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Impact of depression on sexual dysfunction and HRQoL in CAD patients

Research Article

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Abstract: Background. The aim of this study was to assess the impact of the depression on sexual dysfunction and the health-related quality of life (HRQoL) in coronary artery disease (CAD) patients admitted for cardiovascular rehabilitation within 3 months after an acute myocardial infarction (AMI). Methods. In all, 745 consecutive CAD patients (502 men and 243 women, aged 60.9 ± 9.3 years) admitted for cardiovascular rehabilitation within 3 months after an AMI, were enrolled in the study and divided into 4 groups according to Beck depression inventory (BDI) score range. HRQoL was estimated using the SF-36 questionnaire for total QoL and dimensions for physical and mental health [physical and mental component summary scores (PCS, MCS)]. Sexual dysfunction was assessed using the ASEX scale. Results. The HRQoL decreased following the range of depression, as demonstrated for significantly higher PCS in minimal compared to mild, moderate and severe depression groups ($P<0.001$). The MCS was significantly higher in minimal compared to mild, moderate and severe depression groups ($P<0.001$). The ASEX score was significantly higher in minimal, compared to mild, moderate and severe depression groups, as well as in mild and moderate compared to severe depression group. A significant association was found between depression score range and age, self-reported regular exercise, type 2 diabetes mellitus, and cigarette smoking. Conclusions. Depression significantly affected HRQoL and sexual dysfunction in CAD patients, as demonstrated by the significant decrease of PCS, MCS, and significant increase of ASEX score following the range of the depression according to BDI.

Keywords: *Coronary artery disease • Depression • Health related quality of life • Sexual dysfunction*

1. Introduction

Depression is highly prevalent in patients with cardiovascular disease (CVD), with not to use hyphen of patients meeting criteria for major depressive disorder or experiencing an elevation in depressive symptoms. Approximatively 31% to 45% of patients with coronary artery disease (CAD) suffer from clinically significant depressive symptoms and 15% to 20% of them meet full criteria for major depressive disorder [1-5]. These depressive symptoms are often chronic, persistent, and highly associated with the development and progression of CAD, worse health-related quality of life (HRQoL) and poor physical functioning [6].

Impaired adherence to healthy behaviors and adverse physiological effects of depression, including inflammation, endothelial dysfunction, platelet hyperactivity

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and autonomic nervous system abnormalities, may link depression with adverse cardiac outcomes. Despite the availability of safe and effective treatments, depression usually remains underrecognized and undertreated in CAD patients.

Depression after myocardial infarction (MI) is a predictor for recurrent cardiac events, for cardiac-related death and for all-cause mortality. Meta-analyses have revealed that depressed post-MI patients have a 2- to 2.5-fold increased risk for all-cause mortality, even after adjusting for other cardiac risk factors [7-9]. Even low levels of depressive symptoms not typically associated with depressive disorder predict a 4-month mortality post-MI [10-12]**.** However, major depression following MI is a recognized predictor of disability, poor HRQoL [13-15] and mortality in the year post-MI.

Depressive disorders have been demonstrated to be associated with reduced HRQoL in CAD patients, while CAD was shown to have an adverse effect on HRQoL, which, in turn, is associated with increased morbidity and mortality among CAD patients. Comorbid depression in CAD patients produces a greater impact on their subjective well-being than on their actual cardiac functioning [16,17]. Indirect pathways refer to psychosocial and behavioral mediators, which correlate with depression and CAD [18-23].

Cardiac rehabilitation aims at promoting optimal physical and psychological function. Even the short-term psychological effect of cardiac rehabilitation may affect long-term prognosis. Rehabilitation programs that are successful in reducing emotional distress may be more successful in reducing mortality than programs without a psychological component. Reduction in distress might modify pathophysiological mechanisms that have been associated with stress-related cardiac events, and intervention should be effective in reducing distress and tailored to the needs of each patient [24].

The aim of the present study was to investigate the impact of the depression on sexual dysfunction and the HRQoL in CAD patients admitted for cardiovascular rehabilitation in the Institute for Treatment and Rehabilitation “Niska Banja”, Nis, Serbia, within 3 months after acute MI, including patients who did not undergo a revascularization procedure, as well as those who underwent either percutaneous coronary intervention and/or surgical revascularization.

2. Patients and methods

2.1. Patients

The present study included 745 consecutive CAD patients (502 men and 243 women, aged 60.9 ± 9.3 years) admitted for specialized cardiovascular rehabilitation within 3 months after an acute MI, including those who had not undergone a revascularization procedure performed (n=174); those who underwent elective or emergency percutaneous coronary intervention (n=238); and/or elective or emergency surgical revascularization (n=333) (Tables 1 and 2). The patients were divided into 4 groups according to Beck depression inventory (BDI) score range (minimal, mild, moderate and severe depression groups) to assess the impact of the depression on HRQoL and sexual dysfunction. The study was approved by the local research ethics committee and informed consent was obtained from all individuals enrolled in the study.

3. Methods

3.1. Personal history

Data collection was undertaken by trained research assistants, who interviewed and examined all recruited patients using standardized methods and instruments and reviewed all individual medical records. Data concerning personal and family history of CAD or other atherosclerotic disease; lifestyle habits in relation to smoking, diet, physical activity (regular physical activity was defined as a moderate aerobic exercise at least 3 to 5 days weekly, 30 to 45 minutes daily); self-reported exposition to stress; and the presence of major cardiovascular risk factors, was obtained at interview and following individual medical records.

3.2. Clinical examination

Body height and weight were measured in light indoor clothes without shoes. Blood pressure was measured on the patient’s right upper arm in a sitting position by trained technicians, after five minutes rest, using sphygmomanometer (Diplomat Pressametar, desk model with Velcro cuff, RIESTER, Germany). Body mass index was calculated as the ratio of body weight and height squared.

3.3. Biochemical analyses

Blood samples for biochemical analyses were drawn from an antecubital vein after an overnight fast of 12 hours. Blood glucose and lipid profile parameters were measured using a clinical chemistry analyzer (ARTAX, Menarini Diagnostics, Florence, Italy). Fasting blood glucose level was determined by GOD-PAP method, using an enzymatic colorimetric test for glucose without deproteinization. Triglyceride and total cholesterol plasma levels were determined by GPO-PAP and CHOD-PAP methods respectively, using enzymatic colorimetric tests with lipid clearing factor. HDL-cholesterol was determined by precipitation.

3.4. Health-related quality of life

The patients' health-related quality of life (HRQoL) was assessed using the Medical Outcomes Study 36-item Short Form Survey (SF-36) [25], a generic questionnaire consisting of 36 items, summarized and transformed to give eight summary scales: physical functioning (PF), role-physical limitation (RP), bodily pain (BP), general health perception (GH), vitality (VT), social functioning (SF), role limitation attributable to emotional problems (RE), and mental health (MH). The PF, RP and BP scales were considered as the primary members of the physical component summary (PCS) score, whereas the SF, RE and MH were considered as the primary members of the mental component summary (MCS) score. The GH and VT were considered the members of both dimensions. As a final point, the total SF-36 quality of life summary score was calculated.

3.5. Arizona Sexual EXperiences (ASEX) Scale

The participants' sexual functioning was assessed using the Arizona Sexual EXperiences (ASEX) Scale, a 5-item rating scale that quantifies sex drive, arousal, vaginal lubrication/penile erection, ability to reach orgasm, and satisfaction from orgasm. Possible total scores range from 5 to 30, with the higher scores indicating more sexual dysfunction [26].

3.6. Beck Depression Inventory (BDI)

The depression was assessed using the Beck Depression Inventory (BDI) [27] scoring system. According to BDI score range, patients were divided into 4 groups: minimal (0–13), mild (14–19), moderate (20–28) and severe depression (29–63) groups.

Table 1. Clinical and biochemical parameters in relation to depression score range.

	Beck depression inventory score range				
	Minimal 0-13 (n=513, 68.9%)	Mild 14-19 (n=92, 12.3%)	Moderate 20-28 (n=99, 13.3%)	Severe 29-63 (n=41, 5.5%)	Total (n=745, 100%)
Age and sex					
age (years)	60.4±9.3	61.8±9.1	62.4±9.1	62.6±9.2	60.9±9.3
sex (♂: ♀) (n, %)	352:161 (69:31)	60:32 (65:35)	66:33 (67:33)	24:17 (58:42)	502:243 (67:33)
Clinical parameters					
WC (cm)	101.91±12.01	103.20±10.52	102.63±11.02	103.73±13.43	102.26±11.79
BMI (kg/m^2)	26.97±3.57	26.38±3.64	26.90±3.56	27.05±4.27	26.89±3.62
SBP (mmHg)	123.58±14.14	123.80±14.44	123.18±15.33	123.29±17.02	123.54±14.48
DBP (mmHg)	76.56±8.02	76.09±7.87	76.72±9.18	74.88±10.75	76.43±8.32
HR (beats/min)	68.41±7.89	67.66±8.41	68.27±6.51	69.29±8.20	68.35±7.79
EF (%)	50.23±10.15	50.42±8.59	48.81±9.71	50.44±11.55	50.07±9.99
Biochemical parameters					
FG (mmol/l)	6.31±1.65	6.54±2.02	6.29±1.72	6.32±1.06	6.34±1.69
TC (mmol/l)	4.70±1.20	4.76±1.10	4.76±1.33	4.79±0.97	4.72±1.19
HDL-C (mmol/l)	1.24±0.37	1.25±0.35	1.24±0.37	1.23±0.29	1.24±0.37
LDL-C (mmol/l)	2.79±1.00	2.78±1.06	2.72±1.05	2.84±0.90	2.78±1.01
TG (mmol/l)	1.62±1.07	1.58±0.71	1.70±1.03	1.54±0.78	1.62±1.01

WC, waist circumference; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; HR, heart rate; EF, ejection fraction; FG, fasting glycemia; TC, total cholesterol; HDL-C, high density lipoprotein cholesterol; LDL-C, low density lipoprotein cholesterol; TG, triglycerides.

Table 2. Cardiovascular risk factors in relation to depression score range.

	Beck depression inventory score range				
	Minimal 0-13 (n=513, 68.9%)	Mild 14-19 (n=92, 12.3%)	Moderate 20-28 (n=99, 13.3%)	Severe 29-63 (n=41, 5.5%)	Total (n=745, 100%)
Behavioral risk factors					
cigarette smokers (n,%)	247 (48.1)	40 (43.5)	49 (49.5)	15 (36.6)	351 (47.1)
former smokers (n,%)	87 (17.0)[C†]	20 (21.7)	23 (23.2)	15 (36.6)	145 (19.5)
diet (n,%)	195 (38.0)	35 (38.0)	29 (29.3)	10 (24.4)	269 (36.1)
regular exercise (n,%)	137 (26.7)[A†, C†]	13 (14.1)	17 (17.2)	2 (4.9)	169 (22.7)
alcohol consumption (n,%)	174 (33.9)	24 (26.1)[D*]	44 (44.4)	17 (41.5)	259 (34.8)
without stress (n,%)	51 (9.9)[C*]	7 (7.6)	10 (10.1)[F*]	0 (0)	68 (9.1)
intermitent stress (n,%)	332 (64.7)	57 (62.0)	62 (62.6)	28 (68.3)	479 (64.3)
permanent stress (n,%)	102 (19.9)	25 (27.2)	23 (23.2)	11 (26.8)	161 (21.6)
sudden stress (n,%)	28 (5.5)	3 (3.3)	4 (4.0)	2 (4.9)	37 (5.0)
Personal history of CVD					
stable angina (n,%)	74 (14.4)[C*]	17 (18.5)	21 (21.2)	12 (29.3)	124 (16.6)
unstable angina (n,%)	1 (0.2)	0 (0)	0 (0)	0 (0)	1 (0.1)
NSTEMI (n,%)	270 (52.6)	49 (53.3)	53 (53.5)	20 (48.8)	392 (52.6)
STEMI (n,%)	96 (18.7)	12 (13.0)	22 (22.2)	8 (19.5)	138 (18.5)
myocardial reinfarction (n,%)	25 (4.9)	3 (3.3)	5 (5.1)	4 (9.8)	37 (5.0)
fibrinolysis (n,%)	86 (16.8)[A*]	25 (27.2)	17 (17.2)	7 (17.1)	135 (18.1)
primary PTCA (n,%)	90 (17.5)	16 (17.4)	9 (9.1)	8 (19.5)	123 (16.5)
re-CABG (n,%)	5 (1.0)	0 (0)	0 (0)	0 (0)	5 (0.7)
valvular disease (n,%)	180 (35.1)[A*, C*]	44 (47.8)	44 (44.4)	23 (56.1)	291 (39.1)
arrhythmias (n,%)	159 (31.0)[A†]	42 (45.7)	40 (40.4)	18 (43.9)	259 (34.8)
CHF (n,%)	99 (19.3)	15 (16.3)	19 (19.2)	9 (22.0)	142 (19.1)
Cardiovascular risk factors					
obesity (n,%)	286 (55.8)	55 (59.8)	55 (55.6)	20 (48.8)	416 (55.8)
arterial hypertension (n,%)	467 (91.0)	84 (91.3)	93 (93.9)	37 (90.2)	681 (91.4)
hyperlipoproteinemia (n,%)	495 (96.5)[A*, C*]	84 (91.3)	94 (94.9)	36 (87.8)	709 (95.2)
diabetes mellitus (n,%)	114 (22.2)	27 (29.3)[E*]	21 (21.2)	5 (12.2)	167 (22.4)
type 2 diabetes (n,%)	40 (7.8)	9 (9.8)	5 (5.1)	6 (14.6)	60 (8.1)
family history of CVD (n,%)	332 (64.7)	68 (73.9)	60 (60.6)	31 (75.6)	491 (65.9)
Treatment strategy					
WR (n,%)	120 (23.4)	17 (18.5)	25 (25.3)	12 (29.3)	174 (23.4)
PTCA (n,%)	164 (32.0)	34 (37.0)	28 (28.3)	12 (29.3)	238 (31.9)
CABG (n,%)	229 (44.6)	41 (44.6)	46 (46.5)	17 (41.5)	333 (44.7)

CVD, cardiovascular disease; NSTEMI, non ST-elevation myocardial infarction; STEMI, ST-segment elevation myocardial infarction; PTCA, percutaneous transluminal coronary angioplasty; WR, without revascularization; CHF, chronic heart failure; CABG, coronary artery bypass graft.
A – Minimal vs. Mild depression;
B – Minimal vs. Moderate depression;
C–Minimal vs. Severe depression;
D – Mild vs. Moderate depression;
E – Mild vs. Severe depression;
F – Moderate vs. Severe depression;
**–P<0.05;*
†–P<0.01.

4. Statistical analysis

Data were analyzed using statistical software SPSS for Windows Version 10.0, and expressed as means ± SD or percentages, as appropriate. Categorical variables were compared using Chi-Square or Fisher's exact test, whereas non-categorical variables were compared using One-way analysis of variance with the Tukey-Kramer post hoc test. A multivariate regression model using a backward method was performed to estimate associations between depression score and factors of interest. A P value <0.05 was considered statistically significant.

5. Results

5.1. Clinical and biochemical parameters

Major clinical and biochemical parameters, according to BDI score range, are given in Tables 1 and 2, with particular attention to sex and age; clinical parameters (waist circumference, body mass index, systolic and diastolic blood pressure, heart rate, ejection fraction); biochemical parameters (fasting glycemia, total cholesterol, HDL- and LDL-cholesterol, triglycerides); behavioral risk factors (smoking, diet, regular exercise, alcohol consumption, exposition to stress); personal history of cardiovascular diseases (stable and unstable angina pectoris, myocardial infarction and reinfarction, revascularization procedures); cardiovascular risk factors (obesity, arterial hypertension, diabetes mellitus, family history of cardiovascular diseases;) and performed treatment strategy (without revascularization, PTCA or CABG).

5.2. Cardiovascular risk factors

The most frequently observed behavioral risk factors were cigarette smoking and self-reported exposition to intermittent stress in all examined groups of patients according to BDI score range (Table 2). Significantly higher frequency of former smokers was demonstrated in severe compared with minimal depression group (P<0.01) (Table 2). Minimal depression group exercised more frequently compared with mild and severe depression group (P<0.01) (Table 2). Alcohol consumption was more frequently self-reported in the mild compared with the moderate patients` group (P<0.05) (Table 2).
With regards to personal history of CVD, the majority of patients in all examined groups survived NSTEMI (Table 2). The frequency of the type 2 diabetes mellitus was significantly higher in mild compared to severe depression group (P<0.05) (Table 2).

Among traditional cardiovascular risk factors, arterial hypertension and hyperlipoproteinemia were the most frequently observed at the time of admission in all examined patients` groups, and were followed by obesity and family history of CVD (Table 2). Hyperlipoproteinemia occurred more frequently in minimal both compared to mild and severe depression groups (P<0.05) (Table 2).

According to the results of the multivariate regression model, significant association was found between the depression score range and age (B=0.147; 95%CI: 0.071–0.224; P<0.001), self-reported regular exercise (B=-3.345; 95%CI: -5.005– -1.686; P<0.001), type 2 diabetes mellitus (B=2.584; 95%CI: 0.050– 5.117; P<0.05)

Table 3. HRQoL and ASEX in relation to depression score range.

	Beck depression inventory score range				
	Minimal 0-13 (n=513, 68.9%)	Mild 14-19 (n=92, 12.3%)	Moderate 20-28 (n=99, 13.3%)	Severe 29-63 (n=41, 5.5%)	Total (n=745, 100%)
PCS	53.95±17.08$^{A‡, B‡, C‡}$	43.05±13.60$^{D†, E‡}$	35.66±12.06	29.16±12.52	48.81±17.82
MCS	56.63±16.03$^{A‡, B‡, C‡}$	42.24±11.84^{E‡}	37.74±12.93^{F*}	30.14±14.65	50.88±17.50
SF-36	55.05±16.85$^{A‡, B‡, C‡}$	42.16±12.43$^{D*, E‡}$	36.14±12.16	28.75±12.54	49.50±17.82
ASEX	17.15±6.33$^{A†, B‡, C‡}$	19.70±6.90^{E†}	20.45±6.83^{F*}	24.15±6.81	18.29±6.76

PCS, physical component score; MCS, mental component score; SF-36, 36-item Short Form Health Survey Questionnaire; ASEX, Arizona Sexual EXperience scale.
A – Minimal vs. Mild depression;
B – Minimal vs. Moderate depression;
C–Minimal vs. Severe depression;
D – Mild vs. Moderate depression;
E – Mild vs. Severe depression;
F – Moderate vs. Severe depression;
**–P<0.05;*
†–P<0.01;
‡–P<0.001

Table 4. Depression score relations with variables considered in the study (multivariate regression model).

	B	95% CI for B		P
		Lower bound	Upper bound	
Variables in the equation				
age (years)	0.147	0.071	0.224	<0.001
regular exercise	-3.345	-5.005	-1.686	<0.001
type 2 diabetes mellitus	2.584	0.050	5.117	0.046
cigarette smoking	1.316	0.282	2.350	0.013
Excluded variables				
WR	-0.094	-2.326	2.137	0.934
PTCA	-0.710	-2.215	0.795	0.355
CABG	0.171	-1.566	1.908	0.847
sex (male/female)	-1.178	-2.681	0.325	0.124
diet	-1.319	-2.958	0.320	0.115
alcohol consumption	1.438	-0.219	3.094	0.089
risk factors number	0.172	-0.447	0.791	0.585
arterial hypertension	-1.294	-3.779	1.191	0.307
obesity	-0.456	-2.137	1.224	0.594
diabetes mellitus	-0.061	-2.172	2.050	0.955
valvular disease	1.253	-0.219	2.724	0.095
arrhythmias	0.781	-0.790	2.353	0.329
CHF	0.131	-2.850	3.112	0.931
EF (%)	0.009	-0.069	0.087	0.822
FG (mmol/l)	-0.102	-0.576	0.372	0.673
TC (mmol/l)	0.291	-0.639	1.220	0.539
HDL-C (mmol/l)	0.374	-1.660	2.407	0.718
LDL-C (mmol/l)	-0.462	-1.585	0.662	0.420
TG (mmol/l)	0.155	-0.624	0.934	0.695
family history of CVD	-0.448	-2.090	1.194	0.592
BMI (kg/m^2)	0.066	-0.131	0.264	0.510
without stress	-1.247	-3.818	1.324	0.341
intermittent stress	0.162	-1.304	1.628	0.829
permanent stress	1.157	-0.533	2.847	0.179
sudden stress	0.252	-3.104	3.607	0.883
without MI	0.149	-1.401	1.699	0.850
STEMI	0.198	-1.679	2.075	0.836
NSTEMI	-0.458	-1.864	0.948	0.523

WR, without revascularization; PTCA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft; CHF, chronic heart failure; EF, ejection fraction; FG, fasting glycemia; TC, total cholesterol; HDL-C, high density lipoprotein cholesterol; LDL-C, low density lipoprotein cholesterol; TG, triglycerides; BMI, body mass index; MI, myocardial infarction; STEMI, ST-elevation myocardial infarction; NSTEMI, non ST-segment elevation myocardial infarction.

and cigarette smoking (B=1.316; 95%CI: 0.282– 2.350; P<0.05) (Table 4).

6. HRQoL

The HRQoL was markedly affected by the BDI score range, as demonstrated by PCS, MCS and total SF-36 scores (Table 3). Physical health markedly decreased following the range of depression, as observed for significantly higher PCS in minimal compared to mild, moderate and severe depression groups (P<0.001), as well as in mild compared to moderate and severe depression groups (P<0.01 and P<0.001 respectively). However, there were no significant differences for PCS between moderate and severe depression groups (Table

3). The mental health decreased following the range of depression as well, as demonstrated for significantly higher MCS in minimal compared to mild, moderate and severe depression groups (P<0.001), as well as in mild and moderate compared to severe depression group (P<0.001 and P<0.05 respectively), although with no significant differences for MCS between mild and severe depression groups (Table 3). The total SF-36 score was significantly higher in minimal compared with mild, moderate and severe depression groups (P<0.001), as well as in mild compared with moderate and severe depression groups (P<0.05 and P<0.001 respectively), but it was not significantly different between moderate and severe depression groups (Table 3).

7. ASEX

Sexual dysfunction, as demonstrated using the ASEX score, was markedly affected by the BDI score range as well. The ASEX score was significantly higher in minimal compared with mild, moderate and severe depression groups (P<0.01, P<0.001 and P<0.001 respectively), as well as in mild and moderate compared with severe depression group (P<0.01 and P<0.05 respectively) (Table 3).

8. Discussion

Depression has been demonstrated to be highly prevalent in CAD patients. However, depressed patients with CAD were found to be less adherent to medication regimens and recommended lifestyle modifications that are intended to reduce cardiovascular risk [28,29]. Depression was demonstrated to be associated with increased rates of smoking in CAD patients [30], as well with increased alcohol use and physical inactivity. Behavioral risk factors such as smoking, low physical activity, a poor diet, and the failure to adhere to medical recommendations mediate the relationship of depressive disorders with CAD [31]. Depression is a risk factor for poor adjustment to somatic illness events in the elderly, including those with MI, reflected by poorer HRQoL and functional status in the year after the acute illness episode [17]. The results of the present study confirmed those results because the depression score range was significantly associated with age, self-reported physical activity and cigarette smoking. Cigarette smoking and self-reported exposition to intermittent stress were the most frequently observed behavioral risk factors in all examined groups; it was demonstrated that the minimal depression group exercised more frequently compared with mild and severe depression groups.

The HRQoL is defined as “individuals’ perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns”, according to the World Health Organization [32]. The HRQoL following acute MI is affected by emotional distress, angina pectoris, side effects induced by drug therapy and comorbidities [33]. A study of 198 patients who underwent elective catheterization [34] found that depression and anxiety independently predicted diminished self-reported physical function and activity interference at 6- and 12-month follow-up. In another prospective study, a 5-year follow-up of 111 patients with stable CAD showed that the impact of depression on perceived physical health (PCS score of the SF-36) was significantly mediated by physical symptoms of angina and fatigue and was also both mediated and moderated by personality states and traits [35]. A prospective study evaluated the impact of the severity and course of depressive symptoms using the BDI on 2- and 6-months postsurgical HRQoL measured with the SF-36. Postoperative increases in depression from baseline assessment to 2-month follow-up significantly predicted both poorer physical and psychosocial functioning at 6 months, even after adjusting for presurgical depression and other traditional predictors [36].

Clinically significant levels of anxiety and depressive symptoms predicted poorer HRQoL on all dimensions of the SF-36, as well as more impairment, as shown by measures of daily activity and frequency of chest pain at 3 and 12 months after MI [37]. Beck et al. reported that the presence of baseline depression on the BDI predicted poorer HRQoL of 587 acute MI patients followed up 6 and 12 months after MI [14]. Other important predictors were baseline HRQoL, age, and previous surgical revascularization.

In a study of 196 patients hospitalized for acute MI and assessed at baseline to evaluate depression before hospitalization and both the BDI and Beck Anxiety Inventory to measure post-MI depression and anxiety demonstrated that the depression was independently related to reduced general health at 4 months; reduced overall mental health including vitality, psychological health and social function; and increased role interference from psychological problems. Aggregated MCS scores of both groups improved significantly over the follow-up period; although significant changes in the aggregated PCS scores were not evident, physical function tended to decline for the depressed group and improve slightly for the not-depressed group [38].

According to the results of the present study, the HRQoL was markedly affected by the BDI score range,

as demonstrated for all dimensions of the SF-36 (PCS, MCS and total SF-36). Physical health markedly decreased following the range of the depression, as observed for significantly higher PCS in minimal compared to mild, moderate and severe depression groups, and in mild compared to moderate and severe groups; however, there were no significant differences for PCS between moderate and severe depression groups. The mental health decreased following the range of depression as well, as demonstrated for significantly higher MCS in minimal compared with mild, moderate and severe depression groups, and in mild and moderate compared to severe depression group, although with no significant differences for MCS between mild and severe depression groups. The SF-36 score was significantly higher in minimal compared with mild, moderate and severe depression groups, as well as in mild compared with moderate and severe depression groups, but it was not significantly different between moderate and severe depression groups.

Sexual dysfunction was demonstrated to be highly prevalent at the time and after an acute coronary event [39]. After the acute coronary event or interventional procedure about 25% of patients resume their normal sex life with the same frequency and intensity; half of the patients resume their sex life at a reduced level in terms of frequency and/or intensity; the remaining 25% never resume sexual activity [40]. A number of factors are well-established in regard to the possibility of decreasing sexual activity after cardiac events, including fear of coital death or reinfarction, dyspnea, angina, exhaustion, loss of libido, depression, impotence, anxiety, drug-induced dysfunctions and risk factors such as diabetes, hypertension, dyslipidemia, smoking and sedentary life stile. According to the results of the present study, sexual dysfunction, as demonstrated using the ASEX score, was markedly affected by the BDI score range. The ASEX score was significantly higher in minimal, compared to mild, moderate and severe depression groups, as well as in mild and moderate compared with severe depression group. The study population was observed within 3 months after an acute myocardial infarction, during the rehabilitation period, without any assumption whether or not the sexual life will improve after that period.

In conclusion, according to the results of the present study, the HRQoL and sexual dysfunction were significantly affected by the range of the depression in CAD patients admitted for cardiovascular rehabilitation within three months after acute MI, as demonstrated for significant decrease of PCS, MCS and total SF-36 and for significant increase of ASEX score following the range of the depression according to BDI. The depression score range was, however, significantly associated with age, self-reported regular physical activity, type 2 diabetes mellitus and cigarette smoking.

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Conflict of interests

None

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