their current condition.

Predictors of Depression in Outpatients With Coronary Artery Disease

The predictors of depression identified in this study include gender, prior surgery, exercise, sexual activity, and perceived psychological health. These variables, with the addition of perceived psychological health and the absence of concomitant chronic diseases, are the same as those that were found to be significantly related to depression. Although, because disease management was not investigated, compliance with medications was not identified as a significant issue in this study, nonadherence to CAD self-management routines likely contributes to depression as well (Khawaja et al., 2009).

A statistically significant relationship was identified between depression and self-perceived psychological health. This finding is consistent with prior studies in which patients with CAD with poor self-perceived mental health statuses reported more depressive symptoms than those who perceived their mental health as good (Kent & Shapiro, 2009; Morgan et al., 2014). Patients who hold negative images of themselves may be more likely to rate their mental state as lower than their stabler or better-adjusted peers. Negative self-image may increase stress in patients and lead to more depressive symptoms. In addition, coronary disease and the commonly prescribed medications for this disease are known to cause psychophysiological changes that the patient may perceive as unhealthy or mentally debilitating, which may exacerbate stress and increase depression.

Limitations

This study was conceived as an initial attempt to study depression among patients with CAD in Jordan. There are several limitations to this study. First, the cross-sectional design approach that was used addresses only one point in time. Second, the convenience sampling technique may introduce a bias because the participants may not be representative of the general Jordanian population. Third, the lack of a theoretical framework may affect the clarity of the results. Fourth, the use of self-ratings is inherently subjective, and participant responses are likely to be affected by bias. All of the participants were attending the outpatient clinic and presumably had some degree of pain or anxiety that may have negatively affected their perceptions. Conducting follow-up studies would further enhance scholarly understanding of the variables that affect perception. All of these limitations may affect the generalizability of the results (Brennan, 2001), which should be considered and applied with caution. Research into this topic must be further advanced by developing interventions that combine psychobehavioral techniques with pharmacological interventions to treat heart disease and depression concurrently.
Conclusions/Implications for Practice
The nonhospitalized patient population with CAD in Jordan is affected by a relatively high prevalence of depression. However, depression is not routinely diagnosed or treated. Screening for depression using an easy-to-use, reliable instrument such as the CDS and then treating both heart disease and depression simultaneously may be expected to improve medical outcomes and reduce the overall cost of treating these diseases.

Certain sociodemographic and health-related factors were shown in this study to be statistically significant predictors of depression in patients with CAD and should be considered by healthcare providers. Patients with CAD who are female, who do not exercise regularly, and who rate their psychological health as poor are more likely to be severely depressed than their peer patients with CAD. Furthermore, having a history of surgeries and having one or more concomitant chronic diseases (e.g., diabetes, hypertension) are likely to be significant contributors to depression.

Future studies should identify additional variables that predict depression and use all of the identified variables to build CAD patient treatment guidelines. The results of this study support the need for specialized intervention programs to enhance the quality of life for patients with CAD.

On the basis of the findings of this study, healthcare organizations and health policymakers should consider using CDS as a screening tool for depression to detect and treat depression earlier, which may reduce overall costs of treatment, reduce mortality, and reduce comorbidities.

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Study conception and design: IMA
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Critical revision of the article: HFD

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