

Sexual dysfunction in males with systolic heart failure and associated factors

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Abstract

BACKGROUND: Erectile dysfunction (ED) is the inability to achieve or maintain the adequate erection for intercourse. Heart failure is a major risk factor for erectile dysfunction. The aim of this study was to investigate the prevalence and factors associated with erectile dysfunction in systolic heart failure.

METHODS: In a cross-sectional study 100 male patients with systolic heart failure were selected using convenience sampling method. IIEF-5 questionnaire (the International Index of Erectile Function, 5-item version), MLHFQ (Minnesota Living with Heart Failure Questionnaire) and CES-D (Centre for Epidemiologic Studies Depression Scale) were used to obtain data.

RESULTS: Mean score of erectile dysfunction was 14.02 ± 6.26 and 80% of heart failure patient had erectile dysfunction. Erectile dysfunction was significantly associated with 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 (ED) was common in systolic heart failure and was associated with age, medical conditions, co morbidities, drugs for treatment and psychological disorders. In heart failure patients erectile dysfunction had negative impact on quality of life.

Keywords: Heart Failure, Erectile Dysfunction, Depression, Quality of Life.

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Introduction

Heart failure is a clinical syndrome caused by the inability of the heart to pump sufficient amount of oxygenated blood needed for maintaining body metabolism. Heart failure is classified as systolic and diastolic. Systolic heart failure is related to reduced or weakened pumping action of the heart and diastolic is related to failure of myocardium to relax and the ventricles to be filled during diastole.¹ Low exercise tolerance, fatigue and apnea significantly affects the quality of life in these patients,² ultimately leading to reduced occupational performance, economic problems,³ impairment in daily functioning, reduced independence, increased reliance on others for self-care activities, social isolation, impaired sexual activity and altered roles in family and society.³⁻⁴

Sexual activity is an important determinant of life quality. Sexual dysfunction reduces the quality of life in patients with heart failure,⁶ by decreasing libido, decreasing intercourse and sexual dissatisfaction.⁷ Erectile dysfunction is defined as the inability to

achieve and maintain erection to perform satisfactory sexual intercourse with a partner.⁸ Studies conducted by Medina et al. indicated that 74% of patients with heart failure had erectile dysfunction while 51% had orgasmic disorder.⁹ A study performed by Schwarz et al. showed that occurrence of erectile dysfunction in patients with heart failure was 84%.¹⁰ It was 75% in the study by Rastogi et al.¹¹ Erectile dysfunction is a consequence of several factors including psychiatric, neurological, hormonal and vascular related problems and also the side effect of various drugs.⁷ Multiple factors are related to erectile dysfunction in men with heart failure including aging,^{12,13} smoking,¹⁴ body mass index,¹⁵ other chronic diseases such as hypertension, diabetes, chronic obstructive pulmonary disease, ischemic heart disease, hyperlipidemia, anaemia,^{16,17} severity of heart failure and left ventricular ejection fraction.¹⁸ Drugs such as digoxin, beta-blockers, diuretics and spironolactone can cause erectile dysfunction.¹¹

Social attitude towards sexual health has changed

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over the past decades¹⁹ and many researchers have emphasized the importance of recognition and treatment of sexual dysfunctions.²⁰ As patients with chronic heart failure are continually increasing, it is important to recognize factors affecting sexual dysfunction in an effort to improve quality of life in these patients.

Materials and Methods

In this cross-sectional study a total of 100 men with systolic heart failure (HF) were studied for the presence of erectile dysfunction (ED) and associated factors. The subjects were selected among patients admitted to Alborz hospital and Shahriar hospital in Karaj, Iran in 2010 using convenience sampling method. A total of 100 patients with HF met inclusion criteria including being married, 1 year minimum history of HF, ejection fraction below 40%, and no history of psychiatric disease, depression and infertility. The assistant researcher visited the mentioned hospitals daily and collected the required data via interviewing and explaining the research objectives. Demographic information such as age, marital status, education, smoking was collected as well as information on duration of disease, the type of chronic disease with heart failure, consumed drugs, left ventricular ejection fraction (LVEF) based on echocardiography, body mass index (BMI), serum haemoglobin and cholesterol level. International Index of Erectile Function-5 items (IIEF-5), Minnesota Living with Heart Failure Questionnaire (MLHFQ) and Centre for Epidemiologic Studies Depression Scale (CES-D) were filled.

In the current study smoking was defined as smoking at least two cigarettes per day for one year. BMI was calculated by dividing weight (kg) to height (cm) squared. Patients were asked to put their backs to the wall with knees, hips, shoulder and head aligned and without any shoes on and their height were measured with at 1 cm precision. The IIEF-5 included 5 questions which were filled based on the 5-point Likert scale. The points ranged 5 to 25 and points below 21 indicated erectile dysfunction. Subjects were categorized based on their points into the following groups: severe erectile dysfunction (5 to 10), moderate erectile dysfunction (11 to 15), mild erectile dysfunction (16 to 20) and normal (25 to 21). The reliability coefficient for this scale was reported as 96% by Bener et al.²¹

MLHFQ was designed to assess the quality of life in patients with heart failure. This questionnaire shows patients awareness regarding the effects of heart failure on physical, socioeconomic and mental

aspects of life.²² Questions were given a rating of 0 to 5, indicating the best and the worst status, respectively. Therefore the quality of life declined with higher ratings. This questionnaire is highly accredited and is reliable compared to other questionnaires. In the study performed by Rector the reliability coefficient of this instrument was reported to be 94%.²²

CES-D questionnaire consisted of 20 items measuring the severity of depression using a 4-point Likert scale (0 to 3). In this questionnaire, 0 indicated rarely or never (below 1 days), 1 little (1-2 days), 2 occasionally (3-4 days) and 3 indicated often (5-7 days). According to the total scores of this tool, the scores less than 15 indicated normal depression, scores 15-21 indicated mild to moderate depression and scores higher than 21 indicated severe depression.^{23,24} In the study by Clark et al. the reliability coefficient of this questionnaire was found to be 0.85.²⁵ In order to determine the scientific validity of the mentioned tools, content validity was confirmed by studying scientific references. In the current study test re-test method was used to determine the reliability coefficient of the questionnaire. For this reason, questionnaires were filled with 10 heart failure patients at two stages with 10 days interval and correlation of them was measured. In the present study Cronbach's alpha coefficient was found to be 0.78 for IIEF-5 questionnaire, 0.70 for MLHFQ and 0.84 for CES-D.

The ethical aspect of this study were considered including permission from the hospital officials, providing the hospital officials with required paper work, presenting the researcher to the study subjects and explaining the aims and procedures to them, obtaining a written informed consent from the subjects, providing the freedom to abandon the study at any stage, being compatible with social beliefs and giving the patients and officials the assurance of declaring the results. SPSS version 14 was used for data analysis. Data were described using proportion, mean and standard deviation. Pearson correlation coefficient, students't-test for independent groups and one way ANOVA were used for data analysis. Level of significance was considered 0.05 in the present study.

Results

With respect to economical status, 46% were at medium level. Forty two percent of subjects had primary education and 51% were retired. Sixty two percent of participants were non-smokers. The most

accompanying diseases were hypertension (33%) and diabetes (33%). Forty one percents of the subjects were treated with digoxin, 38% with diuretics, 29% with ACE inhibitors, 5% with calcium channel blockers, 19% with beta blockers, 74% with nitrate, 35% with angiotensin receptor blockers and 8% were treated with spironolactone. Table 1 shows some measured factors among the study population.

The mean erectile dysfunction score was 14.02 ± 6.26 . Eighty percent of subjects had erectile dysfunction in which 36% was severe 26% moderate and 18% mild. The mean depression score was 20.31 ± 12.06 and the mean point for overall quality of life was 41.61 ± 21.30 . As illustrated in table 2, significant difference was seen in mean erectile dysfunction

between education groups ($P = 0.019$) and occupation groups ($P = 0.002$).

Pearson correlation coefficient showed a significant relationship of haemoglobin level ($P = 0.003$) and LVEF ($P = 0.030$), blood cholesterol ($P = 0.001$), depression ($P < 0.001$) and quality of life ($P < 0.001$) with erectile dysfunction (Table 3). As illustrated in table 4, a significant difference in mean erectile dysfunction with respect to renal disease ($P = 0.009$) was found.

As table 5 shows, the mean erectile dysfunction score was significantly different with respect to the consumption of digoxin ($P = 0.014$), angiotensin receptor blockers ($P < 0.001$), beta blockers ($P = 0.001$) and diuretics ($P = 0.035$).

Table 1. The range and mean of some measured factors among study population

	Mean	Range
Age (Years)	59.230 ± 11.690	34-88
Duration of heart failure (Years)	4.590 ± 2.950	1-15
Monthly income (Thousand Rials)	486.000 ± 2.547	2,000-24,000
Body Mass Index (BMI)	26.180 ± 4.470	18.52-48.44
Left ventricular ejection fraction (LVEF) (%)	35.190 ± 7.430	10-40
Haemoglobin level (g/dl)	14.320 ± 1.860	9.9-20.3
Cholesterol level (mg/dl)	171.98 ± 43.21	103-327

Table 2. Comparison of erectile dysfunction points with respect to background characteristics in men with systolic heart failure

		Erectile dysfunction
		Mean \pm SD
Education	Illiterate	10.610 ± 4.310
	Primary	12.850 ± 5.890
	Guidance school	15.470 ± 5.750
	High school	15 ± 7.520
	Diploma and Advanced Diploma	19.500 ± 7.720
	Bachelor and upper	19 ± 5.780
Statistical test		$t = 2.861$ $P = 0.019$
Economic situation	Good	15.700 ± 6.530
	Moderate	15.190 ± 6.150
	Poor	12.400 ± 6.070
	Statistical test	$t = 2.716$ $P = 0.071$
Job	Unemployed	12.400 ± 6.200
	Retired	11.840 ± 5.850
	Self-employed	17.370 ± 5.160
	Employee	18.500 ± 4.950
	Farmer	16.660 ± 3.050
	Other	16.500 ± 6.920
Statistical test		$t = 4.158$ $P = 0.002$
Smoking	Positive	14.180 ± 6.100
	Negative	13.910 ± 6.400
	Statistical test	$t = 0.204$ $P = 0.839$

Table 3. Correlation of erectile dysfunction points with other numerical factors in men with systolic heart failure

	P	r
Age (year)	< 0.001	0.417
Income (Rials)	0.576	0.057
Duration	0.133	0.151
Serum Cholesterol (mg/dl)	0.001	0.322
Hemoglobin (g/dl)	0.003	0.295
Left ventricular ejection fraction (%)	0.030	0.217
Body Mass Index (BMI)	0.234	0.120
Depression score	< 0.001	0.608
Quality of life score	< 0.001	0.556

Table 4. Comparison of the mean erectile dysfunction point with regards to other accompanying diseases in men with systolic heart failure

		Erectile dysfunction
		Mean \pm SD
Diabetes	Positive	13.57 \pm 6.05
	Negative	14.23 \pm 6.39
	Statistical test	t = 0.496 P = 0.621
Hypertension	Positive	15.45 \pm 6.31
	Negative	13.31 \pm 6.16
	Statistical test	t = 1.621 P = 0.108
Renal disease	Positive	8.14 \pm 2.91
	Negative	14.46 \pm 6.23
	Statistical test	t = 2.652 P = 0.009
Chronic obstructive pulmonary disease	Positive	14.65 \pm 6.89
	Negative	13.83 \pm 6.09
	Statistical test	t = 0.550 P = 0.584
Ischemic heart disease	Positive	14.66 \pm 6.16
	Negative	13.81 \pm 6.32
	Statistical test	t = 0.578 P = 0.564
Asthma	Positive	9.60 \pm 4.77
	Negative	14.25 \pm 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 of which 36% had severe erectile dysfunction. This finding is consistent with the results of other studies. In studies conducted by Medina et al.⁹ Schwarz et al.¹⁰ and Rastogi et al.¹¹ the prevalence of erectile dysfunction in HF¹ patients was found to be 74%, 84% and 75%, respectively. Our findings confirmed that sexual activity is altered in patients with systolic heart failure.

In the current study, statistically significant relationship was found between age and erectile severity. This is in line with the findings of Apostolo et al.¹⁶ and Steinke et al.¹⁵ which showed a relationship between age and erectile dysfunction in men with systolic heart failure. It is postulated that altered penile vasculature, reduced penile circulation, reduced androgen, reduced smooth myocytes,

reduced nitric oxide production are involved in severe erectile dysfunction in the elder patients with HF. Our findings suggested that following a decrease in LV ejection fraction, erectile dysfunction is aggravated in men with systolic heart failure. These are consistent with the findings of Mandras et al.¹⁷ and Jaarsma et al.²⁶ that showed sexual desire, sexual function and intercourse are negatively affected by reduced LV ejection fraction. It is estimated that lowered ejection fraction restricts vascular congestion in the penis ultimately leading to erectile dysfunction.

The present study showed that reduced haemoglobin levels are associated with an increase in the severity of erectile dysfunction. This is consistent with the results of Apostolo et al. who demonstrated that blood haemoglobin levels and erectile dysfunction are related in men with HF.¹⁶ Anaemia presumably deteriorates erectile dysfunction by reducing tolerance

for activity and causing fatigue. In the current study, reduced blood cholesterol level was related to erectile dysfunction. This finding was in agreement with the results of Vrentzos et al.²⁷ and Smith et al.²⁸ who showed that elevated cholesterol levels are related to erectile dysfunction. Findings of another study conducted by Miner and Billups suggested that dyslipidemia and hyperlipidemia enhance vascular disorders related to erectile dysfunction.²⁹ Therefore, improving life style with nutrition, exercise and medications for reducing and monitoring blood cholesterol levels can significantly reduce the severity of erectile dysfunction in men with HF.

In this study, erectile dysfunction was found to be significantly related to education and profession in which the highest rate of erectile dysfunction was found in illiterate and retired subjects. This is consistent with the results of Holden et al. who revealed that demographic and social variables are

related to erectile dysfunction.³⁰ Our findings showed that erectile dysfunction was more severe in HF patients who also suffered from kidney disease. This is in line with the findings of Jaarsma who stated that the concurrence of chronic diseases with HF is associated with more severe erectile dysfunction.⁶ In a study by Makarem et al. the prevalence of erectile dysfunction in men with chronic kidney failure under haemodialysis was reported to be 86.6%.³¹ In a study by Nassir, 71% of men under dialysis were found to have erectile dysfunction.³² It seems that mental factors, progression of atherosclerosis in kidney disease, hormonal alterations as in hyperprolactinemia, lowered serum testosterone levels and blood pressure controlling drugs all play a role in the aggravation of erectile dysfunction in men with HF along with kidney failure.

Men with systolic heart failure treated with digoxin had more severe erectile dysfunction. This is consistent with the findings of Rastogi et al. who

Table 5. Comparison of the mean erectile dysfunction point with regards to various drug intakes in men with systolic heart failure

Drug history	Erectile dysfunction	
		Mean \pm SD
Digoxin	Positive	12.19 \pm 6.09
	Negative	15.28 \pm 6.14
	Statistical test	t = 2.492 P = 0.014
Angiotensin-converting Enzyme Inhibitor	Positive	15.27 \pm 6.21
	Negative	13.50 \pm 6.25
	Statistical test	t = 1.286 P = 0.202
Angiotensin blockers	Positive	10.62 \pm 4.77
	Negative	15.84 \pm 6.23
	Statistical test	t = 4.312 P < 0.001
Spirolactone	Positive	10.37 \pm 5.37
	Negative	14.33 \pm 6.26
	Statistical test	t = 1.733 P = 0.086
Diuretics	Positive	12.34 \pm 5.95
	Negative	15.04 \pm 6.27
	Statistical test	t = 2.135 P = 0.035
Nitrate	Positive	14.29 \pm 6.46
	Negative	13.23 \pm 5.70
	Statistical test	t = 0.745 P = 0.458
Beta-blocker	Positive	9.84 \pm 4.65
	Negative	15 \pm 6.20
	Statistical test	t = 3.398 P = 0.001
Calcium Chanel blocker	Positive	11 \pm 3.80
	Negative	14.17 \pm 6.33
	Statistical test	t = 1.107 P = 0.271

showed that the side effects of certain drugs including digoxin are related to the severity of erectile dysfunction in men with HF.¹¹ A study conducted by Schwarz et al.⁷ claimed that the use of digoxin was associated with higher incidence of erectile dysfunction with an increase in estrogen levels and decrease in testosterone and luteal hormone following digoxin treatment. Moreover, digoxin inhibits nitric oxide production and impairs smooth muscle function in the vessels.⁷ In this study, men with HF treated with angiotensin receptor blockers had more severe erectile dysfunction. This was concordant with the results of Rastogi et al.¹¹ However some studies have associated angiotensin receptor blockers and angiotensin converting enzyme inhibitors with improved sexual performance.^{7,33,34} In the current study, men with systolic HF treated with beta blockers had more severe erectile dysfunction. This was similar to the results of Rastogi et al.¹¹ A study performed by Franzen et al. revealed that 31% of cardiovascular patients showed drug related erectile dysfunction following the use of atenolol.³⁵ However, results found by Cruickshank et al. showed that metoprolol and atenolol have no effect on sexual performance.³⁶

In this study HF patients treated with diuretics were found to have more severe sexual dysfunction. This finding was similar to the results of Apostolo et al. who showed a relationship between diuretic consumption and sexual dysfunction.¹⁶ Buranakitjaroen et al.³⁷ also revealed that treatment with diuretics in men was a predictor of sexual dysfunction. Basically, drug side effects can affect patient's adherence to the administered drugs. The present study revealed that male HF patients with more severe sexual dysfunction also suffered from higher degrees of depression. This is consistent with the results of other studies which found depression is related to erectile dysfunction.^{7,38,39} It seems that while depression is associated with lower sexual desire, mental and psychiatric factors could reciprocally affect the emergence of erectile dysfunction in men with systolic HF. This study indicated that men with more severe erectile dysfunction experience a lower quality of life. This is consistent with the findings of Schwarz et al.¹⁰ and Freitas et al.⁴⁰ It appears that sexual performance is an important aspect of life in which its impairment can affect personal relations and mental states in patients with systolic heart failure. The main limitation of this study was the absence of control group. Further studies are needed to determine the prevalence of erectile dysfunction in men with diastolic heart failure. This study was part of a research project with the code 1/11972.

In conclusion, erectile dysfunction was prevalent

in patients with systolic heart failure and it was related to factors such as age, occupation, education, left ventricular ejection fraction, haemoglobin and cholesterol levels, kidney disease, medications, depression and quality of life.

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Conflict of Interests

Authors have no conflict of interests.

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