

Sexual Function and Psychological Status among Males and Females with Ischemic Heart Disease

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ABSTRACT

Introduction. Patients with coronary artery disease (CAD) may also suffer from mental and sexual problems, and we should consider the mutual influence such conditions have on each other. However, the interrelation between sexual and mental problems in the context of CAD has not been fully investigated, especially when it comes to gender.

Aim. Our aim was to evaluate sexuality and psychiatric symptoms among patients with CAD and the relation between them in each gender.

Methods. In this cross-sectional study, 550 (397 men and 153 women) patients with documented CAD were surveyed for anxiety and depression using the hospital anxiety and depression scale (HADS) self-administered questionnaire as well as the relation and sexuality scale (RSS). Three subscores were calculated for sexual function, frequency, and fear, with higher scores indicative of a poorer condition.

Main Outcome Measures. The HADS and the RSS.

Results. Depressive symptoms and anxiety were more severe among our female subjects than they were among the male ones. In addition, the scores for sexual frequency, sexual function, and the total RSS were significantly higher in women, while men had a significantly higher score for sexual fear. The total RSS score correlated with depressive symptoms in women ($r = 0.19$, $P = 0.03$), but not in the male subjects. Considering the subscores, a higher score for sexual frequency correlated with depressive symptoms in both genders; however, being afraid of sexual relation correlated with depressive symptoms only in men with CAD and their spouses ($r = 0.18$, $P = 0.001$).

Conclusion. We found that women with CAD have poorer sexual relation and more severe depressive symptoms than men do. Among men with CAD and their wives, fear of sexual relationship is a more serious problem. Such gender-specific characteristics and their interrelations ought to receive due consideration in the management of CAD. **Kazemi-Saleh D, Pishgoo B, Farrokhi F, Fotros A, and Assari S. Sexual function and psychological status among males and females with ischemic heart disease. J Sex Med 2008;5:2330–2337.**

Key Words. Sexuality; Coronary Artery Disease; Psychiatric Symptoms; Depression, Anxiety; Gender

Introduction

There is now corroborative evidence that a poor quality of life, depression, and anxiety are associated with a higher morbidity rate in coronary artery disease (CAD) [1–3]. In line with these facts, some investigators have shown that the treatment of mental problems, such as depression, can reduce cardiac mortality [4,5]. Sexual function

is another factor associated with CAD [6]. It is proposed that mental health, sexual function, and CAD are in fact interrelated [7]. Sexuality is an important component of quality of life that can alter the patient's health status. Nonetheless, only a small proportion of the patients receive sexual counseling [6,8,9,10]. In contrast to what is generally presumed, sexuality is important to many older adults and physicians need to appreciate

patients' perception of their health needs, sexual activity being one of them [6,10].

Since the 1970s, research on quality of life and sexual relations in unhealthy conditions, such as CAD, has gained momentum; however, most of the studies have focused mainly on men, and there are, indeed, very few reports on the sexual life of women with cardiac disease[8]. Differences in the behavioral and physiological characteristics of men and women are thought to be reflected in their health problems and needs. Consequently, multidisciplinary management in patients with CAD is required with special attention to the sexual and mental health of each gender.

Aim

We designed our study to investigate the correlation between psychiatric symptoms and sexuality in men and women with CAD.

Methods

Patients

In this cross-sectional study, we evaluated sexuality in patients with CAD and examined its relation with anxiety and depression. The study was approved by the local ethics committee of Baqiyatallah University of Medical Sciences and informed consent was obtained from all the subjects selected from among married patients referring to Baqiyatallah General Hospital for cardiac angiography or those who presented to the clinics with documented CAD. As the majority of our patients were married and the answers of unmarried individuals about their sexual activity could be unreliable because of their reluctance and cultural boundaries, we selected only married patients. The exclusion criteria were myocardial infarction (MI) or hospitalization during the previous 6 months. Also, patients who refused or were reluctant to answer questions about their sexual relations or psychological status were excluded from the study.

A randomly selected control group consisting of 100 married individuals was selected. They were individuals in the same age range as our patients. We have performed a large study in which a series of questionnaires have been used for married patients with specific diseases, one of them being CAD. For comparisons with a healthy population, we approached 790 married individuals in a subway station, of whom 510 people accepted to

participate in the study and provided informed consent. According to a self-reporting measure that evaluates the presence of 13 chronic illnesses [11], 447 did not report any degrees of the 13 chronic illnesses including heart disease. They were considered "healthy individuals," and a computerized random selection was conducted from among 326 of them who were in the age range similar to our patients.

Main Outcome Measures

In addition to questionnaires on the sociodemographic and clinical characteristics of the patients that were filled out by the visiting research assistant, two self-administered questionnaires were completed by the patients after instructions given by a trained sex-matched research nurse. A translation of the Hospital Anxiety and Depression Scale (HADS) [12] was used, comprising 14 statements relevant to generalized anxiety (7 items) and depression (7 items). This translated version of the HADS has been reported to be acceptable to almost all patients, with a Cronbach's alpha coefficient of 0.78 for the HADS anxiety subscale and 0.86 for the HADS depression subscale [13], and has been repeatedly used in our country [14,15].

Each item had four possible answers with scores ranging from zero to 3. The maximum score was 21 for each scale. The Zigmond and Snaith cut-point of greater than 8 was considered for the assessment of depression and anxiety [12]. Furthermore, the total score was calculated as the total HADS score. The Cronbach's alpha was 0.815. The individuals in the control group also answered the HADS questionnaire and the results were compared with those of patients with CAD.

In order to evaluate the alterations in the patients' sexual relationship since the onset of CAD, we used the relation and sexuality scale (RSS) questionnaire (see Appendix) [16,17]. The RSS questionnaire translated into Farsi had been back-translated and previously used in an outpatient setting in our country [18]. The RSS questionnaire evaluates the sexual relationship of a patient in relation to that before the onset of the disease. In addition to the total score; three subscores, namely sexual function, sexual frequency, and sexual fear, were assessed. Items 1, 2, 3, 7, and 8 were used for the sexual function; 4, 9, and 10 for the sexual frequency; and 5 and 6 for the sexual fear. The Cronbach's alpha was 0.802 for the total RSS, 0.861 for the sexual function, 0.820 for the sexual frequency, and 0.769 for the sexual fear.

Table 1 Psychiatric symptoms and sexual relationship disorders in men and women with coronary artery disease (CAD)

Characteristics	Men	Women	Total	P
Anxiety	66 (16.6)	70 (45.8)	136 (24.7)	<0.001
Depression	38 (9.6)	31 (20.3)	69 (12.5)	0.001
Sexual relation since CAD diagnosis				
Negatively affected (score > 0)	301 (75.8)	125 (81.7)	426 (77.5)	0.14
Disease reduced sexual desire (score > 1)	258 (65.0)	119 (77.8)	377 (68.5)	0.004
Treatment reduced sexual desire (score > 1)	245 (61.7)	117 (76.5)	362 (65.8)	0.001
Unsatisfied with kisses and hugs frequency (score > 2)	38 (9.6)	28 (18.3)	66 (12.0)	0.005
Afraid of intercourse (score > 1)	37 (9.3)	7 (4.6)	44 (8.0)	0.07
Partner afraid of intercourse (score > 1)	55 (13.9)	3 (2.0)	58 (10.5)	<0.001
Decreased frequency of intercourse (score > 2)	246 (62.0)	128 (83.7)	374 (68.0)	<0.001
Decreased possibility to reach orgasm (score > 2)	246 (62.0)	127 (83.0)	373 (67.8)	<0.001
Unsatisfied with sexual relation (score > 2)	38 (9.6)	29 (19.0)	67 (12.2)	0.003
No intercourse in previous 2 weeks (score > 3)	204 (51.4)	111 (72.5)	315 (57.3)	<0.001

Statistical Analyses

The chi-square was used for comparisons of the HADS and the RSS dichotomous variables between men and women. The independent sample *t* test was used for comparisons of the HADS and the RSS quantitative variables between men and women. The Pearson correlation test was utilized to evaluate correlations between variables with normal distribution with the aid of SPSS software (Version 13.0, SPSS Inc., Chicago, IL, USA). A *P* value less than 0.05 was considered significant.

Results

Of 680 patients who met our criteria, 19.2% refused to answer or were reluctant, so they were excluded; 550 (80.8%) filled out the questionnaires and were enrolled in the study. Of these patients, 397 (72.2%) were men and 153 (27.8%) were women. The mean age of the patients was 57.0 ± 10.9 (range, 31–99) years. The mean ages of the men and women were not significantly different (57.3 ± 11.5 years vs. 56.4 ± 9.4 years; $P = 0.42$). Of the 100 individuals in the control group, 65 (65%) were men and 35 (35%) were women. The sex distribution was not different between the patients with CAD and the controls ($P = 0.15$). Also, the two groups were not different regarding their age ($P = 0.54$). The mean age of the control individuals was 56.4 ± 4.0 years (56.7 ± 4.2 years in the men and 55.7 ± 3.5 years in the women, $P = 0.24$).

According to the HADS, 136 patients with CAD (24.7%) and 13 healthy individuals (13.0%) had anxiety ($P = 0.01$). Depression was identified by the HADS in 69 (12.5%) and 5 (5.0%) of the patients and healthy controls, respectively ($P = 0.03$). The effect size was 0.41 for this significant

difference. Also, anxiety and depression rates were 45.8% and 20.3% in the women with CAD and 2.9% and 8.6% in the healthy female controls, respectively ($P < 0.001$; $P = 0.007$). The effect sizes for these differences were 0.99 and 0.05, respectively. These rates were 16.6% and 9.6% in the men with CAD and 15.4% and 6.2% in the healthy males, respectively ($P = 0.80$; $P = 0.37$).

In patients with CAD, the anxiety and depression measured by the HADS were more common among women (Table 1), and overall psychological condition in women (total HADS) was poorer (Table 2). In addition, the sexual frequency, sexual function, and total RSS scores were higher in women, indicative of their poorer sexual function, frequency, and overall relationship; the negative effect of the disease on the sexual relations, decreased sexual desire since the disease or the treatment, decreased frequency of kisses and hugs, intercourses, and orgasms, and decreased satisfaction (factors used to assess the sexual frequency and sexual function) were more common among women (Table 1). However, men with CAD and their spouses were more afraid of sexual activity, as shown in Tables 1 and 2 (the mean scores for sexual fear).

Table 2 Scores for hospital anxiety and depression scale (HADS) and relationship and sexuality scale (RSS) in men and women with coronary artery disease*

Characteristic	Men	Women	P
Total HADS	10.6 ± 6.5	17.1 ± 7.7	<0.001
Anxiety	5.9 ± 5.1	10.7 ± 6.3	<0.001
Depression	4.7 ± 3.1	6.4 ± 3.1	<0.001
RSS			
Sexual function	10.3 ± 3.3	11.8 ± 2.9	<0.001
Sexual frequency	5.5 ± 2.2	6.6 ± 2.3	<0.001
Sexual fear	0.7 ± 1.5	0.3 ± 1.3	0.001
Total sexual relationship	16.5 ± 4.8	18.6 ± 3.8	<0.001

*Values are demonstrated as mean \pm standard deviation. Higher scores are indicative of worse conditions.

Table 3 Correlations of sexual relation indicators with mental health status in men and women with coronary artery disease*

Scales	Sexual function		Sexual frequency		Sexual fear		Total RSS	
	Men	Women	Men	Women	Men	Women	Men	Women
Anxiety	0.06 (.26)	0.05 (.58)	0.02 (0.78)	0.07 (0.41)	0.03 (0.59)	0.04 (0.64)	0.06 (0.26)	0.09 (0.29)
Depression	-0.04 (0.46)	0.12 (0.17)	0.20 (<0.001)	0.10 (0.04)	0.18 (0.001)	-0.08 (0.39)	0.11 (0.05)	0.19 (0.03)
Total HADS	0.03 (0.60)	0.09 (0.32)	0.11 (0.06)	0.13 (0.14)	0.11 (0.05)	0.003 (0.97)	0.10 (0.07)	0.15 (0.08)

*Values are correlation coefficients and those in parentheses are *P* values.
HADS = hospital anxiety and depression scale; RSS = relationship and sexuality scale.

Table 3 depicts the correlations between sexual relationship scores and the HADS scores in men and women in our sample. While there was no association between the anxiety score and the sexual relation scores, depression score was linked with some of those. The total RSS score had a strong relationship with the depression score in women, but a marginal relationship in men. Concerning the RSS subscores, the depression score correlated with the sexual frequency scores in both genders, but not with the sexual function, showing that both men and women with CAD with more severe depressive symptoms had a lower frequency of sexual activity but not necessarily an impaired sexual function. Regarding the RSS item 5, depression score correlated with being afraid of sexual activity in the CAD men ($r = 0.19$; $P = 0.001$). Fear of sexual activity in this group was strongly associated with that in their spouses ($r = 0.57$; $P < 0.001$); hence, the sexual fear score, which was a sum of the fear scores in both the patient and the spouse, also correlated with depressive symptoms in the CAD men (Table 3). On the contrary, the sexual fear score was not associated with any of the HADS scores in CAD women in our sample (Table 3).

Discussion

In the present study, we observed that depressive symptoms and especially anxiety were more common among women with CAD than in female healthy individuals. Although the effect size of the difference was low, depression, as surveyed by the HADS, was more than twice as common in women with CAD as that in female healthy individuals. In men with CAD, however, depression and anxiety were not more frequent than that in healthy men. We can speculate that CAD might be accompanied by an increase in the rate of mental problems in women, but not in men. Concerning gender differences within the CAD group, we found the same results; among patients with CAD, women suffered from psychological symptoms more than

men did. In general, the prevalence of depressive symptoms was found to vary between 18% and 27% among patients with CAD [7]. Schleifer and colleagues studied 283 patients with CAD and found that 18% of them were suffering from major depression and 27% from minor depression after MI [19]. Diagnostic approach for mental problems and the severity of CAD varies in the aforementioned studies. Furthermore, the literature lacks a comparison of these patients with healthy individuals in large scales. However, in agreement with our results, there is a consensus that depression and anxiety are two major mental factors that cannot be neglected in patients with CAD, especially in women [7].

It has been well documented that health-related quality of life and overall satisfaction are poorer in women with CAD or MI than they are in men [9,20]. There are a few studies that have focused on the differences in mental health indicators between men and women. For instance, Wiklund and colleagues followed 421 men and 174 women for 1 year following an MI and found that women complained of fatigue, weakness, psychosomatic symptoms, and anxiety more frequently than men did [20]. Other investigators have added worse psychosocial adjustment, higher levels of depression, and later returning to work to the aforementioned list [21–23]. In concert with these findings, anxiety and depressive symptoms were seen in about 46% and 20% of the women in our series, all being remarkably higher than those in men with CAD in our sample. The fact that patients with depression have eight times greater risk of cardiac death [1] may partly explain the lower survival rates of female CAD patients [8]. Treatment of depression, therefore, and in the same way, other mental problems of women, might reduce the gap between the two genders in terms of CAD outcomes [1,9].

Asadi-Lari and associates came up with different results in search of gender differences in health needs of patients with coronary disease. In their research, the mental component of health-related

quality of life was poorer in women, but men suffered the same levels of anxiety and depression as women did [9]. This raises suspicion of an impact of other mental health components. We found that CAD women were more dissatisfied with their sexual function, frequency, and overall satisfaction. We used the RSS questionnaire, which focuses on the subjects' perspectives on their sexual relationship since the onset of a disease, rather than the organic aspect of sexual dysfunction [13,14]. Therefore, our results show that women, in comparison with men, tend to find their unfulfilled sexuality more annoying. In men, erectile dysfunction (ED) has been fully described and gained clinical attention in relation to CAD, especially since the introduction of oral agents, such as sildenafil [24–28]. However, sexuality in women with CAD has been neglected. In an interesting report on patients' attitudes, it was demonstrated that 64% of women with CAD believed that “physicians should talk with their patients about sexual functioning.” On the other hand, compared to men, women showed more reluctance to talk about their sexual activity. Also, they felt that their physician was not comfortable to open the issue [6]. In a totally different cultural setting, our findings were supportive of the above studies, showing that women with CAD suffer from impaired sexual activity even more than men.

Fear of sexual intercourse and the risk of death or cardiac injury is common in CAD patients and their partners [25,29]. Surprisingly, we found that in contrast to sexual frequency and function, fear of sexual activity is more frequent in men with CAD and their spouses. There is a scarcity of evidence on this aspect and its gender differences. One study showed that 20% of women were afraid of sexual activity after a cardiac event [30]. In men, it has been shown that inhibited enjoyment is strongly related to depression [31]. A vicious circle of fear and depression has been reported to worsen the health status of men [1], and a two-way mutually reinforcing relation was proposed by Goldstein between depression and ED, for which both psychological and organic mechanisms can be postulated [7]. We found that only in men with CAD, depression correlates with fear of sexual intercourse in the couple. It can be speculated that fear of sexual intercourse, a mental factor in the context of CAD, may be a disturbing factor for the couple's sexual relation that is ultimately linked with depression in men. The presence of such relations in men rather than in women is suggestive of the need for different management strategies in each gender.

Several studies have demonstrated that sexual activity in stable CAD patients is not associated with a considerable absolute risk [26]. Generally, it is estimated that the metabolic equivalent of energy expenditure for intercourse is similar to that for exercise of a moderate degree [32]. Moreover, an intriguing study has depicted that sexual activity has a protective effect on men's health and that it lowers mortality in the long run [33]. Thus, resumption of sexual activity—of course with due care—should be advised. Successful sex therapy has been reported in CAD couples by attention to the patients' fears, fantasies, and sexual desires [29]. In line with our findings, it has been demonstrated that ED in men, developed after CAD, could be improved significantly by sexual counseling and raising patients' self-confidence and removing their fears [29]. Physicians should pay enough attention to the attitudes of the patients and their spouses toward the cardiac risk of intercourse. Men with CAD, and especially their wives, seem to be afraid of having intercourse. They need to be assured that they can continue their sexual activity.

In our study, depression was a factor linked with the frequency of intercourse in CAD patients, but not the sexual function component of their relations. Also, we found that the overall sexuality of women correlated with their severity of depression. Most studies have focused on the relation between sexual dysfunction and depression in men with CAD, while women with CAD are more frequently involved with these conditions. We can emphasize the “mutually reinforcing triad” between CAD, depression, and sexual problems in women as shown previously in men [7]. It seems that diagnostic and therapeutic approaches to tackle depression and sexual problems in women with cardiac disorders warrant further investigation.

A series of limitations obliges us to take a conservative approach in drawing conclusions. Using self-reported questionnaires has its own disadvantages especially in our patients because of their reservedness (a cultural characteristic). This led to confining the study population to married subjects only. On the other hand, a reasonable interpretation of our findings can be achieved only when comparison with healthy men and women has been made. The RSS questionnaire is specifically designed for patients and we did not have any documented data on the sexual relation of our male and female subjects before development of coronary disorders. Therefore, although we compared the patients with healthy people for HADS

scores; this questionnaire is not a proper measure in this group when comparison with patients is the aim [34]. While we acknowledge all these limitations, we can still emphasize the differences found between the genders regardless of their sexual and mental condition before CAD, which is clinically important enough to be reported and requires more attention in practice.

Conclusions

Our findings showed that gender differences might be present in the sexual relationship and mental health status of CAD patients. For instance, women with CAD have poorer sexual relation and their sexuality is associated with depressive symptoms. In men with CAD, fear of sexual relationship, a factor in relation to their depressive symptoms, is a more serious problem that involves both the patients and their wives. Such gender-specific characteristics should be considered in the management of CAD patients.

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Statement of Authorship

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References

- Roose SP, Seidman SN. Sexual activity and cardiac risk: Is depression a contributing factor? *Am J Cardiol* 2000;86:38F-40F.
- Consedine NS, Magai C, Chin S. Hostility and anxiety differentially predict cardiovascular disease in men and women. *Sex Roles* 2004;50:63-75.
- Harter M, Woll S, Reuter K, Wunsch A, Bengel J. Recognition of psychiatric disorders in musculoskeletal and cardiovascular rehabilitation patients. *Arch Phys Med Rehabil* 2004;85:1192-7.
- Weeke A, Juel K, Vaeth M. Cardiovascular death and manic-depressive psychosis. *J Affect Disord* 1987; 13:287-92.
- Barth J, Schumacher M, Herrmann-Lingen C. Depression as a risk factor for mortality in patients with coronary heart disease: A meta-analysis. *Psychosom Med* 2004;66:802-13.
- Bedell SE, Duperval M, Goldberg R. Cardiologists' discussions about sexuality with patients with coronary heart disease: A meta-analysis. *Am Heart J* 2002;144:239-42.
- Goldstein I. The mutually reinforcing triad of depressive symptoms, cardiovascular disease, and erectile dysfunction. *Am J Cardiol* 2000;86:41F-45F.
- Brezinka V, Kittel F. Psychosocial factors of coronary heart disease in women: A review. *Soc Sci Med* 1996;42:1351-65.
- Asadi-Lari M, Packham C, Gray D. Gender difference in health-related needs and quality of life in patients with acute chest pain. *Br J Cardiol* 2005; 12:459-64.
- Smith LJ, Mulhall JP, Devenci S, Monaghan N, Reid MC. Sex after seventy: a pilot study of sexual function in older persons. *J Sex Med* 2007;4:1247-53.
- Ifudu O, Paul HR, Homel P, Friedman EA. Predictive value of functional status for mortality in patients on maintenance hemodialysis. *Am J Nephrol* 1998;18:109-16.
- Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;67:361-70.
- Montazeri A, Vahdaninia M, Ebrahimi M, Jarvandi S. The Hospital Anxiety and Depression Scale (HADS): Translation and validation study of the Iranian version. *Health Qual Life Outcomes* 2003; 1:14.
- Karaminia R, Tavallaii SA, Lorgard-Dezfuli-Nejad M, Moghani Lankarani M, Hadavand Mirzaie H, Einollahi B, Firoozan A. Anxiety and depression: a comparison between renal transplant recipients and hemodialysis patients. *Transplant Proc* 2007;39: 1082-4.
- Noohi S, Khaghani-Zadeh M, Javadipour M, Assari S, Najafi M, Ebrahimi M, Pourfarziani V. Anxiety and depression are correlated with higher morbidity after kidney transplantation. *Transplant Proc* 2007;39:1074-8.
- Berglund G, Nystedt M, Bolund C, Sjoden PO, Rutquist LE. Effect of endocrine treatment on sexuality in premenopausal breast cancer patients: A prospective randomized study. *J Clin Oncol* 2001;19: 2788-96.

- 17 Institute for Algorithmic Medicine. The Relationship and Sexuality Scale. The Medical Algorithms Project. Available from: <http://www.medal.org/visitor/www%5CActive%5Cch15%5Cch15.28%5Cch15.28.02.aspx> (accessed January 24, 2007).
- 18 Tavallaii SA, Fathi-Ashtiani A, Nasiri M, Assari S, Maleki P, Einollahi B. Correlation between sexual function and postrenal transplant quality of life: Does gender matter? *J Sex Med* 2007;4:1610–8.
- 19 Schleifer SJ, Macari-Hinson MM, Coyle DA, Slater WR, Kahn M, Gorlin R, Zucker HD. The nature and course of depression following myocardial infarction. *Arch Intern Med* 1989;149:1785–9.
- 20 Wiklund I, Herlitz J, Johansson S, Bengtson A, Karlson BW, Persson NG. Subjective symptoms and well-being differ in women and men after myocardial infarction. *Eur Heart J* 1993;14:1315–9.
- 21 Stern MJ, Pascale L, Ackerman A. Life adjustment postmyocardial infarction: Determining predictive variables. *Arch Intern Med* 1977;137:1680–5.
- 22 Mayou R. The course and determinants of reactions to myocardial infarction. *Br J Psychiatry* 1979;134:588–94.
- 23 Guiry E, Conroy RM, Hickey N, Mulcahy R. Psychological response to an acute coronary event and its effect on subsequent rehabilitation and lifestyle change. *Clin Cardiol* 1987;10:256–60.
- 24 Jackson G, Rosen RC, Kloner RA, Kostis JB. The second Princeton consensus on sexual dysfunction and cardiac risk: New guidelines for sexual medicine. *J Sex Med* 2006;3:28–36.
- 25 Montorsi P, Ravagnani PM, Galli S, Briganti A, Salonia A, Deho F, Schulman C, Montorsi F. Association between erectile dysfunction and coronary artery disease: a case report study. *J Sex Med* 2005;2:575–82.
- 26 DeBusk R, Drory Y, Goldstein I, Jackson G, Kaul S, Kimmel SE, Kostis JB, Kloner RA, Lakin M, Meston CM, Mittleman M, Muller JE, Padma-Nathan H, Rosen RC, Stein RA, Zusman R. Management of sexual dysfunction in patients with cardiovascular disease: Recommendations of the Princeton Consensus Panel. *Am J Cardiol* 2000;86:175–81.
- 27 Heruti RJ, Uri I, Arbel Y, Swartzon M, Galor S, Justo D. Erectile dysfunction severity might be associated with poor cardiovascular prognosis in diabetic men. *J Sex Med* 2007;4:465–71.
- 28 El-Sakka AI. Association of risk factors and medical comorbidities with male sexual dysfunctions. *J Sex Med* 2007;4:1691–700.
- 29 Scalzi CC, Loya F, Golden JS. Sexual therapy of patients with cardiovascular disease. *West J Med* 1977;126:237–44.
- 30 Baggs JG, Karch AM. Sexual counseling of women with coronary heart disease. *Heart Lung* 1987;16:154–9.
- 31 Dunn KM, Croft PR, Hackett GI. Association of sexual problems with social, psychological, and physical problems in men and women: A cross sectional population survey. *J Epidemiol Community Health* 1999;53:144–8.
- 32 DeBusk RF. Evaluating the cardiovascular tolerance for sex. *Am J Cardiol* 2000;86:51F–56F.
- 33 Ebrahim S, May M, Ben Shlomo Y, McCarron P, Frankel S, Yarnell J, Davey Smith G. Sexual intercourse and risk of ischaemic stroke and coronary heart disease: The Caerphilly study. *J Epidemiol Community Health* 2002;56:99–102.
- 34 Groenvold M, Fayers PM, Sprangers MAG, Bjorner JB, Klee MC, Aaronson NK, Bech P, Mouridsen HT. Breast cancer patients at low risk of recurrence compared with the general population: A valid comparison? *J Clin Epidemiol* 1999;52:523–30.

Appendix

Relationship and Sexuality Scale [15,16]*

1. Negative effect of disease on sexual life
 (1) not at all (2) slightly (3) rather much (4) much (5) very much
2. Effect of disease on sexual desire
 (1) increased (2) no change (3) decreased (4) all gone
3. Effect of treatment on sexual desire
 (1) increased (2) no change (3) decreased (4) all gone
4. Satisfaction with frequency of hugs and kisses
 (1) very much (2) much (3) rather much (4) slightly (5) not at all
5. Fear of sexual intercourse
 (1) never (2) rarely (3) sometimes (4) often (5) always
6. Perceived fear of partner for sexual intercourse
 (1) never (2) rarely (3) sometimes (4) often (5) always

7. Frequency of sexual intercourse relative to level before disease diagnosed
(1) increased a lot (2) somewhat increased (3) no change (4) somewhat decreased
8. Ability to reach orgasm relative to that before disease diagnosed
(1) increased a lot (2) somewhat increased (3) no change (4) somewhat decreased
9. Satisfaction with your intercourse
(1) very much (2) much (3) rather much (4) slightly (5) not at all
10. Frequency of sexual intercourse in last 2 weeks
(1) none (2) once (3) twice (4) three times (5) four or more

*Values in parentheses are the scores.