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Health-related quality of life in patients with coronary artery disease after coronary revascularization

Research Article

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Abstract: The aim of this study was to investigate the quality of life (HRQoL) in coronary artery disease(CAD) patients, admitted for rehabilitation within 3 months after an acute coronary event, in relation to treatment strategy [conservative treatment without revascularization (WR), percutaneous transluminal coronary angioplasty (PTCA), coronary artery bypass graft (CABG)]. Methods: Overall 719 consecutive CAD patients were involved in the study: WR (n=170), PTCA (n=226), CABG (n=323). HRQoL was estimated using the SF-36 questionnaire for total QoL and its two dimensions for physical and mental health [physical and mental component scores (PCS, MCS)]. Sexual dysfunction was assessed using the ASEX scale. Results: Significantly higher PCS, MCS and total SF-36, but lower ASEX score, were found in men compared with women. The ASEX score was significantly affected by age. Significantly higher PCS was found in PTCA group compared with that of CABG group. In multivariate analysis a significant positive association was obtained between PCS/MCS and male sex, between regular exercise, hyperlipoproteinemia, and permanent stress. ASEX was significantly positively associated with the age, CHF and non smoking. Conclusion: The results of this study have demonstrated significantly better HRQoL in men, younger CAD patients, patients who underwent PTCA and in patients without self-reported exposition to stress.

Keywords: *Coronary artery disease • Quality of life • SF-36 • Sexual dysfunction*

1. Introduction

The Quality of Life (QoL) is defined by the World Health Organization as an "individuals' perception of their position in life inthe context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns" [1]. Cardiovascular diseases (CVDs), including coronary artery disease (CAD), are the most important cause of morbidity and mortality worldwide. A significant progress of interventional cardiology has contributed to better understanding of its complexity. The treatment is believed to affect the whole of patient's life in all its aspects. Quantitative analysis of the QoL allows evaluation of the degree and the results of this intervention. HRQoL is a multidimensional concept that includes physical and social functioning, mental and general health perceptions. The HRQoL following acute myocardial infarction (AMI) is affected by emotional distress, angina pectoris, side effects induced by drug therapy and comorbidities [2]. Thus, traditional measurements of AMI outcome, such as survival rates or functional capacity and QoL measurement, seem to complement each other to provide a more comprehensive assessment of the impact of disease and/or its treatment [3].

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Coronary artery bypass grafting (CABG) has become one of the primary surgical option for treatment of CAD [4]. CABG for elderly is characterized by an increase in comparative mortality, morbidity andnumerous perioperative complications [5]. Despite this negative impact on the immediate postoperative period, research findings suggest that older patients also experience an improvement in their symptoms and fewer cardiac events in long-term post CABG surgery compared with patients who undergo drug therapy [6]. Some studies have confirmed the long-term positive impact on HRQoL, but others show less benefit between the age and HRQoL after the CABG [7]. The functional capacity of elderly patient's is limited, as they have more comorbidity, but their life expectancy is also limited by age. However, data in the literature suggests the same improvement of their symptomatic status post CABG, as in their younger counterparts [8].

CAD is the leading cause of death and disability for both women and men worldwide, and although there have been substantial medical advances that improve survival for cardiac ischemic events, there are still gender differences in the pathophysiology, treatment, course of recovery and outcomes for the patients with CAD [9]. It has been reported that women with CAD have a higher burden of comorbidities, as well as physical, social and medical disadvantages, compared with their male counterparts [10,11]. Women have less relief of angina, more dyspnea and lower functional status in the postoperative follow-up studies [12]. However, long-term survival does not differ between the women and men with CAD [13].

The survival of women was even better than in the men after adjusting for risk factors in some of the studies, despite the disparities in the outcome of coronary revascularization between women and men [14-16].

Sexual dysfunction is highly prevalent at the time and after the acute coronary event [17]. After the acute 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 rate in terms of frequency and/or intensity and the remaining 25% never resume sexual activity [18]. There are number of well-established factors which can lead to the possibility of decreasing sexual activity after the cardiac events, including fear of coital death or reinfarction, dyspnea, angina, exhaustion, loss of libido, depression, impotence, anxiety, drug-induced dysfunction and risk factors such as diabetes, hypertension, dyslipidemia, smoking and sedentary life style [19]. The aim of the present study was to evaluate the HRQoL in overall of 719 consecutive CAD patients, admitted for specialized cardiovascular rehabilitation at the Institute for Treatment and Rehabilitation "Niška Banja", Niš, Serbia, within 3 months post CAD and to assess their general condition with regards to treatment strategy, sex, age and self-reported exposure to stress.

2. Patients and methods

2.1 Patients

The present study included overall of 719 consecutive CAD patients (487 men, 232 women, aged 60.9 ± 9.3 years), admitted for specialized cardiovascular rehabilitation within 3 months post AMI without revascularization (WR group) (n=170, 106 men, 64 women, aged 63.3 ± 9.5 years), elective or emergency percutaneous transluminal coronary angioplasty (PTCA group) (n=226, 160 men, 66 women, aged 57.6 ± 9.8 years) or elective or emergency coronary artery bypass graft (CABG group) (n=323, 221 men, 102 women, aged 62.0 ± 8.3 years) (Table 1). The selection of treatment strategy after the AMI was based on physician's clinical decision and the results of coronary angiography. Concerningthe participation in this study, the response rate was relatively high, around 95%. This study has been approved by the local research ethics committee (Rehabilitation Center "Niška Banja", Niš, Serbia) and the informed written consent was obtained from all the individuals enrolled in the study.

2.2 Methods

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, exposure to stress, and the presence of major cardiovascular risk factors, including obesity, arterial hypertension, hyperlipoproteinemia and diabetes mellitus, was obtained at interviews and by consulting individual medical records.

Height and weight measurements of patients were obtained in the daylight, indoor, with clothes and 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). Three consecutive measurements were obtained and the mean value was recorded.

Blood samples were drawn after an overnight fast of 12 hours. Fasting blood glucose levels were determined by GOD-PAP method using an enzymatic colorimetric

Table 1. Clinical and biochemical characteristics.

	Total (n=719, 100%)	WR (n=170, 23.6%)	PTCA (n=226, 31.4%)	CABG (n=323, 44.9%)
Age and sex				
Age (years)	61.1±9.3	63.5±9.3	57.7±9.8 [A, B]	62.1±8.2
Sex (♂:♀) (n,%)	487:232 (68:32)	106:64 (62:38)	160:66 (71:29)	221:102 (68:32)
Clinical parameters				
WC (cm)	102.2±11.8	103.3±12.6	102.2±11.4	101.6±11.6
BMI (kg/m^2)	26.9±3.6	27.2±3.8	27.0±3.7	26.6±3.5
SBP (mmHg)	123.6±14.6	127.1±15.2 [C, D]	121.7±14.9	123.1±13.6
DBP (mmHg)	76.4±8.4	77.2±8.5	76.2±8.4	76.1±8.3
HR (beats/min)	68.3±7.8	69.3±7.5	66.8±7.6 [D, E]	68.8±8.0
EF (%)	50.2±9.9	51.9±9.2 [F]	50.1±9.4	49.2±10.5
Biochemical parameters				
FG (mmol/l)	6.3±1.7	6.2±1.4	6.2±1.5	6.5±2.0
TC (mmol/l)	4.7±1.2	4.9±1.2	4.7±1.3	4.7±1.2
HDL-C (mmol/l)	1.2±0.4	1.3±0.5 [C, D]	1.2±0.3	1.2±0.3
LDL-C (mmol/l)	2.8±1.0	3.0±1.0 [C, D]	2.7±1.0	2.8±1.0
TG (mmol/l)	1.6±1.0	1.7±1.1	1.6±0.8	1.6±1.1

WR, without revascularization; PTCA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft; WC, waist circumference; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; HR, heart rate; EF, ejection fraction; FG, fasting glycaemia; TC, total cholesterol; HDL-C, high density lipoprotein cholesterol; LDL-C, low density lipoprotein cholesterol; TG, triglycerides; MBP, maximal blood pressure; ST-dep., ST -segment depression
[A] P<0.001 vs. WR, [B] P<0.001 vs. CABG, [C] P<0.01 vs. PTCA, [D] P<0.01 vs. CABG, [E] P<0.01 vs. WR, [F] P<0.05 vs. CABG

Table 2. Cardiovascular risk factors.

	Total (n=719, 100%)	WR (n=170, 23.6%)	PTCA (n=226, 31.4%)	CABG (n=323, 44.9%)
Lifestyle habits				
Cigarette smoker (n,%)	346 (48.1)	72 (42.4)	113 (50.0)	161 (49.8)
Former smoker (n,%)	133 (18.5)	31 (18.2)	54 (23.9) [A]	48 (14.9)
Diet (n,%)	254 (35.3)	57 (33.5)	69 (30.5) [B]	128 (39.6)
Regular exercise (n,%)	156 (21.7)	38 (22.4)	47 (20.8)	71 (22.0)
Alcohol consumption (n,%)	250 (34.8)	63 (37.1)	76 (33.6)	111 (34.4)
Intermitent stress (n,%)	459 (63.8)	108 (63.5)	150 (66.4)	201 (62.2)
Permanent stress (n,%)	155 (21.6)	26 (15.3) [B]	48 (21.2)	81 (25.1)
Sudden stress (n,%)	37 (5.1)	6 (3.5)	17 (7.5)	14 (4.3)
Personal history of CVD				
Stable angina (n,%)	124 (17.2)	87 (51.2) [C, D]	18 (8.0)	19 (5.9)
Unstable angina (n,%)	1 (0.1)	1 (0.6)	-	-
NSTEMI (n,%)	124 (17.2)	35 (20.6)	39 (17.3)	50 (15.5)
STEMI (n,%)	387 (53.8)	116 (68.2) [D]	166 (73.5) [D]	105 (32.5)
Myocardial reinfarction (n,%)	37 (5.1)	8 (4.7)	7 (3.1)	22 (6.8)
Fibrinolysis (n,%)	127 (17.7)	45 (26.5) [D]	46 (20.4) [A]	36 (11.1)
Primary PTCA (n,%)	116 (16.1)	-	116 (51.3) [D, E]	-
Re-CABG (n,%)	5 (0.7)	-	-	5 (1.5)
Valvular disease (n,%)	284 (39.5)	64 (37.6)	80 (35.4)	140 (43.3)
Arrhythmias (n,%)	255 (35.5)	64 (37.6)	78 (34.5)	113 (35.0)
CHF (n,%)	135 (18.8)	23 (13.5) [B]	40 (17.7)	72 (22.3)
Cardiovascular risk factors				
Obesity (n,%)	394 (54.8)	98 (57.6)	117 (51.8)	179 (55.4)
Arterial hypertension (n,%)	655 (91.1)	157 (92.4)	196 (86.7)	302 (93.5)
Hyperlipoproteinemia (n,%)	683 (95.0)	158 (92.9)	217 (96.0)	308 (95.4)
Diabetes Mellitus (n,%)	165 (22.9)	36 (21.2)	41 (18.1) [B]	88 (27.2)
Family history of CVD (n,%)	474 (65.9)	93 (54.7) [A, C]	165 (73.0)	216 (66.9)

WR, without revascularization; PTCA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft; NSTEMI, non ST-elevation myocardial infarction; STEMI, ST-elevation myocardial infarction; CHF, chronic heart failure; CVD cardiovascular diseases
[A] P<0.01 vs. CABG, [B] P<0.05 vs. CABG, [C] P<0.001 vs. PTCA, [D] P<0.001 vs. CABG, [E] P<0.001 vs. WR

test for glucose without deproteinization. Blood glucose and lipid profile parameters were measured using a clinical chemistry analyzer (ARTAX, Menarini Diagnostics, Florence, Italy). Triglyceride and total cholesterol plasma levels were determined with GPO-PAP and CHOD-PAP methods respectively, using enzymatic colorimetric tests with lipid clearing factor. HDL-cholesterol was measured by precipitation.

For all patients enrolled in the study HRQoL was assessed using the Medical Outcomes Study 36-item Short Form Survey (SF-36), a generic questionnaire consisting of 36 items, summarized and transformed to give eight summary scales: physical functioning (PF), rolephysical 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) [20]. The PF, RP and BP scales are the primary members of the physical component summary (PCS) score, whereas the SF, RE and MH are the primary members of the mental component summary (MCS) score. The GH and VT are considered members of both dimensions. As a final point, the total SF-36 quality of life summary score was calculated. The participants' sexual functioning was assessed using the Arizona Sexual EXperiences (ASEX) Scale [21].

3. Statistical analysis

Data was analyzed using statistical software SPSS for Windows Version 10.0, and expressed as means ± SD or percentages, as appropriate. Unpaired Student t-test was used to analyze the differences of continuous variables between men and women, while analysis of variance in general linear model with Tukey-Kramer post-hoc test was used to compare means between three or four groups. Pearson Chi-Square Test and Fisher Exact Test were used to compare categorical variables between the groups. A multivariate regression models using stepwise method were performed to estimate associations between HRQoL and ASEX with factors of interest. *P* value < 0.05 was considered statistically significant.

4. Results

4.1 Baseline clinical and biochemical characteristics

Baseline clinical and biochemical characteristics, including major cardiovascular risk factors and the history of previously performed treatment strategies and comorbidities, are given in Tables 1 and 2.

4.2 HRQoL and ASEX in relation to sex

With regards to sex differences, significantly better HRQoL was found in men, as demonstrated by the significantly (*P*<0.001) higher PCS, MCS and total SF-36 scores. However, men were less likely to manifest sexual dysfunction, as demonstrated by significantly (*P*<0.001) lower ASEX score compared with that of women (Table 3).

Table 3. Characteristics of HCWs.

	Women (n=232, 32.3%)	Men (n=487, 67.7%)
PCS	44.2±15.9 [A]	51.1±18.2
MCS	47.9±15.4 [A]	52.6±18.1
SF-36	45.5±15.6 [A]	51.6±18.3
ASEX	22.2±6.6[A]	16.5±5.9

HRQoL, Health Related Quality of Life; PCS, Physical Component Summary score; MCS, Mental Component Summary score; SF-36, 36-item Short Form Health Survey Questionnaire; ASEX, Arizona Sexual EXperience score
[A] P<0.001 vs. men

4.3 HRQoL and ASEX in relation to age

HRQoL tended to decrease with age, and this was demonstrated for PCS, MCS and total SF-36 scores. Significant difference was, however, found amongst patients younger than 50 years and patients older than 70 years for PCS (*p*<0.01) and SF-36 (*P*<0.05). Sexual dysfunction was also affected by age, as demonstrated for ASEX score for decades, with significant differences amongst <50 group age and 50-59, 60-69 and >70 group age (*P*<0.05, *P*<0.001, *P*<0.001, respectively), between 50-59 years age group and 60-69 and >70 years groups (*P*<0.001, *P*<0.001, respectively), as well between 60-69 and >70 years groups (*P*<0.01) (Table 4).

Table 4. HRQoL and ASEX in relation to age.

	<50 years (n=74, 10.3%)	50-59 years (n=241, 33.5%)	60-69 years (n=250, 34.8%)	≥70 years (n=154, 21.4%)
PCS	57.2±19.8 [A, B, C]	48.3±17.5	48.9±17.7	45.8±16.1
MCS	57.3±18.5 [D, E, F]	50.4±17.8	51.4±17.3	48.6±15.7
SF-36	57.6±19.7 [A, B, C]	48.9±17.8	49.9±17.5	46.6±15.7
ASEX	14.2±5.5 [D, C, G]	16.4±6.0 [C, G]	19.5±6.8 [H]	21.3±6.3

HRQoL, Health Related Quality of Life; PCS, Physical Component Summary score; MCS, Mental Component Summary score; SF-36, 36-item Short Form Health Survey Questionnaire; ASEX, Arizona Sexual EXperience score
[A] P<0.01 vs. 50-59, [B] P<0.01 vs. 60-69, [C] P<0.001 vs. ≥70, [D] P<0.05 vs. 50-59, [E] P<0.05 vs. 60-69, [F] P<0.01 vs. ≥70, [G] P<0.001 vs. 60-69, [H] P<0.05 vs. ≥70

4.4 HRQoL and ASEX in relation to treatment strategy

Regarding treatment strategy, the best HRQoL was found in PTCA group, as found for PCS, MCS and total SF-36 scores. Adjusted for age and sex, significantly higher were PCS (P<0.01) and SF-36 (P<0.05) in PTCA group compared with CABG group. The treatment strategy affected sexual function as well, as observed for significantly lower ASEX score adjusted for age and sex in PTCA group compared with WR (P<0.001) and CABG (P<0.01) groups (Table 5).

4.5 HRQoL and ASEX in relation to self-reported exposition to stress

HRQoL was markedly affected by the level and duration of previously self-reported exposure to stress, as demonstrated for PCS, MCS and total SF-36 scores. Adjusted for age and sex, the significant (P<0.05) differences for PCS, MCS and SF-36 were found between the group of patients who self-reported intermittent stress and the group of patients who self-reported exposition to permanent stress. With regards to sexual function, the highest ASEX score was observed in the group of patients who self-reported sudden stress, although this was not significant (Table 6).

4.6 Results of the multivariate regression analysis

Significant association was found between the PCS and CABG (B=-2.87; 95%CI: -5.40 to 0.34), age (B=-0.25; 95%CI: -0.39 to -0.11), male sex (B=6.35; 95%CI: 3.68 to 9.03), regular exercise (B=4.67; 95%CI: 1.50 to 7.84), risk factors number (B=-1.12; 95%CI: - 1.95 to -0.30), hyperlipoproteinemia (B=6.26; 95%CI: 0.33 to 12.18), intermittent stress (B=3.71; 95%CI: 0.51 to 6.90) and permanent stress (B=-3.64; 95%CI: -6.70 to -0.57) (Table 7). MCS was significantly associated with age (B=-0.20; 95%CI:-0.33 to -0.06), male sex (B=4.13; 95%CI: 1.46 to 6.81), regular exercise (B=3.70; 95%CI: 0.54 to 6.86), the number of risk factors (B=-0.91; 95%CI: -1.73 to -0.09), hyperlipoproteinemia (B=7.62; 95%CI: 1.71 to 13.54), intermittent stress (B=-4.07; 95%CI: -7.12 to -1.02) and permanent stress (B=3.99; 95%CI: 0.81 to 7.17) (Table 7). SF-36 was significantly associated with CABG (B=-3.07; 95%CI: -5.67 to 0.47), age (B=-0.25; 95%CI:-0.39 to -0.12), male sex (B=5.53; 95%CI: 2.84 to 8.22), regular exercise (B=4.28; 95%CI: 1.10 to 7.46), the number of risk factors (B=-1.11; 95%CI: -1.94 to -0.28), hyperlipoproteinemia (B=7.14; 95%CI: 1.18 to 13.10), intermittent stress (B=4.03; 95%CI: 0.82 to 7.23) and permanent stress (B=-4.21; 95%CI: -7.28 to -1.14) (Table 7). ASEX was significantly associated with age (B=0.24; 95%CI: 0.20 to 0.29), male sex (B=- 5.40; 95%CI: -6.30 to -4.50), regular exercise (B=-1.21; 95%CI: -2.22 to -0.20), CHF (B=1.09; 95%CI: 0.02 to 2.16) and non smoking (B=2.37; 95%CI: 1.34 to 3.40) (Table 7).

5. Discussion

The aim of the present study was to evaluate the HRQoL in CAD patients, admitted for specialized cardiovascular rehabilitation within 3 months after AMI. The HRQoL was assessed using the SF-36 in regard to performed treatment strategy, sex, age and self reported exposure to stress. The functional status was demonstrated to be important, since the higher PCS and MCS were associated with 5–8% reduction in the risk for hospitalization and 9–23% reduction in mortality [22]. In patients who underwent CABG, physical health domain scores of the

Table 5. HRQoL and ASEX in relation to treatment strategy.

	WR (n=170, 23.6%)	PTCA (n=226, 31.4%)	CABG (n=323, 44.9%)
PCS	49.1±18.9	51.7±18.9 [A]	46.8±16.0
MCS	50.5±17.6	52.6±18.9	50.3±16.1
SF-36	49.8±18.6	52.0±19.4 [B]	48.0±15.8
ASEX	19.3±6.8	17.1±6.7 [A,C]	18.6±6.6

HRQoL, Health Related Quality of Life; PCS, Physical Component Summary score; MCS, Mental Component Summary score; SF-36, 36-item Short Form Health Survey Questionnaire; ASEX, Arizona Sexual EXperience score; WR, without revascularization; PTCA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft
[A] P<0.01 vs. CABG, [B] P<0.05 vs. CABG, [C] P<0.001 vs. WR

Table 6. HRQoL and ASEX in relation to self-reported stress.

	no stress (n=68, 9.5%)	intermitent stress (n=459, 63.8%)	permanent stress (n=155, 21.6%)	sudden stress (n=37, 5.1%)
PCS	50.0±17.8	49.9±18.1 [A]	45.6±13.4	48.0±18.0
MCS	52.0±16.4	52.1±17.8 [A]	47.8±15.9	50.4±19.0
SF-36	50.8±17.7	50.7±18.1 [A]	46.2±16.0	48.6±18.6
ASEX	19.3±6.2	18.0±6.5	18.5±7.1	19.7±8.3

HRQoL, Health Related Quality of Life; PCS, Physical Component Summary score; MCS, Mental Component Summary score; SF-36, 36-item Short Form Health Survey Questionnaire; ASEX, Arizona Sexual EXperience score
[A] P<0.05 vs. permanent stress

Table 7. Results of multivariate regression models: HRQoL and ASEX relations with variables considered in the study (regression coefficients and 95%CIs).

	PCS	MCS	SF-36	ASEX
WR	1.50 (-2.14, 5.14)	-0.17 (-3.78, 3.45)	1.23 (-2.42, 4.87)	0.02 (-1.20, 1.24)
PTCA	2.95 (-0.40, 6.30)	0.97 (-2.36, 4.30)	2.28 (-1.08, 5.64)	-0.46 (-1.59, 0.66)
CABG	-2.87 (-5.40, -0.34) [A]	-1.35 (-3.90, 1.21)	-3.07 (-5.67, -0.47) [A]	0.56 (-0.43, 1.55)
age (years)	-0.25 (-0.39, -0.11) [C]	-0.20 (-0.33, -0.06) [B]	-0.25 (-0.39, -0.12) [C]	0.24 (0.20, 0.29) [C]
sex (male/female)	6.35 (3.68, 9.03) [C]	4.13 (1.46, 6.81) [B]	5.53 (2.84, 8.22) [C]	-5.40 (-6.30, -4.50) [C]
diet	0.30 (-2.91, 3.52)	1.58 (-1.62, 4.77)	1.18 (-2.05, 4.40)	-0.70 (-1.78, 0.38)
regular exercise	4.67 (1.50, 7.84) [B]	3.70 (0.54, 6.86) [A]	4.28 (1.10, 7.46) [B]	-1.21 (-2.22, -0.20) [A]
alcohol consumption	-0.58 (-3.63, 2.47)	0.73 (-2.30, 3.77)	-0.07 (-3.13, 2.99)	-0.36 (-1.38, 0.66)
risk factors number	-1.12 (-1.95, -0.30) [B]	-0.91 (-1.73, -0.09) [A]	-1.11 (-1.94, -0.28) [B]	0.23 (-0.24, 0.70)
arterial hypertension	1.09 (-3.78, 5.96)	1.84 (-3.00, 6.69)	1.20 (-3.68, 6.08)	0.08 (-1.55, 1.72)
obesity	0.24 (-2.85, 3.32)	-0.09 (-3.15, 2.99)	0.12 (-2.97, 3.21)	-0.01 (-1.04, 1.03)
hyperlipoproteinemia	6.26 (0.33, 12.18) [A]	7.62 (1.71, 13.54)[A]	7.14 (1.18, 13.10)[A]	-1.56 (-3.65, 0.53)
diabetes mellitus	-0.96 (-4.50, 2.58)	-1.06 (-4.58, 2.46)	-1.06 (-4.61, 2.49)	-0.05 (-1.24, 1.14)
valvular disease	0.36 (-2.72, 3.43)	0.47 (-2.59, 3.53)	0.24 (-2.84, 3.32)	0.14 (-0.89, 1.17)
arrhythmias	0.52 (-2.84, 3.88)	1.55 (-1.79, 4.89)	0.87 (-2.50, 4.24)	-0.62 (-1.75, 0.50)
CHF	1.05 (-4.23, 6.33)	-0.04 (-5.29, 5.21)	0.53 (-4.76, 5.83)	1.09 (0.02, 2.16)[A]
EF	0.09 (-0.13, 0.30)	0.04 (-0.17, 0.25)	0.06 (-0.15, 0.28)	0.01 (-0.06, 0.08)
family history of CVD	0.99 (-1.94, 3.92)	2.00 (-0.92, 4.91)	1.50 (-1.44, 4.44)	-0.43 (-1.42, 0.55)
WC	0.05 (-0.08, 0.18)	0.12 (-0.01, 0.25)	0.08 (-0.05, 0.21)	-0.02 (-0.06, 0.03)
BMI	-0.21 (-0.62, 0.19)	-0.22 (-0.62, 0.18)	-0.21 (-0.61, 0.20)	0.02 (-0.12, 0.15)
non smoker	-0.81 (-3.57, 1.95)	-0.07 (-2.77, 2.63)	-0.46 (-3.21, 2.30)	2.37 (1.34, 3.40)[C]
smoker	0.06 (-3.08, 3.20)	0.25 (-2.87, 3.38)	0.08 (-3.07, 3.23)	-1.00 (-2.05, 0.06)
ex smoker	1.32 (-2.81, 5.44)	0.26 (-3.84, 4.36)	0.66 (-3.47, 4.80)	-0.55 (-1.93, 0.83)
without stress	5.08 (-0.01, 10.18)	4.39 (-0.68, 9.46)	4.92 (-0.19, 10.03)	-0.15 (-1.86, 1.56)
intermittent stress	3.71 (0.51, 6.90) [A]	-4.07 (-7.12, -1.02) [B]	4.03 (0.82, 7.23) [A]	-0.43 (-1.50, 0.64)
permanent stress	-3.64 (-6.70, -0.57) [A]	3.99 (0.81, 7.17) [A]	-4.21 (-7.28, -1.14) [B]	0.21 (-0.99, 1.41)
sudden stress	0.42 (-5.90, 6.74)	1.04 (-5.25, 7.33)	0.45 (-5.89, 6.79)	1.19 (-0.93, 3.31)
without MI	-2.67 (-5.53, 0.20)	-0.75 (-3.56, 2.06)	-2.12 (-4.98, 0.74)	0.62 (-0.47, 1.70)
STEMI	-0.32 (-4.45, 3.81)	0.12 (-3.99, 4.23)	0.14 (-4.00, 4.28)	0.75 (-0.63, 2.14)
NSTEMI	1.29 (-2.19, 4.77)	0.02 (-3.45, 3.48)	0.77 (-2.72, 4.26)	0.36 (-0.81, 1.53)

PCS, Physical Component Summary score; MCS, Mental Component Summary score; SF-36, 36-item Short Form Health Survey Questionnaire; ASEX, Arizona Sexual EXperience score; WR, without revascularization; PTCA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft; NSTEMI, non ST-elevation myocardial infarction; STEMI, ST-elevation myocardial infarction; CHF, chronic heart failure; CVD cardiovascular disease, EF, ejection fraction; WC, waist circumference; BMI, body mass index; MI, myocardial infarction
[A] $P<0.05$, [B] $P<0.01$, [C] $P<0.001$

SF-36, but not mental health domain scores, significantly predicted 6-month mortality [23]. There are suggestions in the literatures stating that quality of life might be better for those receiving drug eluting stent in comparison with the bare metal stent. According to our data, total of 186 patients have received stents, of whom 2 have received total of 7 stents each, 2 patients received 5 stents each, 10 patients received 4 stents each, 16 patients received 3 stents each, 40 patients received 2 stents only and 116 patients received only 1 stent. The choice of stents was dependent on the results of prior coronary angiography, the total number, length and other characteristics of the lesions and comorbidities. In the medical practice in Serbia, the proportion of use of the drug eluting versus bare metal stents is around 50% vs. 50%.

Previous studies have not reported gender differences in HRQoL following AMI, but have reported, higher levels of depression and less social support in woman, as well as increased risk of death and less likeliness to undergo rehabilitation [24,25]. In contrast, several other studies found that women reported worse HRQoL following AMI, as measured by the elevated levels of anxiety, depression, poorer general health and overall worse psychosocial profiles [26,27]. The results of the present study have corroborated previously published results, since they markedly demonstrated better overall HRQoL in men, as shown by significantly (P<0.001) higher PCS, MCS and total SF-36 scores. Elderly patients not only have more comorbid conditions compared with their younger counterparts, but their life expectancy is limited by age and are hence more likely to develop further health complications [8]. On the other hand, younger patients may have different personality traits than the patients at older ages, and premature onset of the disease is more likely to be seen in genetically vulnerable individuals exposed to stressful envi-

ronmental factors [28]. The results of the present study have demonstrated that HRQoL markedly tended to decrease with ageing, significantly however in regard to total SF-36 (P<0.05) and PCS (P<0.01) among patients younger than 50 years and patients older than 70 years. Studies assessing patients undergoing medical treatment or PTCA showed that the PTCA group had a significant improvement in the QoL in regards to vitality and the physical component, when compared to the medical group. Study aiming at comparing the QoL of patients assigned to medical or surgical treatment showed that the improvement in QoL, results in decrease in angina symptoms, increase in physical activity and reduction in the use of anti angina drugs were higher among the patients treated with surgery only in the first few years of follow-up. Although coronary stenting reduce the rates of angiographic and clinical restenosis, the improvement of both physical and mental components of SF-36 was found to be more significant among patients who underwent CABG. Patients who underwent medical treatment only experienced an improvement in their QoL at the end of the study also [29].

The most frequent cardiovascular risk factors among patients enrolled in the present study were exposure to stress, cigarette smoking, hyperlipoproteinemia, family history of CVD and obesity. Arterial hypertension and diabetes mellitus were the most frequent in CABG group (P<0.001 vs. PTCA group). The baseline clinical and biochemical evaluation has demonstrated a significantly higher systolic blood pressure (P<0.001) in WR group compared with PTCA group, higher body mass index (P<0.05) and systolic blood pressure (P<0.001) in WR group compared with CABG group. The total cholesterol (P<0.05 and P<0.01 vs. PTCA and CABG groups respectively) and LDL-cholesterol (P<0.05 vs. both PTCA and CABG groups) were higher in WR group compared with both PTCA or CABG groups. Similarly higher HDL-cholesterol levels (P<0.05) were measured in WR group compared with PTCA group, and thus suggesting a highest overall cardiovascular risk in the WR group. However, previously published results have demonstrated a superiority of CABG over PTCA with regards to HRQoL in high risk patients [30]. In regard to treatment strategy, the best HRQoL was obtained in PTCA group, as demonstrated for PCS, MCS and total SF-36 scores. However, a significant difference (P<0.05), was only seen in PCS between PTCA and CABG groups. WR group was the most likely (P<0.001) to report recurrent angina pain, compared with both PTCA or CABG groups.

HRQoL was markedly affected by the level and duration of previously self-reported exposure to stress, as demonstrated for PCS, MCS and total SF-36 scores. However, the only significant (P<0.05) difference for MCS was found between the group of patients who have not self-reported exposition to stress or the group of patients who have self-reported exposure to permanent stress.

Sexual disorders were demonstrated to be highly prevalent at the time and after the acute coronary event [19]. There are a number of well-established factors leading to a possibility of decreasing sexual activity after the cardiac events. The results of the present study have clearly demonstrated that sexual dysfunction was significantly affected by the age and sex. Older participants and women were more likely to manifest sexual dysfunction, as assessed using the ASEX score. Sexual function was also affected by the treatment strategy, as demonstrated for significantly lower ASEX score (P<0.01) in PTCA group compared with the WR group. Sexual dysfunction was more prevalent in patients who have self-reported sudden stress, although without any significant difference compared with patients who have not self-reported exposure to stress, or with patients with an intermittent and permanent stress.

The results of multivariate regression analysis, show a significant positive association between PCS and the male sex, regular exercise, hyperlipoproteinemia, intermittent stress or permanent stress; but the negative correlation with CABG, age and the risk factors. MCS was significantly positively associated with the male sex, regular exercise, hyperlipoproteinemia, and permanent stress; but negatively associated with the age, risk factors and intermittent stress. Total SF-36 was significantly positively associated with the age, male sex, regular exercise, hyperlipoproteinemia and intermittent stress; negatively associated with the CABG, risk factors and permanent stress. ASEX was significantly positively associated with the age, CHF and non smoking; although negatively associated with the male sex and regular exercise.

In conclusion, the results of the present study have demonstrated a significantly better overall HRQoL in men, younger CAD patients, patients who underwent PTCA as well as patients have not previously self-reported exposure to stress.

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Conflict of interest

None declared.

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