Assessment of mental health and quality of life in patients with a coronary artery bypass graft

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Received 12 December 2011
Accepted 15 February 2012

Egyptian Journal of Psychiatry 2013, 34:69–75

Objectives
To assess mental state (depression, anxiety, and cognition) and quality of life (QOL) in patients with a coronary artery bypass graft (CABG).
Participants and methods
Three groups were included: one case group (30 individuals who had CABG) and two control groups (60 individuals divided into two subgroups): control group 1 included 30 patients who had coronary artery disease (CAD) and control group 2 included 30 healthy individuals. Patients diagnosed with CAD, patients who had undergone a CABG surgery, and patients who had undergone a successful operation without postsurgical complications were included after a period of 2 months following surgery. Patients with medical conditions that might affect cognition, patients in acute medical distress, and patients with previous psychiatric illness were excluded. All groups were assessed using the following tools: the Mental State Examination, the Hospital Anxiety and Depression Scale (HADS), the Medical Outcomes Survey Short Form 36-item questionnaire (MOS SF-36), and the Present State Examination (PSE) for the *Diagnostic and Statistical Manual of Mental Disorders, 4th ed.* (DSM IV).
Results
There was a nonsignificant difference in age, marital status, sex, and education between patients and the two control groups. Patients with CADs had more severe depression and anxiety than the other two groups, with a significant difference in the depressive scale of the HADS. There was a nonsignificant difference between all groups in the PSE or DSM IV diagnoses. Patients with CADs showed the worst QOL in all groups, with a significant difference in all items of MOS SF-36, except for physical functioning and role emotional functioning.
Conclusion
Patients with CADs experience more depression and anxiety than normal individuals. The CABG operation has a beneficial effect in decreasing depression and anxiety and improving QOL in patients with CADs.

Keywords:
coronary artery bypass graft, coronary artery diseases, depression, quality of life

Egypt J Psychiatr 34:69–75

1110-1105

Introduction

Coronary heart disease is the leading cause of death in the majority of countries. Although coronary artery bypass grafting (CABG) has been shown to improve quality of life (QOL) and functional capacity for many patients, recent studies have shown that a significant number of patients show impairment in cognitive function immediately following surgery. Cognitive decline limits improvement in QOL, with a strong correlation between change in cognition and change in QOL (Phillips-Bute *et al*., 2006; Tully *et al*., 2008; Yap *et al*., 2009; Yoshitani and Ohnishi, 2009). The postoperative course of depressive symptoms may be an important predictor of subsequent QOL, operating independent of presurgical levels of depressive symptoms (Cohen *et al*., 2011).

Fluctuations in depression following CABG may reflect psychological and/or biological processes related uniquely to the occurrence of major surgery. Changes in depressive symptoms have been linked to morbidity and mortality in CABG patients (Spezzaferri *et al*., 2009; Chaichana *et al*., 2011). For example, both moderate to severe depressive symptoms before surgery and mild or moderate to severe depressive symptoms persisting for 6 months following surgery have been associated with elevated mortality rates (Serrano *et al*., 2011). Studies have shown an association between elevated depressive symptoms before and after CABG and lower and worse health-related QOL at the 6-month follow-up (Tully *et al*., 2009; Mladinov *et al*., 2010; Khoueiry *et al*., 2011).

Previous findings have also shown that in patients with more severe symptoms of depression and anxiety, health-related QOL did not change significantly over the 2-year period, except for the Pain and Physical Component Summary (PCS) domains (Staniūtė and Varoneckas, 2007; Khawaja *et al*., 2009; Baumeister *et al*., 2011).

 DOI: 10.7123/01.EJP.0000415470.89733.1d

Caine *et al.* (1991) found that 1 month postoperatively, patients showed increased levels of depression and disability and decreased levels of anxiety and QOL compared with the baseline. A larger proportion of invasively treated patients had difficulties in concentration. With the use of an invasive treatment strategy for patients with inducible postinfarction ischemia, a better health-related QOL may be achieved than if a conservative treatment strategy is followed (Jokinen *et al.*, 2010; Juergens *et al.*, 2010; Karhunen *et al.*, 2011).

The invasive strategy enables patients to achieve improved physical functioning, fewer physical limitations in daily routines, fewer symptoms, and reduced use of anti-angina drugs. No worsening of patients' social functional ability or psychological symptoms compared with the general population or any other difference has been reported between the treatment groups (Ivaškevičiene *et al.*, 2009; Huffman *et al.*, 2010).

Objectives

To assess mental state (depression, anxiety, and cognition) and QOL in patients with a CABG.

Participants and methods

This is a cross-sectional, case–control observational study that was carried out in the Department of Cardiothoracic Surgery in the Hospital of Faculty of Medicine, Cairo University.

Three groups were included: one case group (30 individuals who had CABG) and two control groups (60 individuals divided in two subgroups). Control group 1 included 30 patients who had coronary artery disease (CAD) and control group 2 included 30 healthy individuals. Patients diagnosed with CAD, patients who had undergone a CABG surgery, and patients who had undergone a successful operation without postsurgical complications were included after a period of 2 months following surgery. Patients with medical conditions that might affect cognition, patients in acute medical distress, and patients with previous psychiatric illness were excluded. The control groups included 60 individuals divided into two subgroups: patients with CAD who had not undergone CABG operations and had the same inclusion and exclusion criteria (30 individuals) and individuals without CAD who had the same inclusion and exclusion criteria (30 individuals). Patients were selected randomly from the Cardiothoracic Surgery and Cardiology Outpatient Clinic in Cairo University Hospitals. An informed written consent was obtained from the potential participants of the study. All groups were assessed using the following tools.

The Mental State Examination

This is widely used in hospital settings for assessment and represents a brief and standardized way to assess mental function (Al-Rajeh *et al.*, 1999).

The Hospital Anxiety and Depression Scale

The Hospital Anxiety and Depression Scale (HADS) is an instrument appropriate for use as a self-administered questionnaire or in an interview format. The instrument takes ~10 min for self-administration and no special training is required. It is a widely used self-report instrument designed as a brief assessment tool of the distinct dimensions of anxiety and depression in non-psychiatric populations (Bjelland *et al.*, 2002).

The Medical Outcomes Survey Short Form 36-item questionnaire

The Medical Outcomes Survey Short Form 36-item questionnaire (MOS SF-36) measures eight domains of health: physical functioning (PF), role limitations because of physical problems (RP), bodily pain (BP), general health perceptions (GH), energy/vitality (VT), social functioning (SF), role limitations because of emotional problems (RE), and mental health (MH) (McHorney *et al.*, 1994). For each of the eight dimensions, 2–10 questions were included and scored on a scale from 0 to 100. Each dimension was scored independently. The dimensions were evaluated as eight separate measures of one's health related quality of life. These eight concepts have also been summarized into two scales: a PCS and a Mental Component Summary (MCS) (Ware *et al.*, 1994; Ware and Kosinski, 2001).

Present State Examination

Present State Examination (PSE) is a structured interview schedule for carrying out the mental state examination and scoring the findings. It is designed for adult patients with a functional psychosis or neurosis. A careful description of abnormal forms of conscious experience (symptoms), on the basis of a direct interview of the patient (mental status examination), is very important in this approach to clinical assessment (Schneider, 1959; Jaspers, 1963; Wing *et al.*, 1974).

The *Diagnostic and Statistical Manual of Mental Disorders, 4th ed.* symptom checklist

The *Diagnostic and Statistical Manual of Mental Disorders, 4th ed.* (DSM IV) symptom checklist was used to confirm the diagnosis, on the basis of the PSE (First *et al.*, 1996; First *et al.*, 1997, 2002).

Results

There was a nonsignificant difference in age, marital status, sex, occupation, and education between the patients and the controls (Table 1). There was a significant difference between the different groups in the depression scale of HADS and the physical part of MOS SF-36 (Table 2). There were nonsignificant differences in different items of the PSE (Table 3). There were significant differences in different diagnoses on DSM IV; six patients (20%) of group 1, nine patients (30%) of group 2, and four patients (13.35%) of the case group had a psychiatric diagnosis (Table 4). There were significant differences between the different groups in all items of

MOS SF-36, except physical functioning and role emotional functioning (Table 5).

Correlative study

There was a significant correlation between the depression subscale of HADS and the mental component of MOS SF-36 in the normal and CAD groups ($P = 0.032$ and 0.040, respectively), whereas in the CABG group, there was a significant correlation between the anxiety subscale of HADS and the physical component of MOS SF-36 ($P = 0.014$). In the normal group, age showed a significant correlation with mini mental state examination (MMSE), and HADS depression showed a significant correlation with the HADS anxiety scale ($P = 0.046$ and 0.001, respectively). In the CAD group of patients, age showed an inverse significant correlation with MMSE and PCS ($P = 0.036$ and 0, respectively). There were inverse significant correlations between SF-36 PCS with age and SF-36 MCS with the HADS anxiety scale ($P = 0$ and 0.002, respectively).

Table 1 Demographic data of the patients and the controls

	Normal	CAD	CABG	Total	*P* value
Age					
Number	30	30	30	90	0.071 (NS)
Mean	52	59	56	8	
SD	8	7	6	56	
Occupation					
Not working	7	7	7	21	0.306 (NS)
% within patient group	23.3	23.3	23.3	23.3	
Working nonregular job	4	8	11	23	
% within patient group	13.3	26.7	36.7	25.6	
Working in regular job	19	15	12	46	
% within patient group	63.3	50.0	40.0	51.1	
Sex					
Count of men	16	18	18	52	0.833 (NS)
% within patient group	53.3	60.0	60.0	57.8	
Count of females	14	12	12	38	
% within patient group	46.7	40.0	40.0	42.2	
Marital status					
Count of married	20	19	24	63	0.88 (NS)
% within patient group	66.7	63.3	80.0	70.0	
Count of divorced	3	4	2	9	
% within patient group	10.0	13.3	6.7	10.0	
Count of widow	5	5	3	13	
% within patient group	16.7	16.7	10.0	14.4	
Count of single	2	2	1	5	
% within patient group	6.7	6.7	3.3	5.6	
Education					
Illiterate	5	4	5	14	0.1 (NS)
% within patient group	16.7	13.3	16.7	15.6	
Primary and preparatory school	3	4	3	10	
% within patient group	10.0	13.3	10.0	11.1	
Secondary school	10	11	9	30	
% within patient group	33.3	36.7	30.0	33.3	
Count college or above	12	11	13	36	
% within patient group	40.0	36.7	43.3	40	

CABG, coronary artery bypass graft; CAD, coronary artery disease.

Discussion

The main goal of CABG is to relieve angina and to increase life expectancy. Another important end point is improvement of health-related QOL. The multidimensional complexity of QOL makes this analysis difficult. Prospective studies may isolate the factors that can identify patients at risk of a poor health-related QOL postoperatively. It should, however, kept in mind that the effects of the predictors of outcome are different for the various dimensions of QOL after CABG. Analysis of the demographic composition of the sample indicated that the mean age of the total sample was 55.7 ± 7.6 years. In group 1, the age range was 36–67 years, with a mean of 52 ± 8 years; in group 2, it was 47–79 years, with a mean of 59 ± 7 years; and in group 3, it was 44–68 years, with a mean of 56 ± 6 years. There was no statistically significant difference in age within the three groups. There was a nonsignificant correlation between age and the presence of illness in the three groups as shown by a *t*-test ($P > 0.05$).

A study carried out by Sedrakyan *et al.* (2003) examined the correlation between older age and complications and poorer QOL after CABG. The study included an 18-month follow-up and concluded that age alone does not determine a patient's postoperative QOL. Consistent with the literature, another study by Marzsa (2007) showed that there was a nonsignificant correlation between age and the change in the postoperative quality-of-life scores. The ratio of men : women was 53.3% : 46.7% in the control group 1, 60.0% : 40.0% in group 2, and 60.0% : 40.0% in the case group, with no statistically significant difference between the control and the case groups ($P > 0.05$).The higher

Table 2 Psychometric assessment of the patients and the controls

Patient group	Mini Mental State	Anxiety Scale in HADS	Depression Scale in HADS	MOS SF-36 – Physical Component Summary	SF-36 – Mental Component Summary
Normal					
Mean	29.2	7	7.6	47.1	47.5
SD	0.9	3.9	2.8	7.9	8.7
CAD					
Mean	28.9	8.6	9.4	42.3	43.7
SD	1.4	2.5	3.7	10.1	8.2
CABG					
Mean	29.1	7.3	6.8	48.2	48.1
SD	1.3	3.6	2.3	5.2	5.1
χ^2	0.051	3.102	11.406	6.464	4.527
d.f.	2	2	2	2	2
P value	0.975	0.212	0.003	0.039	0.104

CABG, coronary artery bypass graft; CAD, coronary artery disease; HADS, Hospital Anxiety and Depression Scale; MOS SF-36, Medical Outcomes Survey Short Form item questionnaire.

percentage of men to women is similar to several other international studies that have also shown that men predominantly undergo CABG surgery (Zitser-Gurevich *et al*., 2002; Koch *et al*., 2003; García Fuster *et al*., 2005; Aggarwal *et al*., 2006). Studies in the last decade have largely focused on whether female sex was an independent risk factor for poor outcomes such as mortality and increased length of stay after CABG surgery and are equivocal (Zitser-Gurevich *et al*., 2002; Koch *et al*., 2003). However, current research has now shifted focus to whether the measurements to establish the extent of CAD as well as the management of CAD in women differ from those in men (Raine *et al*., 2002; Anand *et al*., 2005; Jacobs, 2006).

Recent studies that have been carried out to answer this question have found that women, when presenting with acute coronary symptoms such as unstable angina and myocardial infarction, were less likely to undergo coronary angiography and revascularization surgery such as CABG compared with men with similar acute symptoms (Anand *et al*., 2005; Guth *et al*., 2005; Jacobs, 2006).

Guth *et al*. (2005), who examined the influence of sex on surgical outcomes including CABG surgery, reported that women were being underdiagnosed and thus under-

Table 3 Present state examination of the patients and the controls

	Patient group		
	Normal	CAD	CABG
Present State Examination			
Patient not likely suffered mental illness in past year			
Count	12	6	14
% within patient group	40.0	20.0	46.7
Patient has subclinical symptoms			
Count	12	12	11
% within patient group	40.0	40.0	36.7
Patient is likely to be a case			
Count	6	10	4
% within patient group	20.0	33.3	13.3
Patient is a definite case			
Count	0	2	1
% within patient group	0.0	6.7	3.3
χ^2-Tests (*P* value)		0.230 (NS)	

CABG, coronary artery bypass graft; CAD, coronary artery disease.

Table 4 DSM IV Axis I diagnoses in the patients and the controls

	Patient group		
DSM IV Axis I × patient group crosstabulation	Normal	CAD	CABG
Major depressive disorder, single episode			
Count	3	4	0
% within patient group	10	13.3	0.0
Depressive disorder NOS			
Count	0	1	1
% within patient group	0.0	3.3	3.3
Generalized anxiety disorder			
Count	0	3	1
% within patient group	0.0	10	3.3
Anxiety disorder NOS			
Count	3	0	0
% within patient group	10	0.0	0.0
Panic disorder with agoraphobia			
Count	0	0	1
% within patient group	0.0	0.0	3.3
Panic disorder without agoraphobia			
Count	0	1	1
% within patient group	0.0	3.3	3.3
Total	6 (20%)	9 (30%)	4 (13.3%)
χ^2-Tests (*P* value)		0.037 (s)	

CABG, coronary artery bypass graft; CAD, coronary artery disease; DSM IV, *Diagnostic and Statistical Manual of Mental Disorders, 4th ed.*

Table 5 MOS SF-36 in the patients and the controls

Patient group	Physical functioning	Physical role functioning	Bodily pain	General health	Vitality	Social functioning	Role emotional functioning	Mental health
Normal								
Mean	71	65	72	62	58	74	78	66
SD	16	37	22	13	13	15	32	18
CAD								
Mean	64	41	61	49	43	53	67	60
SD	29	37	23	12	18	21	35	13
CABG								
Mean	71	62	81	63	67	74	71	70
SD	16	17	14	12	10	15	24	16
P value	0.889 (NS)	0.012 (S)	0.002 (S)	0.000 (S)	0.000 (S)	0.000 (S)	0.296 (NS)	0.028 (S)

CABG, coronary artery bypass graft; CAD, coronary artery disease; MOS SF-36, Medical Outcomes Survey Short Form item questionnaire; S, significant.

treated because of their atypical presentation of CAD. In terms of marital status, it was found that 66.7% of the patients in group 1, 63.3% in group 2 and 80% in the case group were married. A total of 10% of patients in group 1, 13.3% in group 2, and 6.7% in the case group were divorced. A total of 16.7% of the patients in group 1, 16.7% in group 2, and 10% in the case group were widowed. 6.7% of patients in groups 1 and 2, and 3.3% in the case group were single. There was a nonsignificant difference between the control and the case groups ($P > 0.05$) in the marital status. There was a nonsignificant difference between the control and the case groups ($P > 0.05$) in the level of education; 16.7% of the patients in group 1, and 13.3% in group 2, and 16.7% in the case group were illiterate. A total of 10% of the patients in group 1, 13.3% in group 2, and 10.0% in the case group had completed primary and/or preparatory education. A total of 33.3% of the patients in group 1, 36.7% in group 2, and 30.0% in the case group had graduated from secondary school. Approximately 40% of the patients in both control groups had graduated from university versus 43.3% in the case group. In contrast to the previous findings, Hardarson *et al.* (2001) found that CAD mortality was significantly related to education, even after adjustment for classical risk factors. For men, a 14% reduction was found in CAD mortality among those with high school education relative to elementary school. The figures for junior college and university education were 17 and 38%, respectively. For women, a 34% reduction was found in CAD mortality among those with high school education and 55% among those who had junior college education. On comparing the occupational background, we found that the three groups had the same percentage of patients who were not working. A total of 13.3% of the patients in group 1 and 26.7% of the patients in group 2 were working in a nonregular job versus 36.7% in the case group. There was no statistically significant difference between the control and the case groups ($P > 0.05$). Sumanen *et al.* (2004) found in their research that working-aged people with self-reported CAD had a number of symptoms limiting the quality of their life.

Blom *et al.* (2007) concluded that among women with CAD, all less than 65 years of age, after a cardiac event, those who were working had lower levels of depressive symptoms and better social integration than those who were not working, irrespective of the reasons for being unemployed. There was no significant correlation between marital status and working status on depressive symptoms.

On comparing the three groups in terms of the results of the mini mental state examination, we found a nonsignificant difference; the means of the three groups, 1, 2, and the case group, were 29.2 ± 0.9, 28.9 ± 1.4, and 29.1 ± 1.3, respectively. All scores were within the normal range, which might be because of the relatively younger age of our patients (55.7 ± 7.6 years) and also the relatively brief duration between surgery and assessment, where cognitive problems might occur later. The norms of MMSE were studied by Grigoletto *et al.* (1999). They found that MMSE declined with advancing age, especially among less educated women. Given any age and sex, the norms were higher for individuals with higher educational levels. A study by Farhoudi *et al.* (2010) testing MMSE in 154 CABG patients preoperatively and postoperatively in both on-pump and off-pump, 2-month postoperative neurocognitive impairment was detected in 17 patients of on-pump group (28.8%) and 28 patients of off-pump group (29.4%) ($P = 0.54$). The mean postoperative MMSE scores were not comparable between the groups (25.01 ± 4.49 in the off-pump group vs. 23.73 ± 4.88 in the on-pump group, $P = 0.09$). Researchers at Johns Hopkins (Selnes *et al.*, 2008) compared the cognitive status of 152 patients undergoing CABG and 92 cardiac patients receiving other treatments such as stents or pharmaceuticals. For MMSE, the mean scores at baseline and at 72 months were similar in the two groups. At baseline, 5% of the CABG and 6% of the nonsurgical patients had MMSE scores below normal (<24). From baseline to 72 months, the average within-patient change in the MMSE was a decrease of 0.22 in the CABG group and 0.16 points in the CAD patients.

Lyketsos *et al.* (2006) carried out a study of a population-based cohort that included 5092 individuals 65 years of age and older. Individuals who had undergone CABG surgery at study baseline or had undergone this surgery in between follow-up waves were compared with individuals who had not undergone the surgery using the Modified Mini Mental State, and it was found that participants who had undergone CABG surgery showed a 0.95 point greater decrease relative to the baseline on the Modified Mini Mental State at interview 3 years after CABG and an average 1.9 point greater decrease than those who had not undergone CABG ($t = -2.51$, $d.f. = 2316$, $P = 0.0121$) at the second interview 4 years later. This decrease in the mean scores of the scale was evident 5 years after surgery. The mean of both the normal and the CABG groups was close to the mean of the CAD groups in the subscales of HADS. In the anxiety scale, the mean was 7.0 for the normal group and 7.3 for the CABG group. In the depression scale, the mean was 7.6 for the normal group and 6.8 for the CABG group. All these values were within the range of the normal scale between 0 and 7. In the CAD group, patients had a mean of 8.6 in the anxiety scale and 9.4 in the depression scale, which is higher and is within the range of 8–10, suggestive of the presence of the respective state. Therefore, the mean of both anxiety and depression subscales was higher in the CAD group than the normal and CABG groups. A score of 11 or higher indicates a probable presence (caseness) of a mood disorder. The anxiety scale showed a probable presence of anxiety (score above 11) in 23% of the individuals in the normal group, 30% in the CAD group, and 23% in the CABG groups. The depression scale showed a probable presence of depression (score above 11) in 13% of the individuals in the normal group, 40% in the CAD group, and 10% in the CABG groups.

Ulvik *et al.* (2008) studied a group of patients who had CAD using the HADS, and found anxiety in 26% of the patients and depression in 15% of the participants. There was a nonsignificant correlation between the HADS results and other variables in the normal group. In CAD

patients, there was a nonsignificant correlation in the Anxiety Scale, but there was a significant correlation between the depression scale and the mental component summary of SF-36. There was a significant correlation in the CABG group between the Anxiety Scale of HADS and the SF-36 physical and mental component summaries. This was almost in agreement with the results obtained by Mckhann *et al.* (1997). Whereas preoperative anxiety correlated significantly with health-related QOL 3 months after CABG surgery, correlations between preoperative depression and postoperative QOL were only found for singular scales (Pfaffenberger *et al.*, 2010). Another study tested patients before CABG and 1 month and 1 year after surgery with a series of neuropsychological tests including Centers for Epidemiological Studies-Depression Scale to measure mood. The study found that 27% of the patients had depression before surgery, and statistical analysis showed only minimal correlation or none at all between depression and eight areas of cognitive outcome or between changes in depressed status and cognitive scores. Similar to these results of a decrease in depressive disorders that was reported in a study by Li *et al.*, 2006, depressive disorder occurred in 49.2% of the patients preoperatively and 26.7% of the patients 6 months after the operation. The mean preoperative beck depression inventory score was 5.77, and the postoperative beck depression inventory scores 3 and 6 months after the operation were 4.12 and 3.06, respectively. There were significant differences in different diagnoses on DSM IV; six patient (20%) in group 1, nine (30%) in group 2, and four (13.35%) in the case group had a psychiatric diagnosis, which might indicate the degree of suffering of CAD patients and the beneficial effect of surgery on CABG patients.

The mean of Short Form-36 scores showed better scores overall in the patients in the case group and the normal group than the CAD group in all aspects of QOL, with a significant difference in the PCS ($P = 0.039$), but not MCS ($P = 0.104$), which might indicate the beneficial effect of surgery on QOL, which is similar to the findings in a study carried out by Azzopardi and Lee (2009). The last study showed a statistically significant improvement in the PCS ($P \leq 0.05$) and in five of the SF-36 health domains. Comparison of the 1-year and 2-year SF-36 scores showed a moderate, nonsignificant deterioration in six of the health domains and in the PCS, whereas the Mental Health and the MCS showed a moderate, nonsignificant improvement. The two-year postoperative SF-36 scores were similar to the normative scores of an Australian population with heart disease. Le Grande *et al.* (2006) studied the QOL of patients 5 years after CABG and obtained results similar to those of our study for the mean PCS, which was 45.9, and MCS, which was 54.8. The previous results were different from those of Rumsfeld *et al.* (2004). On comparing CAD findings in our study with the preoperative results of Rumsfeld and colleagues, the mean preoperative MCS score was 44.3, which is close to that of the CAD group. The PCS score was 33.0, which is lower than the value of the CAD group, and, on comparing CABG findings in our study with the postoperative results of Rumsfeld and colleagues, the mean postoperative PCS score was 38.2 ± 10.6 SD, which is lower than our value, and the mean postoperative MCS score was 46.1 ± 9.3 SD, which was close to the value of 48.1 obtained in our study. However, Rumsfeld *et al.* (2004) reported an improvement in PCS and MCS, and our study showed an improvement in PCS alone. This can be due to the nature of the Egyptian people being more concerned about physical health than mental health.

Limitations

The results in the present study should be interpreted in light of the following limitations:

We didn't perform preoperative assessment of CABG patients which stand as baseline for the postoperative one.

Second, assessment of CABG patients was carried out for a short period following surgery; assessment after longer durations (1–2 years) might detect more beneficial effects, especially on cognitive functions.

Third, our sample size was small.

Conclusion

(1) Patients with CADs experience more depression and anxiety than the normal population.
(2) CABG operations might have a beneficial effect in decreasing depression and anxiety and improving QOL in patients with CADs.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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