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DepressIon AmoNg CardiovaScular Disease Patients in Libya—PrEvalenCe and AssociaTions: INSPECT Study

Libya'da Kardiyovasküler Hastalığı Olanlarda Depresyon Yaygınlığı ve İlişkili Olduğu Durumlar: INSPECT Çalışması

ORIGINAL ARTICLE
KLİNİK ÇALIŞMA

Abdalraouf Mohammed Omar[1,2]
Elham O. Elgdhafi[1,3]
Omnia Dalli[3]
Aisha Baraka Mawan[1]
Maha Houman[1]
Hanine Elfelah[1]
Laila T. Sabei[4]

[1]*Department of Cardiology, Tripoli University Hospital, Tripoli, Libya*
[2]*Albadri Polyclinic, Tripoli, Libya*
[3]*Department of Internal Medicine, Faculty of Medicine, University of Tripoli, Tripoli, Libya*
[4]*Department of Community and Family Medicine, Faculty of Medicine, University of Tripoli. Tripoli, Libya*

Corresponding author:
Abdalraouf Mohammed Omar
✉ abdalraouf.omar@gmail.com

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ABSTRACT

Objective: This study sought to assess the prevalence and identify factors associated with depression among patients with cardiovascular diseases and followed-up in a public teaching hospital.

Methods: A cross-sectional study was conducted with a systematic random sample of 302 outpatients with cardiovascular diseases and followed-up in the cardiology outpatient department at Tripoli University Hospital. Stable adults (>18 years of age) were eligible to be included in this study. Face-to-face interviews were conducted to complete a questionnaire comprising questions on demographic, medical, and lifestyle issues besides the Patient Health Questionnaire-9 tool. Statistical Package for the Social Sciences, Version 22, was used to analyze the data.

Result: Age ranged between 29 and 84 years with a mean age of 60.6 ± 10.4 years; 60.6% were females and 75.8% were married. The highest prevalent morbidity was hypertension (76.2%) followed by diabetes mellitus (48%), ischemic heart disease (39%), and different types of arrhythmias (22.8%). About 59.3% of screened patients had different degrees of depression from mild to severe. The participants with a positive history of psychological problems, those complicated with cardiomyopathy, those who were females, patients with a history of cerebrovascular accident, and patients who were living alone were more likely to be depressed.

Conclusion: Prevalence of depression is found to be higher among patients with cardiovascular diseases and a family history of psychological illnesses, and cardiomyopathy had the highest contribution as independent predictor for depression. Screening of all patients with cardiovascular diseases is essential to identify and treat the patients at greater risk of depression.

Keywords: Cardiovascular diseases, depression risk factors, Libya, PHQ-9, prevalence of depression

ÖZET

Amaç: Bu çalışma, kardiyovasküler hastalığı olan ve bir devlet eğitim hastanesinde izlenen hastalarda depresyonun yaygınlığını değerlendirmeyi ve depresyonla ilişkili faktörleri belirlemeyi amaçlamıştır.

Yöntemler: Kardiyovasküler hastalığı olan ve Tripoli Üniversitesi Hastanesi Kardiyoloji Polikliniği'nde takip edilen 302 hastayı içeren, sistematik rastgele örnekleme ile bir kesitsel çalışma yürütüldü. Stabil durumda olan yetişkinler (>18 yaş) bu çalışmaya dahil edilmeye uygun bulunmuştur. Hasta sağlığı anketi-9 [Patient health questionnaire-9 (PHQ-9)] aracının yanı sıra demografik, tıbbi ve yaşam tarzı konularını içeren bir anketi doldurmak üzere yüz yüze görüşmeler yapıldı. Verilerin analizinde SPSS, Version 22 (IBM Corp., Armonk, NY, ABD) kullanıldı.

Bulgular: Hastaların yaşları 29 ile 84 arasında değişmekte olup, yaş ortalaması 60,6±10,4 idi; hastaların %60,6'sı kadın ve %75,8'i evliydi. En sık görülen morbidite hipertansiyondu (%76,2); bunu diyabet (DM) (%48), iskemik kalp hastalığı (İKH) (%39) ve %22,8 ile farklı aritmi tipleri izlemekteydi. Taranan hastaların %59,3'ünde hafif ila şiddetli arasında farklı derecelerde depresyon mevcuttu. Pozitif psikolojik problem öyküsü olan katılımcılar, kardiyomiyopati ile komplike olanlar, kadın olanlar, serebrovasküler hastalık öyküsü olan hastalar ve yalnız yaşayan hastaların depresyona girme olasılıkları daha yüksekti.

Sonuç: Kardiyovasküler hastalığı olan hastalarda depresyon prevalansı daha yüksek bulunmuştur. Ailede psikolojik hastalık öyküsü ve kardiyomiyopati, depresyon için bağımsız belirleyiciler olarak en yüksek katkıyı yapan faktörlerdi. Kardiyovasküler hastalığı olan tüm hastaların taranması, depresyon riski daha yüksek olan hastaları belirlemek ve tedavi etmek için esastır.

Anahtar Kelimeler: Kardiyovasküler hastalıklar, depresyon risk faktörleri, Libya, PHQ-9, depresyon yaygınlığı

Human beings with disease affecting the heart and the cardiovascular system could experience some sort of anxiety and depression. These physiological situations may cause damage to the brain and the cardiovascular system. We conduct this study to estimate the prevalence and identification of factors linked with depression among patients with cardiovascular illness. Cardiovascular diseases (CVD) are an assembled term for diseases of the heart and blood vessels such as heart failure (HF), coronary heart disease, peripheral vascular disease, and stroke, while depression [also known as major depressive disorder (MDD), clinical depression, or unipolar depression] is a common psychiatric disorder, with characteristics of persistent low mood associated with anhedonia, fatigability, and low self-esteem. This is linked to diminished quality of life, medical morbidity, and mortality.[1]

Depression and CVDs are considered to be internationally spread disorders.[2] According to the World Health Organization, the number of people who suffer from depression exceeds 270 million from all ages.[3] On the other hand, CVD which is considered as the most leading cause of death worldwide has an annual death rate of 17.9 million.[4]

Depression and CVDs are concomitant noncommunicable diseases. The depression course in patients with CVD is often chronic and recurrent.[5] Specifically, coronary artery disease patients have the rate of depression symptoms 2 to 3 times greater in comparison with the general population.[6] For the acute coronary syndrome (ACS), the American Heart Association stated that depression is an independent risk factor for poor prognosis following ACS.[7]

What is more, clinically significant depression occurs in 1 out of 5 patients with HF.[8] Likewise, depressive mood in atrial fibrillation (AFib) is a major risk factor for recurrence after electrical cardioversion.[9] Furthermore, a systematic review of patients with intracardiac defibrillators revealed depressive disorder to be present in 11%-28% of patients.[10] Impaired adherence to health behaviors and adverse physiological effects of depression, including inflammation, endothelial dysfunction, platelet hyperactivity, and autonomic nervous system abnormalities, may link depression with adverse cardiac outcomes.[2]

ABBREVIATIONS

ACS	Acute coronary syndrome
AFib	Depressive mood in atrial fibrillation
BEC-BTRC	Bioethics Committee at Biotechnology Research Center
BP	Blood pressure
CVA	Cerebrovascular accident
CVD	Cardiovascular diseases
DM	Diabetes mellitus
DSM-4	The Diagnostic and Statistical Manual of Mental Disorders 4th edition
HF	Heart failure
HTN	Hypertension
IHD	Ischemic heart disease
LD	Libyan dinars
MDD	Major depressive disorder
PHQ-9	The Patient Health Questionnaire-9
VHD	Valvular heart disease

Materials and Methods

A cross-sectional study was conducted with a systematic random sample of 302 outpatients with CVDs and followed-up in the cardiology outpatient department at a public teaching hospital. Among the CVDs arterial hypertension (HTN) which is defined as a persistent elevation in office systolic blood pressure (BP) ≥140 and/or diastolic BP ≥90 mmHg. This is based on evidence from multiple randomized controlled trials, which shows that treatment of patients with these BP values is beneficial.[11] Coronary artery disease, which is defined as a pathological process characterized by atherosclerotic plaque accumulation in the epicardial arteries, whether obstructive or non-obstructive, can present acutely as in ACS or with a progressive course as in chronic coronary syndrome.[12] The cardiomyopathies are defined as a heterogeneous group of heart muscle diseases that make a significant contribution to morbidity and mortality and are associated with mechanical and/or electrical dysfunction accompanied with inappropriate ventricular hypertrophy or dilatation.[13] The study is ethically approved by the Bioethics Committee at Biotechnology Research Center (BEC-BTRC). Registration was done before the start of the clinic every day morning and every fifth patient was interviewed to explain the study and to obtain verbal consent from patients who will agree to be enrolled in the study. Patients with stable CVDs, those aged 18 years or older, and conscious and oriented patients were included in this study. On the other hand, patients with severe cardiac diseases who needed urgent evaluation were excluded. All patients who gave the verbal consent were interviewed. The interview was paused for some time when the patients had to go for medical examinations, consultations, or investigations, and it was again conducted after the medical visit was over. The interviews were face to face in a private and comfortable room. A questionnaire was designed to cover questions about demographic, health, and lifestyle issues. Sociodemographic variables include age, sex, marital status, monthly income, family size, and place of residence. Self-reported lifestyle and medical history [smoking, drinking of alcohol, family history of psychological disease, diabetes mellitus (DM), hypertension, frequency of admission, and frequency of follow-up during the last year), other medical histories, and the type and duration of cardiac disease were also recorded.

The Patient Health Questionnaire-9 (PHQ-9) was selected to screen depression among the commonly used instruments. We selected it based on the recommendation by the US Preventive Services Task Force and others.[14,15] It is a simple, rapid test that can be applied by the patient without the help of a psychiatrist; the PHQ-9 is also a reliable and valid measure of depression severity and a useful clinical and research tool.[16] The PHQ-9 a noncomplicated, good sensitivity and specificity questionnaire has been widely used in patients with heart problems.[17] The questionnaire consists of 9 items that focus on the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-4) for major depressive disorder (MDD). These 9 items have remained unchanged in the DSM-5 update.[18] The questions are using a scale of 0 to 3: null (0), a lot of days (1), more than half the days (2), and approximately every day (3). The PHQ-9 scores classify depression as mild (score: 5-9), moderate (10-14), moderately severe (15-19), and severe (20-27).[16]

Statistical Analysis

Data collected were entered and stored in a personal computer. Statistical Package for the Social Sciences, Version 22 (IBM Corp., Armonk, NY, USA), was used to analyze the data through both descriptive and inferential statistical methods. Descriptive methods included frequency and percentage distribution tables, bar graphs, and summary statistics. Chi-square test and independent sample *t*-test were used to find the relation between categorical and quantitative variables with depression, respectively. Multivariable adjusted binary logistic regression was used to determine predictors of depression, where depression scores were dichotomized into less than mild depression (PHQ-9 <5) or depression (PHQ-9 ≥ 5).

Results

For the total number of 302 patients, age ranged between 29 and 84 years with a mean age of 60.6 $\pm$ 10.4 years; the least presentation in this sample was for patients younger than 35 years (1%) followed by patients aged 35-44 years (4%), and the highest percentage was 33.4% for the age group 55-64 years. About 60.6% were females, 75.8% were married, and 19.9% were widows, and their monthly income ranged from 0 (no income) to 4500 Libyan dinars (LD) with a mean of 565 $\pm$ 455.5 LD; 61.9% of their monthly income was 500 LD or less and only 6.6% received between 1000 and 2000 LD/month. Four patients (1.3%) lived alone and the same percentage were living with large families with more than 12 members. About 75.2% had approximately 1 to 6 householders, 70.2% lived in Tripoli, 19.2% lived outside Tripoli, and 10.6% were displaced from their houses due to the war. Smoking and alcohol use were not common among participants (9.6% and 0.7%, respectively) (Table 1).

Regarding patients' cardiovascular morbidity and comorbidity diseases, hypertension (76.2%) has the highest prevalence for morbidity; among the hypertensive patients, 97.4% were primary hypertension and 2.6% secondary hypertension, with the duration of diseases ranging between 1 year and 40 years. The most common cardiac disease was ischemic heart disease (IHD) (39%) followed by arrhythmia (22.8%), HF (13.9%), and valvular heart disease (VHD) (12.6%), while the percentage of cardiomyopathy and pulmonary hypertension was lower at 3.4% and 0.7%, respectively. DM as a comorbidity was present in48% of the patients. On th other hand, cerebrovascular accident (CVA) presnt in 6.3% (Figure 1).

Concerning the clinical characteristics of the cardiac problems among our patients, 50.3% of them did not need hospitalization for their CVD during the last year, but the other half of the patients hospitalized in different frequencies ranged from once in last year to 20 times, 24.8% admitted for 1 time and 12.9% for 2 times, the number of admissions was significantly higher for patients with HF, VHD, IHD, and HTN. The rate of recurrence of follow-up of patients during the last year ranged between 1 and 6 times, with 11.9% having no follow-up during the last year and 38.7% having follow-up 4 times during the last year. About 39% of the included patients suffered from IHD for different durations (1-30 years); 68.4% presented as myocardial infarction (MI) and 25.6% as stable angina. Sixty-nine patients were diagnosed with arrhythmia for a period between 1 and 26 years, 97.1% with AFib, 1 patient with ventricular fibrillation, and another with heart block. Patients with HF ware Forty-two patients (13.9%) and they have been diagnosed between 1 year and 15 years, about half of them for 4 years or less and 11.9% was right-sided HF 23.8%, left side and 40.5% was decompensated HF. Valvular heart disease affects 12.6% of the patients in this study for a period from 1 year to 58 years; mitral valve was predominantly affected where 31.6%

Table 1. Frequency Distribution of Sociodemographic Variables

Variable	Frequency	Percentage
Gender		
Male	119	39.4
Female	183	60.6
Age (years)		
<35	3	1.0
35-44	12	4.0
45-54	77	25.5
55-64	101	33.4
65-74	76	25.2
75-84	33	10.9
Marital status		
Married	229	75.8
Divorced	6	2.0
Widow	60	19.9
Single	7	2.3
Monthly income (LD)		
0-500	187	61.9
501-1000	93	30.8
1001-2000	20	6.6
>2000	2	0.7
Family size (members)		
Living alone	4	1.3
1-6	227	75.2
7-12	67	22.2
>12	4	1.3
Residence		
Tripoli	212	70.2
Outside Tripoli	58	19.2
Displaced	32	10.6
Current smoking status		
Yes	29	9.6
No	273	90.4
Alcohol consumption		
Yes	2	0.7
No	300	99.3

LD, Libyan dinars.

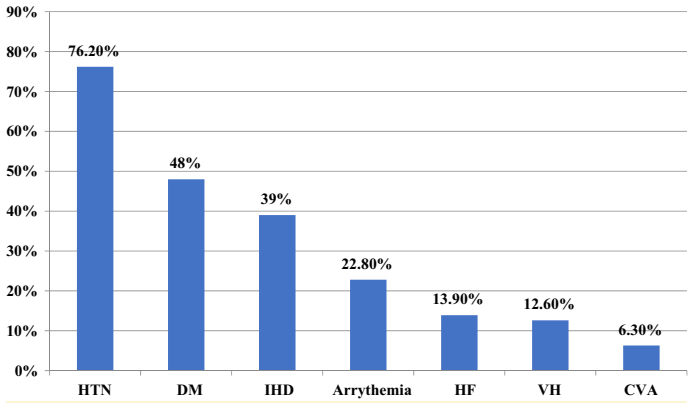

Figure 1. Patients' cardiovascular morbidity and comorbidity diseases. CVA, Cerebrovascular accident; DM, Diabetes mellitus; HF, Heart failure; HTN, Hypertension; IHD, Ischemic heart disease; VHD, Valvular heart disease.

diagnosed with Mitral regurgitation (MR), 28.9% with Mitral stenosis (MS) only, and 2.6% diagnosed with Tricusped regurgitation (TR) (Table 2).

With regard to the used medication in the studied patients, the number of tablets taken daily ranged between 0 in only 2% and 10 tablets with a mean of 3.5 ± 1.9 tablet/day; 68.9% take 4 tablets or less daily and 31.1% take 5 types or more.

It is important to mention that most of the prescribed drugs are not free of charge, and the total monthly cost for drugs consumed by each patient ranged between 6 and 370 LD with a mean cost of 98.8 ± 71.3 LD; 42.7% pay more than 100 LD for cardiac drugs every month.

With regard to the depression prevalence based on PHQ-9, 40.7% had no depression, 36.4% had mild depression, and 22.9% had significant clinical depression of moderate to a severe degree (16.9% moderate, 5.3% moderately severe, and 0.7% severe form of depression) (Figure 2).

The percentage of depression was 66.1% among female patients compared with 48.7% among males ($P=0.004$). An independent *t*-test was used to examine the differences in mean age and monthly income in relation to depression, and the differences were insignificant statistically ($P=0.456$ and $P=0.649$, respectively). Regarding marital status, depression was found to be more prevalent among divorced and widow patients than married and single patients ($P=0.470$); 75% of patients living alone had depression compared with only 59.1% for those not living alone ($P=0.648$). The percentage of displaced patients due to the war in Tripoli was 53.1% (Table 3).

No significant differences in the prevalence of depression and the studied clinical parameters were found; hypertension ($P=0.784$), DM ($P=0.816$), IHD ($P=0.905$), arrhythmia ($P=0.889$), HF ($P=0.738$), VHD ($P=0.481$), and a history of CVA had no significant effect in the distribution of depression. About 63.8% of patients taking more than 4 drugs/day had depression compared with those who take 4 drugs or less ($P=.312$); furthermore, 77.8% of patients with a family history of psychological illness had depression matched with 58.1% for those with no family history of any psychological diseases (Table 4).

Table 2. Clinical Characteristics of the Cardiac Problems

Clinical Character	Frequency	Percentage
Ischemic heart disease		
Stable angina	30	25.6
Unstable angina	7	6.0
Myocardial infarction	80	68.4
Arrhythmias		
Atrial fibrillation	67	97.1
V.F	1	1.4
HB	1	1.4
Heart failure		
Right side HF	5	11.9
Left side HF	10	23.8
Congestive HF	8	19.0
Diastolic HF	2	4.8
Decompensated HF	17	40.5
Valvular heart disease		
MS	11	28.9
MR	12	31.6
AS	1	2.6
AR	8	21.1
TR	1	2.6
Mitral and aortic	5	13.2
Number of drugs used		
≤4/day	208	68.9
>4/day	94	31.1
Cost of drugs/month		
≤100 LD	173	57.3
>100 LD	129	42.7
Hospitalization (last year)		
None	152	50.5
One or more	150	49.7
Frequency of follow-up (last year)		
≤3 times	175	57.9
>3 times	127	42.1

HF, heart failure; LD, Libyan dinars. MS, mitral stenosis; MR, mitral regurgitation; AS,aortic stenosis; AR aortic regurgitation; TR, tricusped regurgitation.

In our study, we found that smoker females were only 1.1% and 98.9% were nonsmokers in comparison to 22.7% of males who were using tobacco and 77.3% were not ($P=0.001$).

Table 5 presents the odds ratios (ORs) of depression for associated factors with 95% CIs and the corresponding *P*-values. The participants with a positive history of psychological problems [OR: 3.148; $P=0.063$; CI (0.938, 10.559)], those complicated with cardiomyopathy [OR: 3.077; $P=0.173$; CI (0.611, 15.502)], those who were females [OR: 2.272; $P=0.007$;

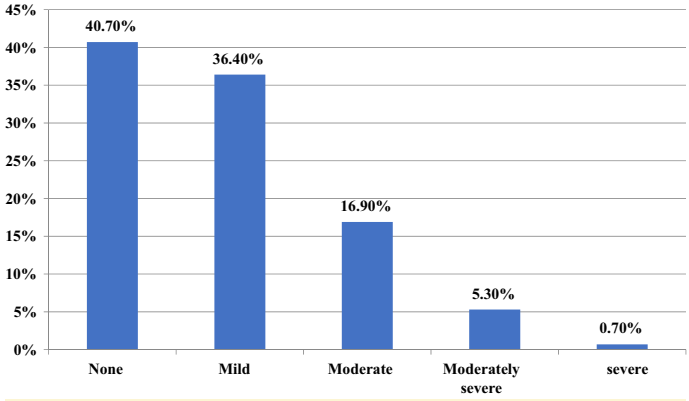

Figure 2. Distribution of patients included in the study by Patient Health Questionnaire-9 depression category.

Table 3. Bivariate Analysis of Depression with Sociodemographic Variables

Variable	The PHQ-9 Score Classification: No Depression (%)	Depression (%)	*P*
Gender			
Male	61 (51.3)	58 (48.7)	0.004
Female	62 (33.9)	121 (66.1)	
Age (mean ± SD)	60 ± 9.9	60.9 ± 10.7	0.456
Marital status			
Married	97 (42.4)	132 (57.6)	0.47
Divorced	2 (33.3)	4 (66.7)	
Widow	20 (33.3)	40 (66.7)	
Single	4 (57.1)	3 (42.9)	
Monthly income (LD) (mean ± SD)	579 ± 509	555 ± 415	0.649
Family size (members)			
Living alone	1 (25)	3 (75)	0.648
Not alone	122 (40.9)	176 (59.1)	
Residence			
Tripoli	86 (40.6)	126 (59.4)	0.708
Outside Tripoli	22 (37.9)	36 (62.1)	
Displaced	15 (46.9)	17 (53.1)	
Current smoking status			
Yes	15 (51.7)	14 (48.3)	0.235
No	108 (39.6)	165 (60.4)	
Alcohol consumption			
Yes	1 (50)	1 (50)	0.789
No	122 (40.7)	178 (59.3)	

LD, Libyan dinars.

Table 4. Bivariate Analysis of Depression with Clinical Characteristics of the Cardiac Problems

Clinical Character	The PHQ-9 Score Classification: No Depression (%)	Depression (%)	*P*
Hypertension			
Yes	95 (41.3)	135 (58.7)	0.784
No	28 (38.9)	44 (61.1)	
DM			
Yes	58 (40)	87 (60)	0.816
No	65 (41.4)	92 (58.6)	
Ischemic heart disease			
Yes	47 (40.2)	70 (59.8)	0.905
No	76 (41.1)	109 (58.9)	
Arrhythmias			
Yes	29 (42)	40 (58)	0.889
No	94 (40.3)	139 (59.7)	
Heart failure			
Yes	16 (38.1)	26 (61.9)	0.738
No	107 (41.2)	153 (58.8)	
Valvular heart disease			
Yes	13 (34.2)	25 (65.8)	0.481
No	110 (41.7)	154 (58.3)	
Cardiomyopathy			
Yes	2 (20)	8 (80)	0.209
No	121 (41.4)	171 (58.6)	
History of CVA			
Yes	5 (26.3)	14 (73.7)	0.232
No	118 (41.7)	165 (58.3)	
Number of drugs used			
≤4/day	89 (42.8)	119 (57.2)	0.312
>4/day	34 (36.2)	60 (63.8)	
Cost of drugs/month			
≤100 LD	70 (40.5)	103 (59.5)	0.913
>100 LD	53 (41.1)	76 (58.9)	
Hospitalization (last year)			
None	64 (42.1)	88 (57.9)	0.641
One or more	59 (39.3)	91 (60.7)	
Frequency of follow-up (last year)			
≤3 times	68 (38.9)	107 (61.1)	0.477
>3 times	55 (43.3)	72 (56.7)	
Family history of psychological illness			
Yes	4 (22.2)	14 (77.8)	0.137
No	119 (41.9)	165 (58.1)	

CVA, cerebrovascular accident; DM, diabetes mellitus; LD, Libyan dinars.

Table 5. Odds Ratios of Risk Factors for Depression Among Patients with Cardiovascular Disease (Tripoli University Hospital 2019)

					95% CI for OR	
Variable	***B***	**Wald**	***P***	**OR**	**Lower**	**Upper**
Age (reference >60 years)	0.339	1.566	0.211	1.404	0.825	2.389
Gender (reference female)	0.821	7.354	0.007	2.272	1.255	4.112
Displacement (reference displaced)	–0.267	0.453	0.501	0.766	0.352	1.666
Family size (reference living alone)	0.699	0.304	0.581	2.012	0.168	24.11
Marital state (reference not married)	–0.1	0.096	0.757	0.905	0.48	1.705
Monthly income (reference ≤500 LD)	–0.007	0.001	0.979	0.993	0.563	1.749
Smoking (reference smoker)	–0.249	0.297	0.586	0.779	0.318	1.912
Alcohol (reference alcoholic)	–0.323	0.049	0.825	0.724	0.041	12.746
FH of psychological disease (reference positive)	1.147	3.447	0.063	3.148	0.938	10.559
Admission (reference 1 or more admissions)	0.175	0.29	0.59	1.191	0.63	2.252
Follow-up (reference >3 times)	–0.266	0.93	0.335	0.766	0.446	1.316
Number of drugs (reference >4 /day)	0.629	2.626	0.105	1.875	0.877	4.012
Drug cost (reference > 100 LD/month)	–0.361	1.033	0.31	0.697	0.347	1.399
DM (diabetic vs. nondiabetic)	–0.033	0.016	0.898	0.967	0.579	1.615
HTN (hypertensive vs. non-hypertensive)	–0.279	0.75	0.386	0.756	0.402	1.423
CVA (CVA vs. no CVA)	0.88	2.237	0.135	2.41	0.761	7.635
HF (HF vs. no HF)	–0.17	0.176	0.675	0.844	0.382	1.864
VHD (VHD vs. no VHD)	0.213	0.25	0.617	1.238	0.536	2.857
IHD (IHD vs. no IHD)	0.084	0.053	0.818	1.088	0.531	2.229
Arrhythmia (arrhythmia vs. no arrhythmia)	–0.063	0.04	0.841	0.939	0.507	1.739
PH (PH vs. no PH)	–1.071	0.504	0.478	0.343	0.018	6.586
Myopathy (cardiomyopathy vs. no cardiomyopathy)	1.124	1.855	0.173	3.077	0.611	15.502
Constant	–0.14	0.109	0.741	0.87		

CVA, cerebrovascular accident; DM, diabetes mellitus; FH, family history; HF, heart failure; IHD, ischemic heart disease; LD, Libyan dinars; OR, odds ratio; VHD, valvular heart disease; PH, Pulmonary hypertension.

CI (1.255, 4.112)], patients with history of CVA [OR: 2.410; $P=0.135$; CI (0.761, 7.653)], and patients living alone [OR: 2.012; $P=0.581$; CI (0.168, 24.110)] were more likely (2 to 3 times) to be depressed. Those who were older than 60 years [OR: 1.404; $P=0.211$; CI (0.825, 2.389) and who use more than 4 types of cardiac drugs daily [OR: 1.875; $P=0.105$; CI (0.877, 4.012)] have slightly higher chance for depression. This is the same for patients who need hospitalization for 1 time or more within the last year [OR: 1.191; $P=0.590$; CI (0.630, 2.252)], those with VHD [odds ratio (OR): 1.238; $P=0.617$; 95% CI (0.536, 2.857)], and those with IHD [OR: 1.088; $P=0.818$; CI (0.531, 2.229)].

Discussion

In this study, we tried to focus on the depression among Libyan cardiac patients, the first of its kind; screening for depression among cardiovascular patients is not yet routinely performed in our hospitals in Libya. Because of rising CVDs and depression has been identified as a major contributor to CVDs morbidity and mortality, early detection and improving mental health care services and programs will reflect positively on cardiac outcomes.[19-22]

In our study, we found that 59.3% of our patients had depression, which is more than what had been found in other studies as in Australia (15%).[23] In another study, it was found that the prevalence of depression was 20%-45% in Caucasian populations with cardiac disease.[24,25] However, it was lower when compared to a study done in Nigerian (67.0%).[26] In Japan, 5.6% of cardiac patients had depression.[27] This is an alarming finding that necessitates more attention to our cardiac patients.

Most of our depressed patients were mildly depressed (58.03%). Our result was similar to that done in Ethiopia, according to which 52.6% of their patients were mildly depressed.[28] However, the percentage was more when compared to a study done in Tobago where 38.4% of their patients were mildly depressed.[29]

As expected, we found depression to be more predominant in female gender; 66% of the females had depression compared to 48.5% of the males, with a *P*-value of 0.004; this finding was similar to the study done in Canada[30] and Ethiopia[31] and studies from the Middle East region which show significantly greater Arab females suffered from depressive symptoms compared to the male gender.[32,33] Many explanations relate this cause to environmental exposure and social processes, specifically due to

the effect of gender differences, involving everyday aspects of life such as cultural behaviors, stress response, and disease prevention.[34,35] This may play a role in why depression is more prevalent in females, doubling the chance of suffering from depression across a variety of nations, cultures, and ethnicities.[35]

Depression was more increased in communities where the income inequality is higher than the others.[36] It is scientifically proven by the European Social Survey 2006/2007 that the income inequality was associated with higher rates of depression.[37] It was similarly found that almost 30% of the depressed people had the lowest income as compared to remaining 30% which had higher income brackets.[38] As a result of depression, there will be increased incidence of hospitalizations and increased rates of unemployment.[40] In our study, we found no significant relation between monthly income and depression, with a *P*-value of 0.649%.

Many studies showed a strong link of DM with depression in Malaysia and the Madrid Diabetes Study; this link may be due to diabetic complications.[40,41] However, there was no association found between patients with DM and significant depressive symptoms.[42] In another local study performed in 2013, depression was substantial among patients with DM.[43] In our study, we found that depression was present in 60% of diabetic patients, while it was present in 58.6% of nondiabetic patients with *P*-value of 0.816%.

Regarding association between depression and CVA, we found that 73.7% of CVA patients had depression, while 58.3% of non-CVA patients had depression with a *P*-value of 0.232%, while many studies showed that depression was found to be 1.77 times more common in CVA.[44]

In our study, we found that depression was present in 59.8% of patients with IHD, while it was present in 58.6% of non-ischemic patients with a *P*-value of 0.905%, compared with trial investigated patients with history of MI- enhancing recovery in coronary heart disease (ENRICHD)- depression was detected in 74% of the patients,[45] and in 30% of coronary heart disease patients in outpatient clinics.[46] The presence of depression in patients with a history of MI is risky with 5 times increased risk of cardiac death within 6 months[47]

Interestingly, we found no effect of smoking on depression prevalence, whereas many studies showed increased percentage of depression in smokers compared with nonsmokers.[48,49]

As expected, we found the rate of depression was more in patients living alone than in patients who were living with their families (75% vs. 59%) with a *P*-value of 0.648; this finding is based on the fact that higher depression levels were also found in those living alone.[50]

During the coronavirus disease 2019 (COVID-19) pandemic, our country opened a well-organized isolation centers for the care and treatment of the patients; with regard to our hospital, a triage was created to check all the patients and their relatives before entering the hospital and those who had fever, cough, and other symptoms, and signs of corona were referred to the specialized corona center; all participating patients did not have corona or received the corona vaccines.

There is a strong relation between depression and arterial hypertension;[51] one study showed that patients who were depressed had poorly controlled HTN, while patients with HTN were found to have depression.[51] In the literature, the percentage of depression in hypertensive patients is 26.8%,[52] while in our study we found the opposite; the percentage of depression was 58.7% in hypertensive patients, while it was present in 61.1% of the non-hypertensive patients with a *P*-value of 0.784%.

In Depression among cardiovascular disease patients in Libya prevalence and associations: INSPECT study, the percentage of depression was found to be 58.7% in hypertensive patients; on the other hand, in non-hypertensive patients, the prevalence of depression was 61.1%. depression concomitant with hypertension could be attributed to the antihypertensive medications. In a study conducted in Denmark, they found that the hazard rate of depression and the combined hazard rate of depression and use of antidepressants, respectively, were significantly lower in people taking no antihypertensive medications compared with 1 to 2 drugs. express that patients with hypertension and CVD are at increased risk of developing depression according to this study conducted in Denmark. Interestingly, the use of classes of angiotensin agents, calcium antagonists, and β-blockers was associated with decreased rates of depression, whereas diuretics were not.[53] In addition to that, in a public health cohort, it was found that co-occurrence of depression and hypertension was more in females.[54] Likewise, in our study, the percentage of depressed females is 66.1%, and more than two-thirds of all females are hypertensive (80.3%). Fragility and being too emotional to be diagnosed by arterial hypertensive disease could be the reason from our perspective, where we have found that, out of 183 females, 80.3% are hypertensive; in contrast, out of 119, 69.7% males are hypertensive.

Tobacco users, in our study, are about 9.6%, of whom only 1.1% are females. The small frequency of smokers in our study, considering the predominant gender is male, could be the attributed cause of smokers being less depressed than hypertensive patients in the INSPECT study. The smoking habit and it is occusions which is mainly in social events and during friends gathering could be considered a factor reducing the depression in this case; however, further study are needed to investigat this.

Limitation

This study was conducted during a difficult period for the residents of Tripoli (the period of the attack on Tripoli and the COVID-19 pandemic), which had an impact on the prevalence and severity of depression. In the same sense, it did not investigate the total number of drugs used for other diseases rather than CVDs or over-the-counter (self-medication) drugs.

Ethics Committee Approval: The study is ethically approved by the Bioethics Committee at Biotechnology Research Center (BEC-BTRC, 24-2022).

Informed Consent: Patients' informed consent ware obtained.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – A.M.O., E.O.E.; Design – A.M.O.; Supervision – A.M.O., E.O.E., L.T.S.; Data Collection and/or Processing

– O.D., A.B.M., M.H., H.E.; Analysis and/or Interpretation – L.T.S.; Literature Review – A.M.O., E.O.E.; Writing – A.M.O., E.O.E., L.T.S.

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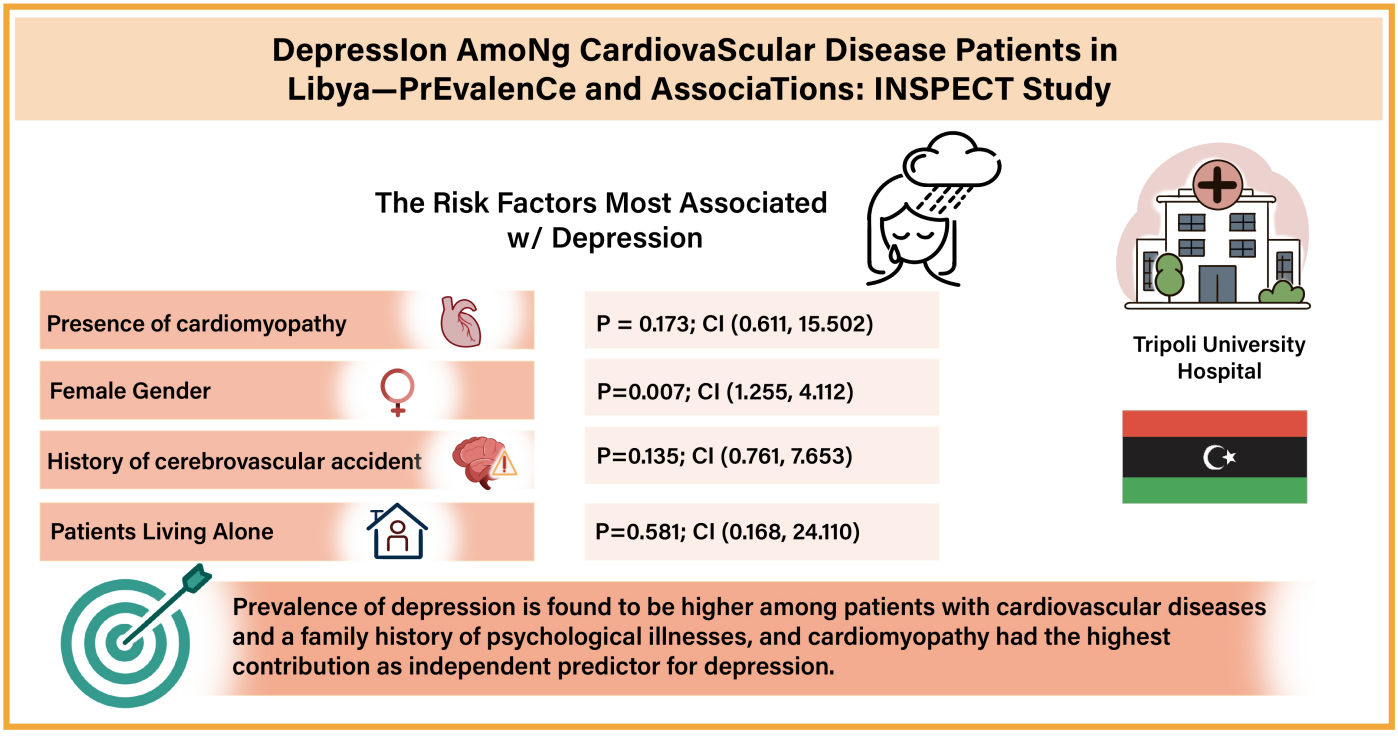

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