



Sexual Dysfunction Status in Iranian Cardiovascular Patients: A Systematic Review

Mohammad Pourebrahimi ¹, PhD student; Masoud Fallahi-Khoshknab ¹, PhD; Hamidreza Taghipour ², MD; Abbas Ebadi ^{3,4}, PhD; Leila Gholizadeh ⁵, PhD; Mohammadali Hosseini ^{1,6,*}, PhD

¹Department of Nursing, University of Social Welfare and Rehabilitation Sciences, Tehran, IR Iran

²Atherosclerosis Research Center, Baghiyatallah University of Medical Sciences, Tehran, IR Iran

³Behavioral Sciences Research Center, Life Style Institute, Baqiyatallah University of Medical Sciences, Tehran, IR Iran

⁴Nursing Faculty, Baqiyatallah University of Medical Sciences, Tehran, IR Iran

⁵Department of Nursing, Faculty of Health, University of Technology Sydney, Sydney, Australia

⁶Department of Health, Faculty of Health, University of Technology Sydney, Sydney, Australia

ARTICLE INFO

Article Type:
 Review Article

Article History:
 Received: 9 Jun 2020
 Revised: 18 Jul 2020
 Accepted: 12 Aug 2020

Keywords:
 Sexual Dysfunction
 Cardiovascular Diseases
 Prevalence
 Systematic Review

ABSTRACT

Context: Sexual dysfunction is one of the challenges faced by heart patients. In Iran, because of the cultural structure, addressing sexual issues and problems is difficult in these patients and the follow-up of heart problems causes these patients' sexual relations to be marginalized. Considering the fact that there is no general conclusion about the prevalence and types of sexual dysfunction in these patients in the Iranian society, in order to gain comprehensive knowledge about this phenomenon, this study was conducted as a systematic review to investigate the sexual dysfunction status in Iranian heart patients.

Evidence Acquisition: In this systematic review, articles published in Persian and English were retrieved from Web of Science, PubMed, Scopus, Medlib, Magiran, SID, Iranmedex, and Google Scholar databases using keywords without time limits. Then, the articles meeting the inclusion criteria were studied and analyzed. Out of the 1011 articles retrieved, 12 were reviewed and analyzed. To extract the data, two experienced researchers reviewed and analyzed the articles simultaneously, and the co-working professors of the research team evaluated the quality of the articles separately to increase the validity and reliability of the study.

Results: All reviewed articles were quantitative studies. The results of extracting the findings indicated male sexual dysfunction, including erectile dysfunction, orgasmic function, sexual desire, sexual satisfaction, and marital satisfaction. In female patients, sexual satisfaction and marital satisfaction were impaired.

Conclusions: According to the results, heart diseases caused sexual dysfunction in heart patients. Patients with heart diseases had significant problems, such as lack of sexual desire, sexual dissatisfaction, and decreased frequency of sexual activity. Considering the severity of this disorder in the Iranian society, the treatment team is recommended to pay serious attention to sexual relations in these patients and consider the improvement of their sexual function as an integral part of the cardiac rehabilitation function.

1. Context

Cardiovascular diseases are from the most common causes of death worldwide, accounting for 31.5% of all deaths (1). These diseases have been reported to cause more than 17.7 million deaths worldwide annually, 80% of which belong to middle- and low-income countries (2). In Iran, many people suffer from cardiovascular diseases. The prevalence of this

disease was reported to be 32.2% in Iran in 2015 (3), and the resulting death rate was 46% (4).

After Coronary Artery Bypass Graft (CABG) surgery, various physical and psychological problems are observed in the lives of patients with cardiovascular diseases. Their health-related quality of life is also impaired after the occurrence of these problems (5, 6). A study by Serber et al. (2008) showed that heart patients with more complex mental and psychological problems had poorer quality of life in terms of physical, psychological, and social dimensions and

*Corresponding author: Mohammadali Hosseini, Koodakyar Ave, Nursing Group, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran. Tel: +98-21-22180036, E-mail: mohammadali.hosseini@uts.edu.au.

had higher levels of depression and anxiety (7).

Sexual dysfunction is one of the common problems in heart patients and can cause imbalance in interpersonal relationships and familial issues and affect the couples' quality of life (8). Sexual relationships are considered one of the most important components of patients' quality of life, and sexual health and sexual function are among the important factors in life satisfaction (6, 9). Optimal sexual intercourse is a key factor in stabilization of the family and is a basis for the acquisition and consolidation of a steady culture (10). A large number of patients suffer from dysfunction in sexual relations after heart attacks, Percutaneous Coronary Intervention (PCI), CABG surgery, and valve surgery. In this regard, the prevalence of erectile dysfunction was reported to be 46% (11) in patients with coronary artery disease and 84% in those with Congestive Heart Failure (CHF) (12). According to studies, age, drug treatment, and risk factors such as diabetes, hypertension, hyperlipidemia, and tobacco use caused sexual dysfunction and erectile dysfunction in most people with heart diseases, resulting in disorder in the quality of their sexual life (13). Research has indicated that the causes of problems in sexual relationships due to these diseases were fear and anxiety of the patient's spouse about sudden death during sexual activity, misinterpretation of natural symptoms of sexual arousal such as increased heart rate and respiration as heart symptoms, anxiety, and depression after a heart attack (13, 14). Sexual dysfunction, for whatever reason, reduces sexual satisfaction, causes deprivation, endangers mental health, and leads to family breakdown, reduced quality of sexual life, and ultimately disorder in the quality of public life (15). If sex-related issues are not considered a part of the nursing care for patients with cardiovascular problems, patients may impose great and unavoidable restrictions on their spouses, assuming that they are unable to engage in sexual activities, or experience sudden death by doing improper sexual activities (6, 15).

Evidence has demonstrated that one of the barriers against sexual education in heart patients is the negative attitude towards talking about sex. In Iran, due to cultural and social backgrounds, talking about marital relationships and sexual problems is introduced as a taboo in the society, causing the marital problems raised for these patients to be forgotten (16, 17). In fact, culture is one of the factors influencing the follow-up or non-follow-up of sexual problems after cardiovascular problems. Hence, nurses and other members of the treatment team should be familiar with cultural issues (18, 19). Iranian culture and the prevailing norms in the atmosphere of Iran restrict the discussion of sexual issues, and patients and the treatment team prefer to keep silent in this regard (18). Despite the importance of paying attention to the status of sexual relations in heart patients, the discussion of sexual issues is silenced due to the modesty of the heart patients admitted to the hospital. Sexual counseling that is one of the areas of nursing activity has been forgotten, as well (20, 21). Although sexual dysfunction is not life-threatening, it can lead to a decline in sexual function, eventually leading to a reduction in the quality of sexual life, reduction in work performance, and increase in the need for health care (22).

Based on what was mentioned above, due to the influential cultural factors in Iran, sexual function and satisfaction are not often asked by doctors. Patients also tend to avoid referring to these problems (16, 23). Up to now, studies have been done in the field of sexual dysfunction among patients with cardiovascular diseases in Iran, but there is no general conclusion about the status of sexual dysfunction in these patients in the Iranian society. Thus, in order to gain more comprehensive knowledge about this phenomenon that can eventually affect different dimensions of individuals' health, the present study aMLHFQ at determining the status of sexual dysfunction in cardiac patients in Iran as a systematic review.

2. Evidence Acquisition

2.1. Search Strategy

This systematic review was based on the Cochrane Handbook for Systematic Reviews (24) and was developed using the PRISMA statement (25). This study was designed to answer the question 'what is the status of sexual dysfunction in heart patients in Iran'. The search strategy was prepared using search terms related to PICO (Patient or Population, Intervention, Control, and Outcomes) for related studies. For this purpose, the studies conducted in Iran were searched using Mesh strategy and free strategy by two researchers without time limit. Investigations and the information needed were first obtained by searching for the following keywords: "cardiovascular diseases", "coronary artery disease", "myocardial infarct", "sexual function", "coronary artery bypass graft", "sexual dysfunction", and combining all keywords with "Iran" in CINAHL, PubMed, Google Scholar, and Science Direct databases as well as Persian databases such as Medlib, Magiran, SID, and Iranmedex. Resources and articles on sexual function in cardiovascular diseases in Persian and English were reviewed. In the search strategy, logical operators (AND, OR) were used. It should be noted that the studies were done from 2007 onwards (Figure 1).

2.2. Inclusion Criteria

The inclusion criteria of the studies were 1- being conducted in Iran, 2- being conducted on patients with cardiovascular problems, 3- having at least one report and desired and related results in this field, 4- being written in Persian or English, 5- availability of the main part of the selected article, and 6- being an original research.

2.3. Study Selection

In the initial search, 1011 articles were identified, 542 ones of which were in English and 369 ones were in Persian. During the screening phase, 347 duplicate articles were deleted. After reviewing the titles and abstracts, 589 articles whose titles and abstracts were not related to sexual function and sexual relations of patients with cardiovascular diseases were omitted in line with the research objectives. In the next phase, 75 articles were reviewed by the two researchers based on the inclusion and exclusion criteria, and 35 articles were omitted. There were 17 papers as posters and lectures in conferences whose full texts were not available. Finally, the full texts of the remaining 23 articles were read and

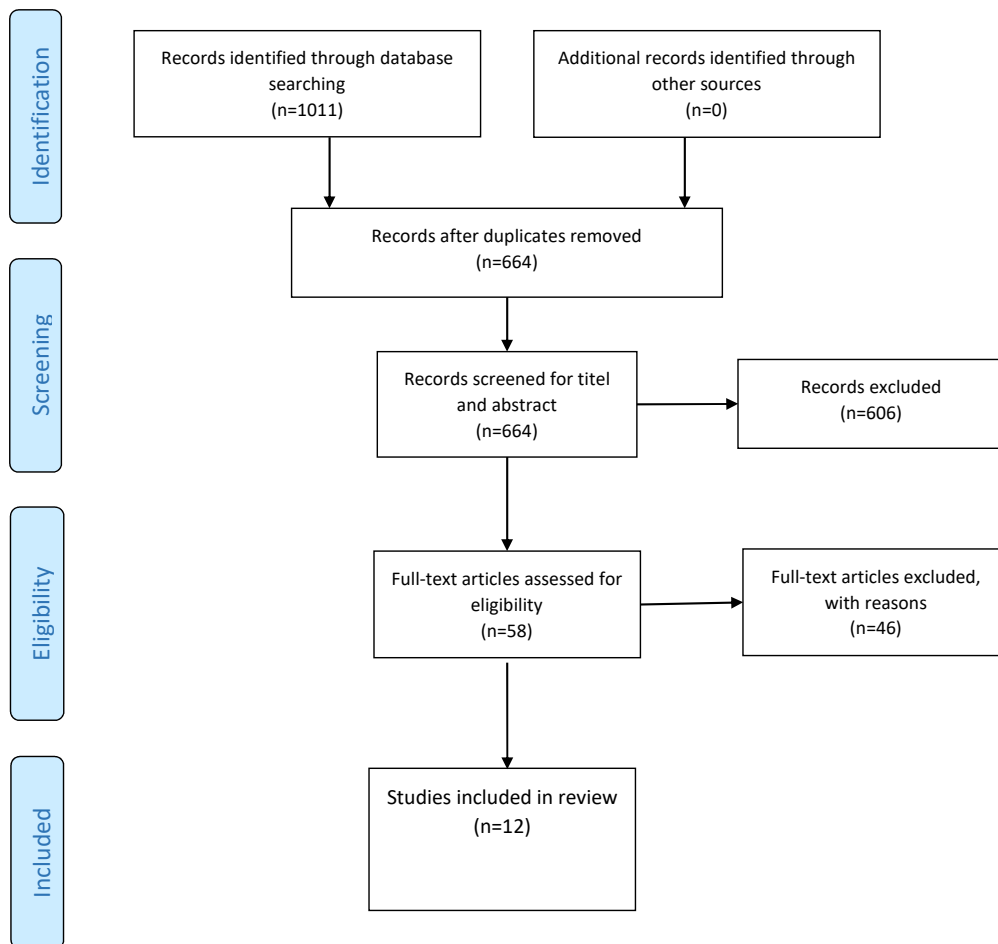


Figure 1. The Process of Reviewing and Selecting the Recovered Articles Based on the PRISMA Diagram.

based on the inclusion and exclusion criteria of the study, 12 articles that were fully consistent with the research were included in the analysis. All these steps were performed independently by two researchers. The process of selecting the articles has been presented in Figure 1.

2.4. Extracting the Data

The two researchers independently extracted the data

related to the objectives of the research and final analysis, and other team members reviewed 12 studies in terms of quality and consistency with the study objectives. Cochrane data extraction form was used for the systematic review. The two researchers separately extracted data from the included studies and came to a consensus after exchange of views. The form of data extraction included author's name, article title, year of publication, sample size, research tools,

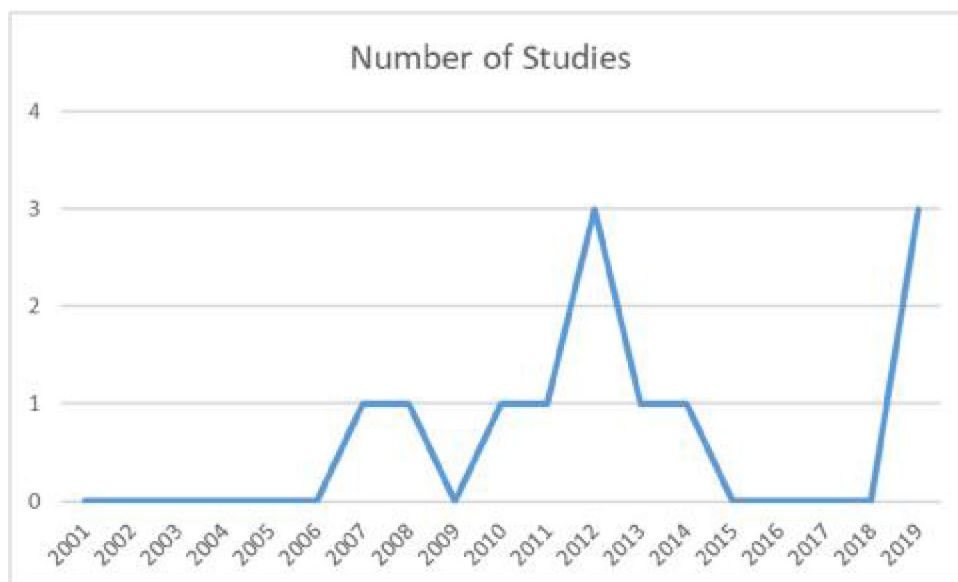


Figure 2. The Frequency of Studies Based on the Year of Conduction

and study findings.

2.5. Evaluating the Quality of Imported Studies

In order to assess the quality of the studies, the team utilized the NIH Study Quality Assessment Tools for observational, cohort, cross-sectional, case-control, and pre/post studies (25). In order to increase the accuracy and robustness of the research methodology, evaluate the quality of the collected articles, and prevent the possible biases, two experienced researchers in systematic reviews reviewed and analyzed the articles in terms of abstract, introduction, working method, results, discussion, and sources. During the quality evaluation process, attention was paid to such important factors as clearly defined population, clear and accurate measurement of consequences and results, sample size, tools, and inclusion and exclusion criteria. Disagreements between the opinions of the two researchers were resolved through discussion with the entire research team. It should be noted that no studies were omitted based on the results of the quality evaluation and the 12 articles were approved.

3. Results

Out of the 1011 articles obtained in the initial search, 12 were selected and included in the study. The studies were done since 2007 onwards (Figure 2). All reviewed articles were original quantitative studies. Seven articles were conducted on coronary artery transplant patients (58.3%), one article on patients with systolic heart failure (8.3%), three articles on patients with Coronary Artery Disease (CAD) (24.9%), and one article on patients with high blood pressure (Figure 1).

Kazemi Saleh et al. (2007) (26) conducted a research on the fear of having sex among married men with heart attacks. The results showed that fear of sex disrupted the sexual function of some of these patients. The study included 87 patients with CAD with a mean age of 59 years. Clinical, demographic, and psychological symptoms were examined. The results revealed fear of having sex in 29 men (33.3%), and the presence of this fear was associated with sexual dysfunction and depression symptoms. In 2008, Kazemi Saleh et al. (27) examined sexual activity and psychiatric symptoms among patients with CAD and the relationship between these variables was investigated among 550 married patients with CAD. The study involved 397 men and 153 women with a mean age of 57 years. The results indicated that 48.8% of the women with CAD had anxiety symptoms and 20.3% had depression. Among the men with CAD, 16.6% reported anxiety symptoms and 9.9% reported depression symptoms. The results indicated sexual dysfunction in these patients. Accordingly, there was a high level of sexual dysfunction in relation to the symptoms of depression in both sexes. However, fear of sex was only associated with male gender, CAD, and depression symptoms. In 2011, a study was conducted by Forouzan Nia et al. (13) on the incidence of sexual dysfunction in men after open heart surgery in Yazd. That study was performed descriptively-analytically on 278 patients aged 25 - 69 years who had undergone heart surgery. Sexual function was measured using the International Index for Erectile Function

(IIEF) before and 12 weeks after the heart surgery. The results demonstrated that the incidence of sexual dysfunction increased from 20.1% before surgery to 76.4% after that, and the difference was statistically significant ($P < 0.05$). In addition, the prevalence of impotence increased from 6.5% to 34.8%, the rate of premature ejaculation increased from 4.3% to 21.5%, and the rate of libido decreased from 9.3% to 20.1% after open heart surgery. In 2011, Zeighami et al. (2011) (28) examined the prevalence of erectile dysfunction in men with hypertension referring to health centers in Tonekabon and Ramsar. That study was conducted on 200 married men with hypertension within the age range of 30 to 69 years with a mean age of 55.35 years. The study data were collected using the IIEF questionnaire. The results showed that erectile dysfunction increased by 75.5% among men with hypertension. Accordingly, 18% of the men had severe erectile dysfunction, 27.5% had moderate erectile dysfunction, and 30% had mild erectile dysfunction. The results also indicated that the score of erectile function was negatively correlated to body mass index, number of cigarettes smoked, systolic blood pressure, diastolic blood pressure, and duration of hypertension. In 2012, Padash et al. (29) compared 50 patients with CAD and 50 healthy individuals with respect to marital satisfaction. In that study, the Index of Marital Satisfaction (IMS) questionnaire was used to measure marital satisfaction. The results revealed that the patients with heart coronary disorders had lower marital satisfaction compared to healthy people. Accordingly, 62.22% of the heart patients had significant problems with their marital satisfaction. After controlling for age and education level, the results of ANOVA showed a significant difference between the patients and healthy individuals regarding the scores of marital satisfaction ($P < 0.05$, $F = 2.31$, $E = 0.87$). In 2012, Foruzan-Nia et al. (30) conducted a study on sex hormone levels and sexual dysfunction in 40 male patients after CABG surgery. IIEF questionnaire was used before surgery and 12 weeks after that in order to measure sexual function. The mean age of the participants was 51.27 years. The rate of sexual dysfunction was 22.5% before the surgery and 47.7% after that. The types of sexual dysfunction included premature ejaculation (5% before and 2.5% after the surgery), impotence (7.5% before and 12.5% after the surgery), and decreased libido (10% before and 32% after the surgery). The levels of sex hormones were also measured before and after CABG surgery, which showed a decrease in the secretion of these hormones after the surgery, but only the decrease in estrogen level was statistically significant ($P = 0.02$). Mohammadi et al. (28) conducted a study in 2012 to evaluate sexual dysfunction among 100 male patients with systolic heart failure with a mean age of 59.23 years. The results showed that the mean score of erectile dysfunction was 14.02 ± 6.26 . Erectile dysfunction was detected in 80% of the patients with systolic heart failure, 36% of whom had severe erectile dysfunction. Erectile dysfunction was statistically correlated to age, education level, occupation, left ventricular ejection fraction, high blood cholesterol, hypertension, kidney disease, digoxin consumption, angiotensin converting enzyme inhibitors, beta-blocker consumption, diuretics consumption, depression, and quality of life. In a 2013 study, Pournaghash

et al. (31) examined the relationship between psychological factors and sexual dysfunction and quality of life of 160 male patients with a mean age of 60 years after CABG surgery. In that study, the data were collected using anxiety, depression, stress, and IIEF questionnaires, and 85.5% of the patients reported some degrees of impotence. Accordingly, 27.3%, 26.1%, and 32.1% of the patients

reported severe, moderate, and mild impotence, respectively. The results also revealed a significant relationship between impotence and the scores of anxiety ($P = 0.03$) and depression ($P = 0.001$). In 2014, Ziabakhsh Tabary et al. (32) investigated sexual dysfunction in patients undergoing on-pump CABG surgery. That study was performed on 426 male patients with a mean age of 58.69 years, and the data were collected

Table 1. Published Articles on Sexual Function in Heart Patients in Iran and the Summary of Their Results

Author and Year	Title	Sample Size	Tools	Conclusions
Kazemi-Saleh et al.; 2007 (1)	Fear of sexual intercourse in patients with coronary artery disease: a pilot study of associated morbidity	87 males and females	HADS (hospital anxiety and depression scale), RSS (relationship and sexuality scale)	The results showed the fear of having sex in 29 men (33.3%), and the presence of this fear was associated with sexual dysfunction and depressive symptoms.
Kazemi-Saleh et al.; 2008 (2)	Sexual function and psychological status among males and females with ischemic heart disease	550 males and females	HADS, RSS	Male and female patients with cad and symptoms of depression had sex less frequently. male depression was correlated to the couple's fear of sexual intercourse.
Foruzan-Nia et al.; 2011 (3)	Incidence of sexual dysfunction in men after cardiac surgery in afshar hospital, Yazd	279 males	IIEF (international index of erectile function)	The incidence of sexual dysfunction was 20.1% before and 76.4% 12 weeks after the operation.
Zeighami et al.; 2011 (4)	Frequency of erection dysfunction among hypertensive men referred to health centers of ramsar and tonekabon in 2009	200 males	IIEF	The prevalence of erectile dysfunction in men with hypertension was 75.5%, with 18% having severe erectile dysfunction, 27.5% having moderate erectile dysfunction, and 30% having mild erectile dysfunction.
Padash et al.; 2012 (5)	Marital satisfaction among coronary artery disease and normal subjects	100 males and females	IMS (index of marital satisfaction)	Patients with adhd were more likely to be healthy. 62.22% of heart patients had significant problems with their marital satisfaction.
Foruzan-Nia et al.; 2012 (6)	Sex hormones levels and sexual dysfunction in men after coronary artery bypass graft	40 males	IIEF, the serum levels of six sex hormones	Sexual dysfunction was 22.5% (9 cases) before and 47.7% (19 cases) after the operation. the levels of sex hormones were generally decreased after the operation, but the difference was statistically significant only for estrogen.
Mohammadi et al.; 2012 (7)	Sexual dysfunction in men with systolic heart failure and associated factors	100 males	IIEF, MLHFQ (minnesota living with heart failure), CES-D (center for epidemiologic studies depression scale)	The mean score of erectile dysfunction was 14.06 ± 6.26 . the results indicated erectile dysfunction in 80% of the patients with systolic heart failure, 36% of whom had severe erectile dysfunction.
Pournaghash et al.; 2013 (8)	Assessment of the relationship between psychological factors and impotency with quality of life of male patients following cabg	160 males	DASS-21 (depression anxiety stress scales), IIEF, SF-36 (the short form (36) health)	About 85.5% of the patients reported some degrees of impotence; 27.2% reported severe impotence, 26.1% reported moderate impotence, and 32.1% reported mild impotence. there was a significant association between the scores of anxiety and depression and impotence.
Ziabakhshatabary et al.; 2014 (9)	Evaluations of erectile dysfunction before and after on-pump coronary artery bypass graft surgery	426 males	IIEF	Mild erectile dysfunction was reported in 77 patients, mild to moderate in 98 patients, moderate in 136 patients, and severe in 51 patients. these measures were respectively reported as 85, 101, 133, and 35 after the operation.
Rahimi et al.; 2019 (10)	Sexual function of male patients before and after coronary artery bypass graft surgery	90 males	IIEF	The total mean score of sexual function increased from 13.43 to 6.93, which indicated a significant decrease in sexual function after the surgery. erectile function, orgasmic function, sexual desire, sexual satisfaction, and post-operative marital satisfaction decreased significantly, as well.
Dehestani et al.; 2019 (33)	Comparison of sexual dysfunction before and after coronary artery bypass grafting using the international index of erectile dysfunction questionnaire	70 males	IIEF	The mean score of erectile function decreased from 19.91 ± 6.4 to 17.46 ± 6.82 . the mean score of orgasmic function decreased from 7.19 ± 2.62 to 6.17 ± 2.99 . the mean score of sexual desire declined from 6.44 ± 2.47 to 4.91 ± 2.76
Nekounam et al.; 2019 (12)	Checking the relationship between sexual satisfaction and marital stress, marital satisfaction, and psychological symptoms of coronary artery bypass graft in heart patients	300 males and females	Hudson sexual satisfaction, anrich sexual satisfaction, tehran stockholm marital stress, DASS-21	115 patients (37.3%) had marital dissatisfaction and 185 ones (61.7%) had low marital satisfaction. all 300 individuals reported low sexual satisfaction.

using the IIEF questionnaire before and six months after the surgery. The results demonstrated that the mean score of erectile function was 13.95 ± 5.44 before the surgery and 14.20 ± 5.69 after that. Additionally, mild erectile dysfunction was reported in 77 patients, mild to moderate erectile dysfunction in 98, moderate erectile dysfunction in 136, and severe erectile dysfunction in 51 patients before the surgery. These measures were obtained as 85, 101, 133, and 35, respectively after the surgery. In 2019, Rahimi et al. (23) investigated sexual function among male patients before and after CABG surgery. That semi-experimental study was performed on 90 patients with a mean age of 52.4 years who had undergone CABG surgery. In that study, sexual function was measured before and 10 weeks after the heart surgery via the IIEF questionnaire. The results showed that the male patients experienced a significant decline in sexual function after coronary artery transplantation. The mean score of total sexual function decreased from 13.43 to 6.93, representing a significant reduction in sexual function after the surgery. Besides, the mean scores of erectile function, orgasmic function, sexual desire, sexual satisfaction, and marital satisfaction were respectively 2.44, 2.68, 2.87, 2.65, and 2.80 before the surgery and 1.28, 1.38, 1.51, 1.31, and 1.43 after that. Accordingly, the results showed a decrease in all abovementioned dimensions after coronary artery transplantation. In 2019, Dehestani et al. (33) examined the sexual function of patients before and after CABG surgery. That study was conducted on 70 male patients, and the data were gathered using the IIEF questionnaire. The results indicated that CABG surgery intensified the patients' sexual dysfunction. The results also demonstrated that the mean score of erectile dysfunction decreased from 19.91 ± 4.6 to 17.46 ± 6.8 . The mean score of orgasmic function decreased from 7.19 ± 2.62 before the surgery to 6.17 ± 2.99 after that. The mean score of sexual desire declined from 6.44 ± 2.47 before the surgery to 4.91 ± 2.76 after that. The mean score of intercourse satisfaction also decreased from 8.59 ± 3.37 to 7.4 ± 3.77 after the surgery. Finally, the mean score of overall satisfaction decreased from 6.71 ± 2.29 before the surgery to 5.34 ± 2.77 after that, and the total score of the IIEF questionnaire declined from 18.84 ± 13.26 to 41.29 ± 14.75 after the surgery ($P < 0.001$). In a 2019 study, Nekounam et al. (34) assessed the relationship between sexual satisfaction and marital stress, marital satisfaction, and psychological symptoms of coronary artery bypass heart disease patients. That descriptive-correlational study was performed on 300 male and female patients with a mean age of 62 years who had undergone CABG surgery. The findings demonstrated that 115 participants (37.3%) had marital dissatisfaction and 185 ones (61.7%) had low marital satisfaction. In terms of sexual satisfaction, the results indicated that all 300 participants had low sexual satisfaction. The results also revealed a significant inverse relationship between sexual satisfaction and depression, stress, anxiety, and marital stress. However, no significant correlation was observed between sexual satisfaction and marital satisfaction. The selected articles and the summary of their results have been presented in Table 1.

4. Discussion

This systematic review aimed to answer the question 'what is the status of sexual dysfunction in heart patients in Iran'. The results disclosed that cardiovascular diseases had a serious impact on these patients' performance and sexual satisfaction, and could cause sexual dysfunction. Accordingly, heart diseases led to a decline in erectile dysfunction, orgasmic function, sexual desire, sexual satisfaction, and marital satisfaction among males (13, 23, 28, 30, 32, 33) and a decrease in marital satisfaction and sexual satisfaction among females (29, 34). Moreover, age, medication, depression (26-28, 31, 34), anxiety (31, 34), hypertension (28, 35), hyperlipidemia (35), and smoking (28) affected sexual function and erectile dysfunction in patients with cardiovascular diseases, eventually impairing the quality of their sexual lives. Generally, sexual dysfunction can be divided into decreased libido, decreased sexual desire, declined relationship satisfaction, erectile dysfunction, and premature ejaculation (13). These five areas were clearly seen in the present study (13, 23, 30, 32). Erectile dysfunction was cited as a common disorder in most patients in these studies (13, 23, 30, 31, 35, 36). It seemed that the prevalence of erectile dysfunction increased with age and underlying diseases such as heart disease. In fact, erectile dysfunction was common in elderly people. Erectile dysfunction was intensified in parallel with aging due to factors, such as smoking, hypertension, hyperlipidemia, taking beta-blockers and digoxin, angiotensin blocker consumption, and some hormonal disorders such as estrogen depletion, and stress and anxiety associated with open heart surgery, each of which alone has been considered a risk factor for erectile dysfunction. In the present study, the mean age of the participants in all studies was over 50 years. Therefore, impairment of sexual function in these patients might be due to changes in penile arteries, reduction in penile blood circulation, androgen depletion, cell depletion of smooth muscles, and reduced production of nitric oxide.

The current study findings showed that high blood pressure, hyperlipidemia, and smoking provided the ground for the incidence of artery disorders associated with erectile dysfunction. Therefore, modification of lifestyle and use of medication for control and decrease of cholesterol and blood pressure can be effective in reducing the severity of sexual dysfunction.

The present study results noted the role of depression and anxiety in reducing performance and sexual satisfaction in patients (26, 27, 31, 34, 35). Depression is one of the psychological problems faced by heart patients, which prevents the effective treatment of the disease, because it reduces the patients' motivation to continue the treatment (34). Anxiety caused by heart surgery should not be ignored, as well. Open heart surgery is one of the most stressful events that can occur in a person's life (6). According to the results of the current investigation, stress, depression, and anxiety led to a low quality of life among heart patients (34). In fact, sexual activity played an important role in quality of life, but the treatment team focused only on maintaining and continuing patients' lives and paid less attention to their sexual functions (23). This lack of attention to sexual issues could aggravate depression in these patients, reduce their self-confidence and understanding of their health status,

reduce their sexual satisfaction, and impair the quality of their sexual lives (36).

In heart patients, the fear of having sex was considered a deterrent to having sex, which reduced the rate of intercourse and impaired sexual satisfaction and marital satisfaction (26, 27). According to the research findings, the fear and anxiety of the patients and their wives about sudden death during sexual activities led to the misinterpretation of the natural symptoms of sexual arousal, such as increased heart rate and respiration, as heart symptoms. This fear was accompanied by anxiety and depression after heart problems and resulted in sexual dysfunction in these patients (13, 14). Fear, anxiety, and depression are the main problems that exist in the normal lives of these patients, but caregivers and the treatment team can affect their sexual function according to these symptoms.

5. Conclusion

The study results indicated the heart patients' sexual dysfunction and dissatisfaction. Considering the cultural structure of the society and the fact that it is difficult for both patients and medical staff to talk about sexual relations, paying attention to sexual relations in these patients has been forgotten. Although sexual dysfunction does not threaten life, it can reduce the quality of life, reduce social abilities, exacerbate mental illnesses such as depression and anxiety, and increase the need for healthcare. Given the fact that organic, psychological, and mixed risk factors have been proven to be involved in sexual dysfunction in these patients, these factors should be identified and the quality of sexual life should be improved in these patients.

5.1. Ethical Approval

This study was a part of a PhD dissertation entitled "explanation of the sexual life quality process of patients after CABG" approved by the Ethics Committee of the University of Social Welfare and Rehabilitation Sciences (IR.USWR.REC.1397.165).

Acknowledgements

There is no acknowledgment.

Authors' Contribution

MP contributed to the searching process, data selection, data extraction, quality appraisal of articles, data synthesis, and manuscript writing. The principal reviewer, MAH, designed this systematic review and was the leading author of the manuscript. AE and MP prepared the preliminary draft of the manuscript. HT, MFK, and LG revised the manuscript critically. MP, HT, AE, and MAH participated in the literature search and screening, data extraction, and analysis. All authors read and approved the final draft of the manuscript.

Funding/Support

This article was not sponsored by any organization.

Financial Disclosure

The authors have no financial interests related to the material in the manuscript.

References

- Pattyn N, Beulque R, Cornelissen V. Aerobic Interval vs. Continuous Training in Patients with Coronary Artery Disease or Heart Failure: An Updated Systematic Review and Meta-Analysis with a Focus on Secondary Outcomes. *Sports Med.* 2018;**48**(5):1189-205.
- Organization. WH. Cardiovascular diseases (CVDs) 2019. [cited [updated 2020; cited 2020]]; Available from: [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)).
- Farahani A, Masoudnia E. Relationship between family functioning indices and incidence risk of myocardial infarction. *Iranian Journal of Cardiovascular Nursing.* 2015;**4**(3):26-34.
- Avazah A, Fetrat M, Bashar F. Effect of progressive muscle relaxation on the vital signs and oxygenation indexes in patients under coronary artery bypass graft surgery: A triple blinded randomized clinical trial. *Koomesh.* 2019;**21**(3):423-36.
- Leon AS, Franklin BA, Costa F, Balady GJ, Berra KA, Stewart KJ, et al. Cardiac rehabilitation and secondary prevention of coronary heart disease: an American Heart Association scientific statement from the Council on Clinical Cardiology (Subcommittee on Exercise, Cardiac Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity), in collaboration with the American association of Cardiovascular and Pulmonary Rehabilitation. *Circulation.* 2005;**111**(3):369-76.
- Schumann J, Zellweger MJ, Di Valentino M, Piazzalunga S, Hoffmann A. Sexual Dysfunction before and after Cardiac Rehabilitation. *Rehabil Res Pract.* 2010;**2010**:823060.
- Serber ER, Todaro JF, Tilkemeier PL, Niaura R. Prevalence and characteristics of multiple psychiatric disorders in cardiac rehabilitation patients. *J Cardiopulm Rehabil Prev.* 2009;**29**(3):161-8; quiz 9-70.
- Soderberg LH, Johansen PP, Herning M, Berg SK. Women's experiences of sexual health after first-time myocardial infarction. *J Clin Nurs.* 2013;**22**(23-24):3532-40.
- Belardinelli R, Lacialaprice F, Faccenda E, Purcaro A, Perna G. Effects of short-term moderate exercise training on sexual function in male patients with chronic stable heart failure. *Int J Cardiol.* 2005;**101**(1):83-90.
- Lewis RW, Fugl-Meyer KS, Bosch R, Fugl-Meyer AR, Laumann EO, Lizza E, et al. Epidemiology/risk factors of sexual dysfunction. *J Sex Med.* 2004;**1**(1):35-9.
- Foroutan SK, Rajabi M. Erectile dysfunction in men with angiographically documented coronary artery disease. *Urol J.* 2007;**4**(1):28-32.
- Schwarz ER, Kapur V, Bionat S, Rastogi S, Gupta R, Rosanio S. The prevalence and clinical relevance of sexual dysfunction in women and men with chronic heart failure. *Int J Impot Res.* 2008;**20**(1):85-91.
- Foruzan-Nia SK, Abdollahi MH, Hekmatimoghaddam SH, Namayandeh SM, Mortazavi MH. Incidence of sexual dysfunction in men after cardiac surgery in Afshar hospital, Yazd. *Iran J Reprod Med.* 2011;**9**(2):89-94.
- Feldman HA, Goldstein I, Hatzichristou DG, Krane RJ, McKinlay JB. Impotence and its medical and psychosocial correlates: results of the Massachusetts Male Aging Study. *J Urol.* 1994;**151**(1):54-61.
- Paulsen LH, Bakke LS, Jarbol DE, Balasubramaniam K, Hansen DG. Associations between lifestyle, erectile dysfunction and healthcare seeking: A population-based study. *Scand J Prim Health Care* 2020 Apr 20:1-9.
- Hoseini MHM, Afra LG, Asayesh H, Goudarzi M, Afra MG. The effect of Self-care educational program on sexual function and quality of life in patients with ischemic heart disease. *J Res Med Dental Sci.* 2018;**6**(1):226-35.
- Karimi A, Dadgar S, Afiat M, Rahimi N. The effect of sexual health education on couples' sexual satisfaction. *The Iranian Journal of Obstetrics, Gynecology and Infertility.* 2013;**15**(42):23-30.
- Goossens E, Norekval TM, Faerch J, Hody L, Olsen SS, Darmer MR, et al. Sexual counselling of cardiac patients in Europe: culture matters. *Int J Clin Pract.* 2011;**65**(10):1092-9.
- Neknam A, Etemadi S, Pornaghash Tehrani S. The effectiveness of excited family therapy approach on improving Sexual Satisfaction and Marital stress in patients with Coronary artery bypass graft. *Journal of psychological science.* 2018;**17**(65):61-77.
- Bagheri I, Memarian R, Hajizadeh E, Pakcheshm B. The effect of sex education on patients and their spouses satisfaction after myocardial infarction. *Jorjani Biomedicine Journal.* 2014;**2**(1):46-0.

21. Lunelli RP, Rabello ER, Stein R, Goldmeier S, Moraes MA. Sexual activity after myocardial infarction: taboo or lack of knowledge? *Arq Bras Cardiol.* 2008;**90**(3):156-9.
22. Wessells H, Joyce GF, Wise M, Wilt TJ. Erectile dysfunction. *J Urol.* 2007;**177**(5):1675-81.
23. Rahimi A, Taghipour H, Ebadi A, Pourebrahimi M. Sexual function of male patients before and after coronary artery bypass graft surgery. *Iranian Journal of Rehabilitation Research.* 2019;**5**(2):41-6.
24. Higgins JP, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, et al. *Cochrane handbook for systematic reviews of interventions.* John Wiley & Sons; 2019.
25. Moher D, Liberati A, Tetzlaff J, Altman DG, Group P. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med.* 2009;**6**(7):e1000097.
26. Kazemi-Saleh D, Pishgou B, Assari S, Tavallaii SA. Fear of sexual intercourse in patients with coronary artery disease: a pilot study of associated morbidity. *J Sex Med.* 2007;**4**(6):1619-25.
27. Kazemi-Saleh D, Pishgou B, Farrokhi F, Fotros A, Assari S. Sexual function and psychological status among males and females with ischemic heart disease. *J Sex Med.* 2008;**5**(10):2330-7.
28. ZeighamiMohammadi S, Ghaffari F. Frequency of Erection Dysfunction Among Hypertensive Men Referred to Health Centers of Ramsar and Tonekabon in 2009. *Journal of Rafsanjan University of Medical Sciences.* 2011;**10**(4):299-308.
29. Padash Z, Izadikhah Z, Abedi M. Marital satisfaction among coronary artery disease and normal subjects. *Journal of Research in Behavioural Sciences.* 2012;**9**(5):0-.
30. Forouzannia SK, Abdollahi MH, Hekmatimoghaddam S, Hassan Sayegh SA. Sex hormone levels and sexual dysfunction in men after coronary artery bypass graft. *Iran J Reprod Med.* 2012;**10**(5):425-8.
31. Pournaghash Tehrani S, Etemadi S, Dehdari T, Lavasani MG, Sadeghian S. Assessment of the relationship between psychological factors and impotency with quality of life of male patients following CABG. *Razi Journal of Medical Sciences.* 2013;**19**(104):34-42.
32. ZiabakhshTabary S, Mokhtari-Esbuie F, Fazli M. Evaluations of erectile dysfunction before and after on-pump coronary artery bypass graft surgery. *Caspian J Intern Med.* 2014;**5**(4):209-12.
33. Dehestani G, Moeinipour A, Mizani K, Akbari M, Fattahi SP, Moallemi M, et al. Comparison of Sexual Dysfunction Before and After Coronary Artery Bypass Grafting Using the International Index of Erectile Dysfunction Questionnaire. *Iranian Heart Journal.* 2019;**20**(3):47-51.
34. Nekounam A, Etemadi S, Tehrani SP. Check the relation sexual satisfaction with marital stress, marital satisfaction and psychological symptoms of coronary artery bypass graft heart patients. 2018.
35. Zeighami Mohammadi S, Shahparian M, Fahidy F, Fallah E. Sexual dysfunction in males with systolic heart failure and associated factors. *ARYA Atheroscler.* 2012;**8**(2):63-9.
36. Montorsi P, Ravagnani PM, Galli S, Rotatori F, Veglia F, Briganti A, et al. Association between erectile dysfunction and coronary artery disease. Role of coronary clinical presentation and extent of coronary vessels involvement: the COBRA trial. *Eur Heart J.* 2006;**27**(22):2632-9.