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Psychological factors, Sexual Dysfunction and Quality of Life in Revascularization Procedures: A Pre and Post Evaluation Study

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Abstract

Objective: The purpose of the present study is to examine the relationship between psychological factors, Erectile Dysfunctional (ED), and quality of life (QOL) before and after Coronary Artery Bypass Graft (CABG) and Percutaneous Transluminal Coronary Angioplasty (PTCA) procedures among Iranian cardiovascular patients.

Method: To do so, one hundred ninety patients, scheduled for CABG and PTCA operations, were selected and administered relevant questionnaires a day before the surgery. Subsequently, the same patients filled out the same questionnaires two months after the procedure.

Results: Data analysis showed an increase in Qol, while revealing a decline in sexual functioning among men and no change in women after the PTCA procedure.

Conclusion: Also, the results showed an improvement in psychological status of all patients following both revascularization procedures.

Keywords: revascularization; quality of life; erectile dysfunction, psychological status

Introduction

People with coronary artery diseases (CAD) suffer from angina, shortness of breath, fatigue and dizziness with or without the onset of physical activity, and a diminished ability to perform their daily activities. There are safe and effective methods used in the treatment of coronary artery disease are Coronary Artery Bypass Grafting (CABG) and Percutaneous Transluminal Coronary Angioplasty (PTCA). The CABG is a procedure that not only diminishes the negative effects of coronary artery disease and reduces the risk of further damage to the heart (i.e. myocardial infarction or congestive heart failure), but also improves patient's health related quality of life (QoL). The PTCA is also a beneficial procedure to alleviate symptoms resulting from coronary artery blockage. In this procedure, special tubing with an attached deflated balloon is threaded up to the coronary arteries. The balloon is then inflated in order to enlarge areas where blood flow to the heart muscle has been blocked or reduced. Similar to the CABG, quality of life has also been reported to improve following PTCA procedure (Blankenship et al., 2012).

Although a number of studies have reported that patients' health-related quality of life improve after CABG (Thomson, Niven, Peck, & Eaves, 2013)

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and PTCA (Levine et al., 2011), operated patients report array of psychiatric disorders, namely depression, anxiety, cognitive functions, and sleep disorders, as well as experiencing many physical problems and relative disabilities such as erectile dysfunction (ED) (Schumann, Zellweger, Di Valentino, Piazzalonga, & Hoffmann, 2010; Karkos et al., 2004). For example, Pignai-Damaria et al. (2003) have equated the importance of the effects of such disorders on the cardiovascular system to those of patients smoking and hypertension, thus, stressing the need for their early detection and treatment. They have also pointed out that these psychological disorders can exacerbate treatment outcomes following an intervention treatment procedure which lead to a marked decrease in quality of life.

In addition to psychiatric disorders, CABG and PTCA may impact cognitive functioning. For example, Bergh et al. (2002) have reported that patients, undergoing the CABG and PTCA treatment, experience significant deterioration in memory one to two years following the operation. Moreover, Ahlgren, Lundqvist, Nordlund, Aren, and Rutberg (2003), in a study to evaluate and compare neurocognitive function and driving performance after CABG and PTCA, concluded that although a decline in cognitive functioning was evident in both groups, it was more severe in the CABG group than in the PTCI group.

Another problem associated with CABG and PTCA procedures is the development of sleep disturbances. Fernandes et al. (2014), for example, in a study of patients successfully undergone percutaneous coronary intervention (PCI), reported sleep disturbances. Also, Gustafsson and Hetta (2002) have shown patients undergone PTCA, one year after the procedure, exhibited fragmented sleep because of psycho-physiological symptoms associated with this procedure. Obviously lack of sleep or poor sleep quality can cause great emotional distress and reduce energy in cardiac patients undergone various revascularization procedures, and can significantly impede their recuperation process which ultimately decreases their QoL.

As mentioned before, one physical problem that can develop following treatment intervention procedures is ED. By Definition, the inability to achieve or maintain an erection required for satisfactory sexual performance is called Erectile Dysfunction (Rosen, 2001). Psychogenic factors that cause ED include anxiety and depression, among others. For instance, Altof (2002) has reported that ED is strongly associated with anxiety, depression, marital conflicts and relationship problems. Laumann et al. (1999) have also noted that health status, stress, life satisfaction, deterioration of general health and emotional functions are strongly correlated with sexual dysfunction. Furthermore, Idung, Abasiubong, Udoh and Akinbami (2012) have concluded that social relationship and psychosocial well-being and domains of Qol of men with ED are particularly impaired (Tsai, Chang, & Hwang, 2008; Litwin, Li, & Bridge, 1998). As such, ED is considered a major quality of life (QoL) issue, and indeed, a major health indicator, particularly in individuals with cardiac problems.

The results of studies examining the impact of treatment intervention procedures on ED are contradictory. For example, Akbulut et al. (2008) reported that following CABG operation, ED improves, thereby; enhancing quality of life of the afflicted patients suggesting that ED is an essential component of QoL and that coronary artery bypass surgery can have considerable influence on erectile function. Similarly, Heaton, Evans, Adams, Smith and Morales (1996) have cited significant

improvement following CABG. On the other hand, Foruzan-Nia, Abdollahi, Hekmatimoghaddam, Namayandeh, and Mortazavi (2011) have reported that the rate of sexual dysfunction increases from 20.1% prior to the surgery to 76.4% after the procedure. Therefore, it appears that CABG procedures do not necessarily enhance ED and that other factors are involved in the enhancement of ED after the operation.

Reports are also contradictory and scant regarding the effects of PTCA on ED. In one study, Karkos et al. (2004) showed that none of the patients undergone PTCA developed ED. Yet, the results of another study indicated that 64% of the patients, eight years after undergoing PTCA, experienced more satisfaction with their sexual functioning than before the procedure (Lukarinen & Lukarinen, 2007). Therefore, no clear and concrete conclusion can be drawn about the effects of this procedure and its ensuing effects on ED.

Because of the false perception of cardiac surgery being a life threatening procedure, a great deal of stress and anxiety can develop before and after the intervention. For example, Chadhury, Sharma, and Pawar (2006) have reported a high prevalence of anxiety and depression in patients undergoing CABG, both before and after surgery. Furthermore, Rymaszewska , Tulczynski, Zagrobelny, Kiejna, and Hadryś (2003) have noted high levels of depression and state trait anxiety before the CABG that appear to be predictors of postoperative psychological outcome. Additionally, Krannich et al. (2007) have found different levels of anxiety and depression before and after CABG depending on the age of patient.

Similar reports have also been made regarding the PTCA procedure. Specifically, Zhao, Lou, Wang and Sue (2008) have reported high prevalence of anxiety and depression rates in patients undergoing PCI, compared to the general population. They maintain that the reduction in anxiety and depression levels from pre to post PCI indicates that patients are under tremendous psychological strain before PCI. Also, Austin, Jones and Thompson (2005) have stressed the need for measuring anxiety and depression following the PTCA intervention given that preoperative anxiety and depression can negatively influence postoperative recovery.

Regarding the assessment of psychological status and the QoL of patients before and after CABG and PTCA, data is very scarce. In this regard, only one study was found in which QOL, mood state, and physical functioning of patients were compared in both groups of pre and post operated. In this study, Papadonaki, Stotts, and Paul (1994) reported that mood state and physical functioning were improved following both procedures, while QoL was similar in both groups before the operation and did not change after both procedures.

In sum, cardiac patients requiring revascularization procedures tend to perceive these procedures as a life threatening event that can cause a great deal of psychological burden on them. These problems are closely tied into other aspects of their lives such as ED which is a major health indicator and is considered a major element of QoL. As such, the present study attempts to address the interrelationship between psychological factors, ED, and Qol, before and after CABG and PTCA procedures, among Iranian samples of cardiovascular patients. To this end, the following questions will be addressed:

-What is the relationship between psychological factors and QoL in patients undergone CABG and PTCA before and after the surgery?

-Are there any gender differences in sexual functioning before and after CABG and PTCA?

-What is the psychological status of men and women before and after CABG and PTCA?

METHODS

Participants

The average age of participants was 60.45 (± 3.4) years old. One hundred eighty patients who referred to Baquiatallah and Tehran Heart Center hospitals for CABG and PTCA operations were randomly selected. Criteria for entering the study included: (1) CAD treated with elective CABG or PTCA, (2) age less than 70 years old, and (3) ability to fill out questionnaire. Following preliminary stages of admission to the hospital and obtaining patients' informed written consent, patients in CABG (n=90) and PTCA (n=90) groups were administered relevant questionnaires one day prior to their surgeries. Specifically, during the pre-test period patients were asked to answer relevant questionnaires to assess anxiety, depression and stress (DASS-21), QOL (Short Form of Health Survey, (SF-36), ED in women (Female Sexual Function Index (FSFI), and ED in men (IIEF). The same procedure was repeated, with the same patients, two months after the surgery. Eventually, data were obtained from a total of one hundred-fifty subjects. Specifically, in the CABG group, one subject died, five patients had post-operation complication (stroke) and ten did not return questionnaires (n=74). Similarly, in the PTCA group, three patients had unsuccessful procedures, eight did not return questionnaires, and three opted to discontinue their participation (n=76).

Statistical Analysis

Statistical analyses were performed by SPSS version 18.0 (SPSS, Chicago, IL, USA). Data were analysed using Pearson's correlation and paired sample t-test.

Assessment

Assessment of QoL: QoL was assessed by means of the Short Form Health Survey (SF-36) questionnaire, which is a reliable and valid instrument for assessment of QOL in older people. The SF-36 includes 8 subscales namely: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH). Scores range from 0 to 100 for each subscale with higher scores indicating a better condition. The questionnaire was normalized in Iran by Montazeri, Goshtasebi, Vahdaninia, & Gandek (2005) and its Test-retest correlation coefficient (with an interval of 14 days) was significant with r= 0/76 and P=0/0006.

Assessment of Erectile Dysfunction in Men: To assess men's erectile dysfunction, the abridged form of The International Index of Erectile Function (IIEF-5) questionnaire, a multi-dimensional self-report ordinal instrument, where lower values indicate lower sexual function, was used. Reliability of this questionnaire in the present population was obtained using a test-retest procedure within a 30-day time interval. The Cronbach's alpha was 0.82 which is indicative of its high reliability. The subjects' ED was measured and categorized according to severity based on their IIEF score: severe dysfunction (score 5-10); mild to moderate dysfunction (score 11-15); mild dysfunction (score 16-20); and no dysfunction (score 21-25).

Assessment of Sexual Dysfunction in Women: To assess female sexual dysfunction, the scale of FSFI was used. This is a brief questionnaire designed to measure sexual functioning in women

with a specific focus on sexual arousal, orgasm, satisfaction, and pain. The questionnaire, assessing sexual functioning with 19 questions, consists of six sexual domains; sexual desire (questions 1 and 2), arousal (questions 3–6), lubrication (questions 7–10), orgasm (questions 11–13), satisfaction (questions 14–16) and degree of pain (questions 17–19) during intercourse. For each six domains, a score is calculated and the total score is obtained by adding the six domain scores. The validity of each six domain, sexual desire, arousal, lubrication, orgasm, satisfaction and degree of pain, was assessed in an Iranian population, which were 0.7, 0.9, 0.9, 0.91, 0.76 and 0.88, respectively (Mohammadi, Heydari, & Faghihzadeh, 2008). The Cronbach's alpha was reported as 0.85 which is indicative of its high reliability. The total score range is 2–36. A total score of more that 25 is considered normal female sexual function and a total score of less than 25 is considered sexual dysfunction.

Assessment of Anxiety, Depression and Stress: The Depression Anxiety Stress Scale - DASS-21 (Lovibond & Lovibond, 1995) is a 21-item self-report measure that provides continuous scores on three subscales of depression, anxiety, and stress, recorded for the past week. Items are scored from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). High levels of severity on this measure are indicated by scores of 20, 14 and 26 or greater for depression, anxiety and stress, respectively. In the development of the measure, individual scales yielded Cronbach's alphas of 0.94, 0.87 and 0.91 for depression, anxiety and stress respectively.

All questionnaires used in the present study were translated from English into Persian and, subsequently, back-translated into Persian by an expert in the field who had a good command of the English language. As such, their validity and reliability were measured and were found to be adequate for use in our population.

To assess normality of data Kolmogorov Smirnov test was used.

RESULTS

Table 1 illustrates the correlation between quality of life and stress before and after PTCA and CABG procedures. As shown, the correlation coefficient scores before and after the PTCA (rb =-0.8; ra= -0.56) were transformed to Fisher's z score in order to compare stress and Qol, before and after the surgery. Results showed an inverse significant relationship between stress and Qol given that the obtained z score (z= -2.67) is greater than 1.96 ($p<0.05$, z= 1.96) indicating that decreasing stress following PTCA causes an improvement in Qol. No significant relationship between anxiety and depression and Qol was evident in this group. Regarding the CABG, no significant relationship between psychological factors and Qol was observed.

Table 2 illustrates the comparison of mean scores of sexual functioning of men and women before and after CABG and PTCA procedures. Results of a paired t-test indicate a significant difference ($p<0.05$) in the mean scores of men's

Table 1. Correlation of quality of life and stress before and after PTCA and CABG procedures

Stress QOL	Before	After
CABG	-.696*	-.695* (-0.01)
PTCA	-.800*	-.565* (-2.67) **

*Correlation was significant: *p<0. 05; Numbers in parenthesis are Fisher's r to Z transformation comparing correlation between Qol and stress before and after revascularization procedures. **p<0.05 compared with pre-surgery values using r transformation to Fisher's z.

sexual functioning before and after PTCA, while no significant difference was shown in women's sexual functioning. Regarding the CABG, no significant difference in the mean scores of men's and women's sexual functioning was observed.

Table 3 illustrates psychological status of men and women before and after CABG surgery. A paired sample t-test was performed to determine the difference in the mean scores of psychological factors before and after surgery. According to this table, significant differences ($p<0.05$) were observed in men and women in all psychological factors prior to and following the surgery.

Table 4 illustrates psychological status of men

Table 4. Psychological status of men and women before and after PTCA surgery

Gender	Men				Women			
Variables	Before		After		Before		After	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Stress	15.87	5.07	13.27	3.84*	15.03	5.21	11.48	4.24*
Anxiety	11.32	3.84	8.20	3.25*	11.06	3.62	7.19	3.20*
Depression	12.82	5.10	9.70	4.23*	11.48	4.90	8.87	4.370*

Post-surgery mean values were significantly different from those of Pre-surgery (paired-samples t test): *P>.05

Table 2. Comparison of sexual functioning of men and women before and after CABG and PTCA procedures

Group	CABG				PTCA			
Gender	Before		After		Before		After	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Men	14.10	5.44	14.68	4.43	19.12	3.42	16.15	4.57*
Women	18.06	6.92	17.98	5.72	20.77	6.74	20.08	4.85

Post-surgery mean values were significantly different from those of Pre-surgery (paired-samples t test): *P>.05

Table 3. Psychological status of men and women before and after CABG surgery

Gender	Men				Women			
Variables	Before		After		Before		After	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Stress	17.78	5.61	11.21	4.28*	18.70	6.14	12.46	5.03*
Anxiety	12.86	3.66	9.18	3.32*	12.26	4.18	8.60	3.42*
Depression	14.1	5.25	10.50	4.91*	15.16	5.36	10.50	4.60*

Post-surgery mean values were significantly different from those of Pre-surgery (paired-samples t test): *P<.05

and women before and after PTCA surgery. A paired sample t-test was used to determine the difference in the mean scores of psychological factors before and after surgery. According to the table, significant differences ($p<0.05$) were observed in men and women in all psychological factors prior to and following the surgery.

Discussion and conclusion

The findings of the present study showed a significant increase in Qol due to a reduction in stress following the PTCA surgery. Also, our results showed a decline in sexual functioning among men after PTCA procedure, while staying the same in women. Furthermore, in terms of psychological factors such as depression, anxiety and stress, our results showed that following both revascularization procedures, they were all reduced in both men and women.

The fact that Qol was increased as a result of a decrease in stress following successful PTCA is consistent with the findings of Blankenship et al. (2012) that reported an improvement of QoL following PTCA. One explanation for this finding is that the reduction of stress after PTCA could be due to the false perception of this type of surgery as being a life threatening procedure. Specifically, patients, at first, might have had a frightening view of the procedure and following the surgery they came to know about the less invasive nature of it compared to that of CABG's, which led to the decline of their stress.

Regarding the sexual functioning of patients, our results indicated that men's sexual functioning worsened after PTCA, while not changing after CABG, whereas in women there were no changes after either procedures. The fact that worsening of sexual functioning was observed in men after PTCA is supported by the findings Karkos (2004) that noted the deterioration of sexual functioning following open and endovascular procedures. Wahrborg (1998) also found no difference in the sex life of patients undergone PTCA. One explanation for our result might be related to a "false" and unrealistic expectation patients may have regarding their physical functioning as a whole before the operation. Specifically, they might mistakenly think that all aspects of their lives, including their sexual functioning, should and will improve once the surgery is completed.

On the other hand, in one study, Lukkarinen and Lukarinnen, in an eight-year follow-up of sexual functioning of CABG and PTCA patients, reported an improvement in men's sexual satisfaction. As such, these contradictory reports might imply that sexual functioning in patients with CAD operations might be a "time-related" phenomenon which can vary with the passage of time. Specifically, it could be that improvement in sexual functioning requires long periods of time, and since in our study this function was measured two months after the surgery, enough time was not given for its improvement, therefore different outcome was observed. This finding can be clinically important in that sexual counselors and health psychologists can inform their patients of this fact in order to prevent the development of any false beliefs or expectations which can potentially cause them distress during the recuperation period following the surgery. As such, longitudinal studies are needed to explore this possibility.

In terms of the status of psychological factors in CABG and PTCA, the fact that depression, anxiety and stress decreased following successful operation is somewhat surprising given that a large body of evidence indicate an increase in psychological status of patients (Herbegue, Lahidheb, Labbene, & Haouala, 2014; Saur, et al., 2001; Doering,

Chen, McGuire, Boda, & Irwin, 2014; Gaw-Ens, 1994). Nevertheless, our findings could imply that pre-operation emotional distress might simply be due to a lack of knowledge of the surgery and perceiving them as being a life threatening event. This finding can have implications for health psychologists and mental health professionals in that educating patients, who are candidate for these surgeries, about the nature of the procedure prior to the operation can have a significant impact on their health status before the surgery and reduce their discomfort to a large extent. As such, educational sessions regarding revascularization procedures must be provided in order to ensure patients of the safety and effectiveness of these operations. In fact, the more knowledgeable the patients are about CHD, the more the possibility of addressing psychological issues will be. Furthermore, given that depression is linked to poor medical compliance (an essential behavior for patients undergone cardiac procedures to conform to) and other risk factors for cardiac heart diseases, the present results are important findings which can not only increase the quality of life, but also may reduce the rate of mortality and morbidity following the intervention.

Compliance with Ethical Standards

Informed Consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of1975, as revised in 2000. Informed consent was obtained from all individual participants included in the study.

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