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Sexual Dysfunction in Men with Systolic Heart Failure and Associated Factors

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Abstract

Aims: Heart failure is a major risk factor for erectile dysfunction. This study seeks to investigate the incidence and factors associated with erectile dysfunction in patients with systolic heart failure.

Methods: This is a cross sectional study that was conducted on 100 male patients with systolic heart failure in 2009. Convenience sampling was used to gather the required data. Data collection instruments included a demographic data form, IIEF-5 (The International Index of Erectile Function, a 5-item version), MLHFQ (Minnesota Living with Heart Failure), and CES-D (Center for Epidemiologic Studies Depression Scale). The data was analyzed by SPSS software and using descriptive statistics, t-test, ANOVA and Pearson correlation coefficient.

Findings: The findings indicated that the mean score of erectile dysfunction was 14.02±6.26 and 80% of male patients with systolic heart failure suffered from erectile dysfunction. There was a significant relationship between erectile dysfunction and age ($p<0.001$), education ($p=0.019$), occupation ($p=0.002$), hemoglobin level ($p=0.003$), left ventricular ejection fraction ($p=0.030$), cholesterol level ($p=0.001$), renal dysfunction ($p=0.009$), use of digoxin ($p=0.014$), angiotensin converting enzyme inhibitors ($P<0.001$), beta blocker ($p=0.001$), diuretics ($p=0.035$), depression ($p<0.001$), and quality of life ($p<0.001$).

Conclusion: Erectile dysfunction is the most common problem in patients with systolic heart failure and is associated with age, medical conditions, co-morbidity, medicinal treatments and psychological disorders. In patients with heart failure, erectile dysfunction has a negative impact on quality of life.

Keywords: Heart failure, Erectile dysfunction, Depression, Quality of life

Introduction

Heart failure is a clinical syndrome resulted from heart inability to pump an essential amount of oxygenated blood which is created to satisfy metabolic needs of body. There are two types of systolic and diastolic heart failure. Systolic heart failure is caused by heart inability to pump enough blood while diastolic heart failure is a result of inability of ventricles to relax and get filled during diastole [1]. About five million people in the United States of America are suffering from heart failure and five hundred thousand new cases are added to them every year, too [2]. Heart inability to circulate blood creates several symptoms such as being short of breath, fatigue, dizziness, angina pectoris, edema, and ascites [3]. Intolerance of labors, getting exhausted, and being short of breath disturb patients' quality of life and functional ability [4]. They cause patients to be unable to fulfill their duties and therefore face financial problems [5], experience disturbance in their ordinary activities of life, lose their independence and depend on others to perform self-care activities, get isolated from the society, face sexual dysfunction, and change their family and social roles in life [3]. Sexual function is an important aspect of quality of life. Sexual dysfunction affects the quality of life of patients with heart failure and reduces it [6], and results in a decrease in libido, reduction of number of intercourses, and dissatisfaction with sexual intercourse [7]. Heart failure itself is known as a risk factor for erectile dysfunction. Erectile dysfunction is the inability to achieve or maintain an erection for a satisfactory intercourse with sex partner [8]. In a survey conducted by Medina, 74% [9], Schwartz, 84% [10], and Rastogi, 75% of patients with heart failure had erectile dysfunction [11]. Erectile dysfunction is caused as a result of mental, neurological, hormonal, or vascular problems or side effects of drugs [7]. Various factors are involved in erectile dysfunction in men with heart failure such as ageing [12, 13], smoking [14], Body Mass Index (BMI) [15], suffering from other chronic diseases such as hypertension, diabetes, chronic obstructive pulmonary diseases, ischemic heart diseases, hyperlipidemia, anemia [16 and 17], intensity of heart failure and left

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ventricular ejection fraction [18], and side effects of medications such as digoxin, beta-blocker, diuretics and spironolactone [11].

Healthy sexual activity plays an important role in men and women's mental health, family formation and stability, and preventing disagreements, misunderstandings, marital breakdown, and its unfortunate consequences [19]. In the past decade, social attitude has changed towards sexual health and hygiene [20]. Nowadays, many scholars and experts increasingly emphasize on identifying and removing people's sexual problems [19]. Considering rapid growth in the number of patients with chronic heart failure, it is essential to know the effective factors in sexual disorders which can damage quality of life. After identifying them, it is necessary to remove the problems via using different methods to increase the quality of life in those patients. This study was carried out to investigate the incidence of erectile dysfunction and factors associated with it in patients with systolic heart failure.

Methods

This is a cross sectional study which investigated erectile dysfunction and associated factors with it. The research population included all patients with systolic heart failure hospitalized in the internal ward and clinic of Alborz Ta'mine Ejtema'i in Karaj and Ta'mine Ejtema'i Hospital in Shahriar. It was conducted from June 2010 to December 2010. Research samples included a hundred patients with heart failure which were chosen from the research population through convenience sampling method and regarding the selection criteria (married, having heart failure for at least one year, ejection fraction below 40 %, not having previous records of mental diseases, depression, or sterility). The researcher assistant visited the mentioned hospitals every day. Considering the selection criteria, after explaining the purpose of the study, he completed and collected the research instruments through interviews. The instruments used in this study included sample selection form, demographic information form with some information about the disease (age, marital status, education, income level, family economic status, occupation, smoking, disease duration, type of chronic disease along with heart failure, type of used medications, left ventricular ejection fraction based on echocardiography, BMI, serum hemoglobin level and cholesterol), IIEF-5, MLHFQ, and CES-D. In the present study, smoking meant smoking at least one cigarette a day for one year. BMI was calculated through dividing weight in kilos by the square of height in meters. To get participants' height, they were asked to remove their shoes and stand next to a wall with their back on it while they closed their legs tight and their knees, pelvis, shoulder and head were along each other. Afterwards, the researcher put the tape measure next to participants' head and got their height by one centimeter accuracy.

IIEF-5 contained 5 questions. Its answers were graded from one to five scores according to 5-point likert scale. The score ranged from 5 to 25. A score below 21 suggested erection failure. Finally, based on the obtained scores, participants were classified into four categories: high erection failure (5 to 10), average erection failure (11 to 15), low erection failure (16 to 20), and normal condition (21 to 25). The reliability was found out to be 0.96 [21].

MLHFQ has been designed to obtain information about the quality of life of patients with heart failure. This specific questionnaire was designed by Rector in 1984 to identify the effect of treatments on the quality of life of patients with heart failure. It is the most common instrument in evaluating the quality of life in these patients in research studies. This questionnaire shows patients' understanding of the impacts of heart failure on physical, economical, social, and psychological aspects of life. Questions of this questionnaire deal with symptoms of the disease such as being short of breath, fatigue, peripheral edema, sleep disorders and psychological symptoms such as depression, anxiety, social relationships, physical and sexual activities, work, and emotions. Each

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Table 1: Investigation of erectile dysfunction score correlation with the studied variables in men with systolic heart failure

Age	p<0.001	r=-0.417
Income	p=0.576	r=0.057
Disease duration	p=0.133	r=-0.151
Blood cholesterol level	P=0.001	r=-0.322
Hemoglobin	P=0.003	r=0.295
Left ventricular ejection fraction	P=0.030	r=0.217
BMI	P=0.234	r=0.120
Depression	p<0.001	r=-0.608
Quality of life	p<0.001	r=-0.556

question has six criteria which are graded from zero to five scores. Zero represents the best condition and number five shows the worst condition. Therefore, the higher the total score is, the lower the quality of life is. Validity and reliability of this questionnaire is higher than other questionnaires. In Rector's study, reliability of this instrument was reported to be 0.94 [22].

CES-D: This questionnaire contains 20 questions on depression. It is related to Center for Epidemiologic Studies and depression level is graded through 20 questions with 4-point likert scale from zero to three. In this study, 0 = rarely or never (less than a day), 1 = slightly (one to two days), 2 = Sometimes (three to four days), 3 = usually (five to seven days). Based on the total scores obtained from this instrument, a score of less than 15 means no depression, 15 to 21 equals little to mild depression, and a score above 21 suggests severe depression [23, 24]. Reliability of this questionnaire was 0.85 in Clark's study [25].

In order to determine the scientific reliability of the above mentioned instruments, content validity method was used through the study of scientific sources and according to the research objectives. To identify the reliability of the questionnaire in the present study, test-retest method was used. In this method, questionnaires were given to 10 patients with heart failure in 2 phases in a 10-day interval and the correlation of the two tests was estimated. In this study, for IIEF-5 r = 0.78, for MLHFQ r = 0.70, and for CES-D r = 0.84.

Moral issues in this study were taken into consideration. The hospital authorities' permission for the study was taken, a formal letter of introduction was presented to the hospital authorities, the researcher was introduced to the participants and the purpose and method of the study were explained to them, all the participants gave written consent for attending the study and having the right to leave it, it was attempted that the study did not violate the culture, traditions, and customs of the society, and the authorities and patients were ensured that the results of the study would be announced if they liked.

To analyze the data, SPSS software version 14 was utilized. The data was described by frequency tables, mean and SD. For data analysis, Pearson correlation coefficient, t-test for independent groups and ANOVA were used. Significance level in this study was considered to be 0.05.

Findings

The mean of age of men with systolic heart failure was 59.23±11.69 with a range of 34 to 88 years old, and the mean of duration of heart failure was 4.59±2.95 years with a range of 1 to 15 years. The mean of monthly income was 486000±254.729 tomans with a range of 200000 to 2400000 tomans per month. 46% of participants had an average economic condition, 42% of them had primary education, and 51% were retired. Their mean of BMI was 26.18±4.47 with a range of 48.44 to 18.52, the mean of left ventricular ejection fraction was 35.19±7.43 with a range of 10 to 40%, the mean of hemoglobin level was 14.32±1.86 with a range of 20.3 to 9.9 g/dl, and the mean of blood cholesterol level was 171.98±43.21 with a range of 327 to 103. 62% of participants never smoked. The most common co-morbidity was hypertension (33%) and diabetes (33%). 41% of participants were being treated with digoxin, 38% of them with diuretics, 29% with

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angiotensin converting enzyme inhibitors, 5% with calcium blocker, 19% with beta blockers, 74% with nitrate, 35% with angiotensin blockers, and 8% with aldactone. The mean of erectile dysfunction score was 14.02±6.26 and 80% 0f men with systolic heart failure had low intensity erectile dysfunction. The mean of depression score in men with heart failure was 20.31±12.06, and the mean of total score of quality of life was 41.61±21.30.

There was a significant difference between the mean of erectile dysfunction score and education (p=0.019) and job (p=0.002); however, no meaningful difference was observed between the mean of erectile dysfunction score and economic condition and smoking (p>0.05).

The results of Pearson coefficient correlation test showed a significant relationship between erectile dysfunction in men with heart failure and age (p<0.001), hemoglobin level (p=0.003), left ventricular ejection fraction (p=0.030), cholesterol (p=0.001), depression (p<0.001), and quality of life (p<0.001) (Table. 1).

According to Table 2, t-test showed a significant difference between the mean of erectile dysfunction and renal disease (p=0.009).

The following results were obtained: the mean of erectile dysfunction score based on the use of digoxin (p=0.014), angiotensin receptor blockers (p<0.001), beta blockers (p=0.001), and diuretics (p=0.035). However, there was no statistically significant difference based on the use of angiotensin converting enzyme inhibitors, nitrates, calcium blocker, and aldactone (p>0.05).

Table 2: Comparison of the mean of erectile dysfunction score based on having morbidity in men with systolic heart failure

Having other morbidity		Erectile dysfunction
		Mean±SD
Diabetes	+	13.57±6.05
	-	14.23±6.39
Statistical test		T=-0.496 p=0.621
Hypertension	+	15.45±6.31
	-	13.31±6.16
Statistical test		T=1.621 p=0.108
Renal disease	+	8.14±2.91
	-	14.46±6.23
Statistical test		T=-2.652 p=0.009
Chronic obstructive pulmonary disease	+	14.65±6.89
	-	13.83±6.09
Statistical test		T=0.550 p=.584
Ischemic heart disease	+	14.66±6.16
	-	13.81±6.32
Statistical test		T=0.578 p=0.564
Asthma	+	9.60±4.77
	-	14.25±6.26
Statistical test		T=-1.632 p=0.106

Discussion

In the present study, 80% of men with systolic heart failure suffered from erectile dysfunction and 36% of them had severe erectile dysfunction. This finding correlated with findings of other researchers. In a survey conducted by Medina, 74% [9], Schwartz, 84% [10] and Rastogi, 75% of patients with heart failure had erectile dysfunction [11]. The present findings support the claim that sexual aspect changes in patients with heart failure. Hence it is recommended that effective ways are considered to improve sexual function in these patients for promoting their quality of life.

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The present study indicated a statistically significant relationship between age and intensity of erectile dysfunction; in a way that with an increase in age, intensity of erectile dysfunction was increased too. This finding is similar to the results of the studies done by Apostolo [16] and Stink [15]. They showed that there was a relationship between erectile dysfunction and age in men with heart failure. Using research evidence, many researchers proved the effect of age variable in erectile dysfunction [12, 13]. The results of Tels's study suggested that the incidence of sexual dysfunction in men aged from 40 to 49 years old was 29%, 50 to 59 years old was 50%, and 60 to 69 years old was 74%. In addition, the incidence of erectile dysfunction in men aged from 40 to 49 years old had increased by 1%, 50 to 59 years old by 2%, and 60 to 69 years by 10% [12]. Lindav's study suggested that an increase in age led to a decrease in sexual activity; in a way that 73% of men aged from 57 to 64 years old, 53% of men from 65 to 74 years old, and 26% of men from 75 to 85 years old were sexually active. In this study, 37% of the participants had erectile dysfunction and 4% of them used medicines to achieve an erection [13]. In Gerson's study, the age from 65 to 75 was one of the most important risk factors for erectile dysfunction; in a way that 62.3% of men between 65 and 75 and 21.6% of men between 45 and 55 suffered from erectile dysfunction [26]. Changes in penile vessels and blood circulation, and reduction of androgen, smooth muscles cell, and nitric oxide formation probably increase erectile dysfunction in patients with heart failure as they grow older.

The results of the present study showed that with reduction in left ventricular ejection fraction, intensity of erectile dysfunction in men with systolic heart failure would increase. This correlates with the findings of Mondress and Jaarsma's study in 1996. In their study, they indicated that reduction in left ventricular ejection fraction had a negative impact on sexual interest, sexual function and marital relationships [17, 27]. Reduction of left ventricular ejection fraction probably limits penile vessels congestion possibility to achieve enough erection and as a result helps erectile dysfunction.

The present study suggested that a decrease in hemoglobin level is associated with an increase in the intensity of erectile dysfunction. This finding is similar to the results of Apostolo's study that showed a relationship between blood hemoglobin level and erectile dysfunction in men with heart failure [16]. Anemia may intensify sexual dysfunction by reducing tolerance level of activity and causing fatigue.

In the present study, there was a relationship between blood cholesterol level and erectile dysfunction. This finding correlates with the results of Vorntzez and Smith's study which showed a relationship between an increase in blood cholesterol level and erectile dysfunction [28, 29].

A systematic study done by Meiner indicated that dyslipidemia and hyperlipidemia increase the possibility of vascular disorders related to erectile dysfunction [30]. Therefore, perhaps lifestyle modification through nutrition, exercise and appropriate medication to control and decrease blood cholesterol can reduce the intensity of erectile dysfunction in men with heart failure.

There was a significant relationship between erectile dysfunction and education and occupation in the present study; in a way that the highest rate of erectile dysfunction was related to the uneducated and retired people. This finding is consistent with the results of Hameldon's study. He believes that demographic and social variables such as education and occupation are associated with sexual dysfunction [31].

In the present study, men with heart failure who also suffered from renal disease had more severe erectile dysfunction. This finding is consistent with the results of Jaarsma's study that showed chronic diseases together with heart failure is associated with an increase in the intensity of erectile dysfunction [6]. In Palmer's study, the incidence of sexual dysfunction in men with chronic renal failure undergoing hemodialysis was reported to be 86.6% [32]. Similarly, in

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Nasir's study, 71% of men undergoing dialysis had erectile dysfunction [33]. It seems that mental and psychological factors, atherosclerosis process intensification in renal diseases, hormonal changes in the form of hyperprolactinemia and reduction in serum testosterone level, and side effects of controlling blood pressure medications increase erectile dysfunction in men with heart failure and renal function disorder.

In the present study, men with systolic heart failure who were treated with the drug digoxin had more erectile dysfunction. This is consistent with the findings of Rastogi's study which showed that the side effects of some drugs such as digoxin are related to erectile dysfunction in men with heart failure [11]. Schwartz claimed that the use of digoxin was associated with an increase in the incidence of erectile dysfunction; in a way that there was a relationship between an increase in estrogen level and a decrease in lutein hormones and testosterone and the use of digoxin. Digoxin also causes dysfunction in nitric oxide production and disorder in vascular smooth muscles [34].

In the present study, men with heart failure treated with angiotensin receptor blockers had more erectile dysfunction. This correlates with the findings of Rastogi's study [11]. Nevertheless, some studies have revealed that angiotensin receptor blockers have helped sexual function [34, 36].

In the present study, men with systolic heart failure who were treated with beta blockers had more erectile dysfunction. These findings are similar to the results of Rastogi's study [11]. Sylvestrey's study suggested that 31% of patients with cardiovascular problems had faced sexual disorders after starting treatment with atenolol due to its side effects [37]; however, Coroic Shank's study indicated that metoprolol and atenolol had no effect on sexual function [38].

In the present study, men with heart failure who were treated with diuretics had more erectile dysfunction. This finding correlates with the results of Apostolo's study which showed there was a relationship between the use of diuretics and erectile dysfunction [16]. Buranakit Jaron also found out that treatment with diuretic in men caused sexual dysfunction (CI=95% 1.3-2.8, OR=1.9]. In general, side effects of medications can affect patients in following medicinal instructions. Since some medicines cause or intensify erectile dysfunction in men with heart failure, their negative effects on different aspects of patients' life, including sexual aspect, can influence on following medicinal instructions.

The present study showed that men with systolic heart failure who had more severe erectile dysfunction suffered from a deeper depression. This is consistent with the results of other researchers who revealed that mood disorders and depression are associated with erectile dysfunction [34, 40, 41]. Like depression which is followed by a decrease in sexual preferences, mental and psychological factors also bring about sexual disorders in men with systolic heart failure.

The present study revealed that men with higher intensity of erectile dysfunction experience lower quality of life. This correlates with the results of the studies carried out by Schwartz [10] and Fritaz [42]. It seems that sexual function is an important aspect in the quality of life of patients with heart failure; in a way that its dysfunction reduces the quality of life and negatively affects interpersonal relationship, and mental and psychological aspects.

Conclusion

In the present study, erectile dysfunction was common among patients with systolic heart failure and was related to factors such as age, occupation and education, left ventricular ejection fraction, hemoglobin and cholesterol level, renal disease, type of medications, depression and quality of life. The main limitation of this study was ignoring the control group. It is suggested that further studies are done to determine the frequency of erectile dysfunction in men with diastolic failure.

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