

Sexual Dysfunction in Female Scleroderma Patients and Its Correlation with Vascular Involvement

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The current study investigated sexual dysfunction in scleroderma patients and its relation to vascular involvement. This case-control study was conducted on 80 married female scleroderma patients aged between 20-60 years. Eighty normal individuals adjusted for age, place of residence, and socioeconomic status were also recruited. Sexual performance was assessed in both groups using the FSFI standardized questionnaire, which evaluated the 6 domains of desire, arousal, lubrication, orgasm, satisfaction, and pain. Micro- and macro-vascular involvements of the patients were also determined using the Raynaud condition score, echocardiography, a physical exam assessing their digital ulcers, and a review of their medical records for a past or present history of renal crisis or thromboembolic events.

The total FSFI score of the case group was significantly lower than that of the control group (16.68 ± 6.35 , 19.69 ± 6.01 , P value < 0.001) in all domains of sexual dysfunction except for pain and lubrication. Moreover, the mean score of FSFI was found to be significantly lower in the limited form of the disease compared to the diffuse one (14.6 ± 6.9 , 18.1 ± 5.5 , P value = 0.01). No significant association was found between vascular complications and sexual impairment among scleroderma patients.

This study is the first to investigate sexual dysfunction in Iranian female scleroderma patients and assess its relation with vascular complications of the disease. Thus, it can be a guide for future studies on sexual dysfunction, especially in societies with cultural limitations in discussing sexual issues.

Keywords: Scleroderma, Sexual Dysfunction, Vascular Complications

Introduction

Systemic Sclerosis (scleroderma, SSc) is an autoimmune disorder characterized by multi-organ dysfunction which ultimately leads to multiple clinical and psychological complications [1]. Sexual dysfunction (SD) was previously reported to be one of the prevalent complications of females with autoimmune diseases like rheumatoid arthritis (RA) (2-4). Despite its high prevalence and great impact on the quality of life of both female and male patients, few studies have been done on sexual impairment in scleroderma patients, and it remains virtually neglected in clinical practice [1, 5].

Although the majority of SSc patients are female, most previous studies on sexual disorders in these patients have investigated erectile dysfunction in men [6, 7]. Accordingly, the most recent studies have tried to focus more on sexual complications in female SSc patients. Previous studies have reported that sexual distress increased and sexual function

as well as relationship quality decreased in female SSc patients [8, 9]. Among the various factors leading to SD, pain was mentioned to be the most important indicator of sexual function in SSc patients [10].

In addition to assessing the prevalence of SD in SSc patients, some studies have tried to focus on the correlation of this complication with other clinical presentations of the disease, specifically vascular involvement. Rosato et al. declared that digital vascular damage is negatively correlated with SD and relationship quality in female SSc patients [8]. However, the correlation between SD and vasculopathy in SSc still remains debatable [11].

SD is a multifactorial problem affected not only by physical complications of the disease, but also by psychological and cultural factors. Social and cultural limitations in countries like Iran may result in physicians neglecting the sexual complaints of patients. This negligence occurs while studies

in other parts of the world report SD to be one of the most common complications of SSc and one that should be considered by physicians in their daily practices [12, 13].

Nonetheless, there has been no report on this complication of scleroderma among Iranian female patients. Therefore, the current study attempted to investigate specifically the sexual complications experienced by female SSc patients. As mentioned, the relation between SD and the vascular complications of scleroderma remains unclear. The present study further aimed to determine whether a correlation existed between vascular complications and SD in the participating SSc patients.

Materials and Methods

Study Design

This case-control study investigated 80 married female SSc patients whose disease was diagnosed based on LeRoy criteria [14]. The patients were aged between 20 and 60 years and were recruited from among 500 female SSc patients who registered in the Rheumatology Tertiary Centers of Shiraz University of Medical Sciences from 2010 to 2018. The patients were selected by computer-based block randomization divided by 4. Eighty healthy, sexually active females who were willing to discuss their sexual relationship were also recruited as the control group. They were matched with participants in the case group based on age, place of residence, and socioeconomic status.

Socio-demographic Data Gathering

The age, place of residence, socioeconomic status, duration of the disease, and type of scleroderma of each patient were determined and gathered on prepared data sheets. The same demographic information was also collected from individuals in the control group. The socioeconomic status of both case and control groups was assessed based on Kuppaswamy's socioeconomic status (SES) scale [15].

Assessing Sexual Performance

To assess SD, the FSFI standardized questionnaire was administered to collect data on the sexual function of patients in the 4 weeks preceding the study [16]. This tool is a brief, 19-item questionnaire which assesses sexual function in 6 domains: desire (2 items), arousal (4 items), lubrication (4 items), orgasm (3 items), satisfaction (3 items), and pain (3 items). The score of each domain as well as the

total score were calculated. A cutoff score of 26 was considered as the criterion for impaired sexual function [17].

The patients were also questioned on their willingness to be asked about sexual problems by their clinician.

Assessing Vascular Involvement in Patients

Vascular complications of patients were classified into micro- and macrovascular involvements.

For microvascular complications, Raynaud phenomenon and its severity were assessed using the Raynaud condition score (RCS) [18]. The number, site, and maximum diameter of each patient's digital ulcers were also measured. Moreover, each patient underwent videocapillaroscopy to assess the stage of the disease and the severity of the microvascular involvement. The presence or absence of pulmonary arterial hypertension (PAH) was determined using echocardiogram.

For macrovascular complications, each patient's medical record and physical exam at the time of the study were applied to exclude renal crisis and thromboembolic events in the course of the disease.

Ethical Issues

Informed consent to the entire protocol as well as signed forms compatible with the Helsinki Declaration were obtained from each patient [19]. Ultimately, those who agreed to enter the study were recruited.

Statistical Analysis

Data was entered in SPSS 19. Descriptive analysis was applied for demographic data. The Mann-Whitney U test was used to compare quantitative variables between the case and control groups. The chi-square and Spearman correlation analyses were also applied to determine any correlations between variables. In all studies, a p-value less than 0.05 was considered significant.

Results

In this study, 80 married female SSc patients with a mean age of 42 ± 9 years and mean disease duration of 9 ± 6 years were enrolled in the case group. Eighty married female patients with a mean age of 41 ± 6 years were included in the control group. Patients' demographic information is summarized in Table 1.

Sexual dysfunction in the 6 previously mentioned do-

Table 1. Demographic information of scleroderma patients

Demographic Information of Case Group	Frequency and Mean
Place of living [No. (%)]	
1. Urban	48(60)
2. Rural	32(40)
Socioeconomic Status [No. (%)]	
1. Low	17(21)
2. Middle	63(78)
3. High	0(0)
Type of Disease [No. (%)]	
1. Diffuse	44(55)
2. Limited	36(45)
Duration of the disease (Mean \pm SD)	9.4 \pm 6
Age at the time of study (Mean \pm SD)	39 \pm 9

mains was assessed. The mean scores of the case and control groups were compared and are summarized in Table 2. The total scores of the two groups were also compared and are presented in Figure 1. Seventy-nine of the 80 SSc patients were estimated to have SD based on their FSFI scores; yet, 74 of the 80 normal healthy individuals in the

control group showed scores below 26.

Fifty-one (63.7%) of the patients believed that the disease generally impacted their sexual function. Thirty-nine (48.7%) patients were willing to be questioned about this issue in follow-ups with their own rheumatologists.

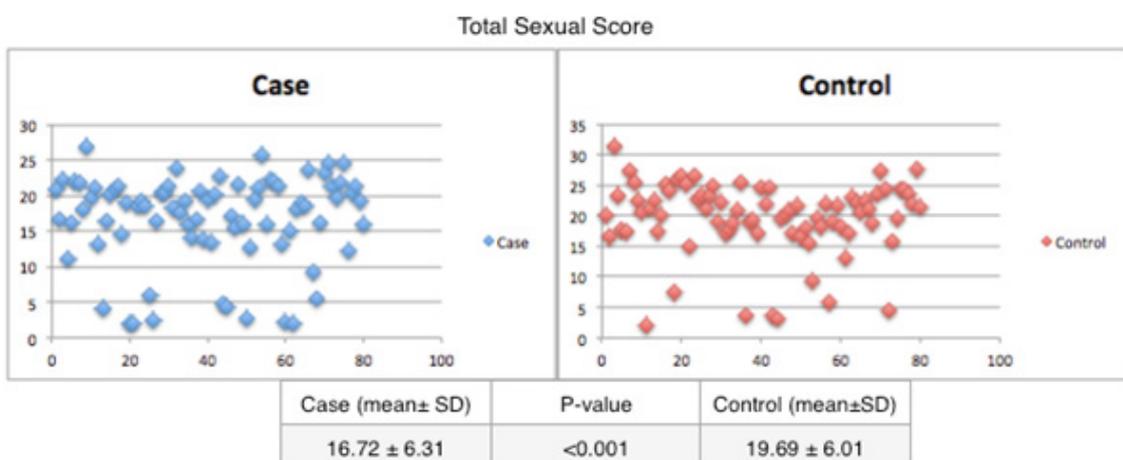
**Figure 1.** Comparing total score of female sexual functional index (FSFI) between case and control group

Table 2. Comparing sexual dysfunction scores between case and control groups.

Sexual Dysfunction Scores	Case (Mean ± SD)	Control (Mean± SD)	P value
Desire	2.43 ±0.99	3.39 ±0.93	< 0.001
Arousal	2.43 ±1.46	3.49 ±1.41	< 0.001
Lubrication	2.76 ±2.74	2.74 ±1.15	0.78
Orgasm	2.87 ±1.37	3.38 ±1.13	0.005
Satisfaction	3.50 ±1.66	4.27 ±1.58	0.004
Pain	2.77 ±2.05	2.44 ±1.34	0.601
Total Score	16.68 ±6.35	19.69 ±6.01	< 0.001

P value < 0.05 is considered to be significant.

Forty-six patients had the diffuse type of scleroderma, and 34 had the limited type. FSFI scores were also compared between these two main types of the disease, and the results are summarized in Table 3.

Reviewing the vascular complications of the patients demonstrated that all of them had microvascular involvement, either in the form of Raynaud, digital ulcers, or pulmonary arterial hypertension. From 80 SSc patients, 21 had at least one digital ulcer. All but 7 patients had experienced at least one Raynaud attack. Reviewing macrovascular involvements showed that only 3 patients had such a complication in the form of deep venous thrombosis (DVT) (1 patient) or deep arterial thrombosis (DAT) (2 patients). Twenty patients were determined to have pulmonary hypertension. The number, duration, and severity of the Raynaud phenomena as well as the number and mean diameter of the largest of the patients' digital ulcers are summarized in Table 4.

Capillaroscopy was also performed for all patients. Eighteen patients showed early, 19 late, and 30 active pat-

tern SSc, and only one showed the non-active form of SSc.

Comparing the mean score of SD of the patients based on their vascular involvements revealed no relationship between macrovascular complications of scleroderma and sexual impairment scores. Nonetheless, among microvascular involvements, significant correlations were found between SD score and duration of Raynaud attack ($r = -0.227$, P value = 0.044) and severity of Raynaud attacks ($r = -0.227$, P value = 0.043). No significant correlation was found for number of Raynaud attacks ($r = -0.088$, P value = 0.44).

SD scores of patients who had PAH showed no significant difference compared with those without PAH. Moreover, no significant difference was found in patients' SD scores based on their capillaroscopy results or number, duration, or severity of Raynaud attacks. The association between both the number and the size of digital ulcers and SD scores showed a significant correlation ($r = -0.23$, $p = 0.04$ and $r = -0.23$, P value = 0.042, respectively).

Table 3. Comparing mean of sexual dysfunction score between two major types of the disease.

Sexual Dysfunction Score	Diffused (mean ±SD)	Limited (mean ± SD)	P value
Total Score	18.1 ±5.5	14.6 ±6.9	0.01
Desire	2.5 ±1	2.2 ±0.9	0.16
Arousal	2.7 ±1.4	2 ±1.4	0.06
Lubrication	3 ±1.2	2.4 ±1.4	0.03
Orgasm	3.1 ±1.2	2.4 ±1.4	0.01
Satisfaction	3.8 ±1.6	3 ±1.6	0.04
Pain	2.8 ±1.8	2.6 ±2.3	0.56

P value < 0.05 is considered to be significant.

Table 4. The summary of the number, duration and severity of Raynaud attacks as well as the number and mean of digital ulcers.

	Minimum	Maximum	Mean	Standard Deviation
1. No of attack of Raynaud	0.00	9.00	2.4	1.7
2. Mean Duration of the Raynaud attacks (Minutes)	0.00	60.00	8.09	10
3. Severity of patients Raynaud attacks	0.00	10.00	4	3
4. Number of digital ulcers	0.00	4.00	0.37	0.8
5. Mean of digital ulcers (Millimeter)	0.00	5.00	0.5	1.1

Discussion

Among the various complications of scleroderma, SD is a major issue in both male and female patients, and it greatly impacts the quality of life of these patients [1]. In a study in Canada by Levis et al., 181 of 296 sexually active SSc patients were found to have SD, mainly due to pain and poor lubrication [12]. A different survey detected that the mean FSFI score was significantly lower in SSc patients [24.9] compared with the normal population (30.5) [20]. The current results also demonstrated that the total SD score was significantly lower in SSc patients (16.68 ± 6.35) compared with the normal population (19.69 ± 6.01 ; $p < 0.001$). Except for pain and lubrication, the patients' scores in all other domains were significantly lower compared with the normal population in the current study. These results were mainly consistent with previous studies; however, compared to the results of studies done in Canada and USA, the FSFI scores of both patients and normal populations in the current study were lower. Even though the total number of SSc patients was higher than the number of participants in the control group, the control group still had a high number of individuals with SD compared with other similar studies around the world. These differences may, in part, be induced by cultural and social differences between various populations around the world. Cultural limitations may cause females to avoid discussing their sexual problems and seeking therapy to improve their sexual relationships. More multicenter and multiregional studies that focus specifically on this complication of the disease and its differences between various populations of the world which have different cultures and social limitations regarding this topic are necessary.

As mentioned, no significant difference was observed in pain and lubrication scores between the patients and the normal population of the current study. This finding differs from previous studies on the relation of genital tract abnormalities and SD in SSc patients. Vaginal dryness, ulcer, and dyspareunia were significantly more frequent in SSc patients compared with the normal population [21]. Structural alterations to the genital tract were also

considered to be the main causes of SD in female SSc patients [1]. On the other hand, sexual function in patients was more correlated with psychological scores than physical ones [20]. These variations confirm the importance of conducting more qualitative studies as well as applying more specific questionnaires for assessing and comparing distinctly the impact of the physical and psychological aspects of the disease on SD in SSc patients. About half of the patients (48.7%) in the current study were willing to talk about and be asked by their physicians about their sexual problems. Nevertheless, due to cultural and religious limitations existing in Iran, this important patient complaint may be neglected by physicians in this country. Accordingly, rheumatologists should pay more attention to this issue and include it in their daily practices.

The current results further demonstrated that the mean score of SD was significantly lower in patients with limited scleroderma than in those with the diffuse type. In other words, patients with limited scleroderma had a significantly higher rate of sexual impairment than those with the diffuse type. Among the various domains of SD, only pain and desire were shown to have no significant difference between diffuse and limited forms of the disease. However, Knafo et al. reported that patients with diffuse SSc had higher levels of sexual impairment compared with those with limited SSc [22]. No other study was found that assessed sexual function in patients with the two main types of SSc.

Previous studies have suggested a relationship between vascular involvement and SD in SSc patients. Despite the female-dominant prevalence of this disease, most surveys have been done on male SSc patients [11, 23]. Few can be found which assess this complication in female patients. One such study, by Impens et al., detected no clear relation between vascular complications and SD in female SSc patients [11]. The current results demonstrated that there is no relation between macrovascular involvements of systemic sclerosis and SD in female patients. Nonetheless, few patients in the current study had macrovascular complications, which limited the validity of the statistical

analysis on its correlation with SD. However, studying the correlation of microvascular complications showed that the duration and severity of Raynaud attacks as well as the number and size of digital ulcers were correlated with SD scores. The current results further demonstrated that the longer the duration and greater the severity of the Raynaud attacks, the lower the FSFI scores in patients would be, indicating lower sexual function. The same pattern was seen for the correlation between the number and size of digital ulcers and FSFI scores. These results demonstrate that SD in female SSc patients is a complex complication which needs to be considered.

One limitation of the present study was difficulty in finding normal individuals who were willing to complete the questionnaire. This issue stems mainly from the culture and religion of the Iranian society, which made it hard not only for normal individuals recruited as the control group, but also for SSc patients to disclose details on the quantity and quality of their sexual relationships with their partners. Nonetheless, attempts were made to minimize this limitation by obtaining informed consent and providing a private environment for participants to answer the questions. Another limitation of the current study was the existence of confounding factors, such as body image, years of marriage, and age at first intercourse. Due to restrictions in recruiting both patients and normal individuals, these confounding factors were inevitable in this study. In addition, social restraints dictated that participants in both groups be selected only from married females; sexually active unmarried females were excluded. This was also inevitable because of the cultural limitations in disclosing sexual issues with participants. Nonetheless, efforts were made to minimize the effects of these limitations by matching the case and control groups by possible factors, such as age, socioeconomic status,

and place of residence, which were indirectly affected by the mentioned confounding factors. Another limitation of the current study was the exclusion of patient psychological condition, which affects sexual performance. However, as most patients with chronic diseases suffer from psychological diseases, especially depression, all patients in the case group were affected in the same way by a comorbid psychological condition.

Despite the mentioned limitations, this study is the first to investigate sexual impairment in Iranian female SSc patients compared with the normal population. It can be used as a guide for future studies on this complication of SSc, specifically in societies which may neglect this issue in clinical practice due to cultural and religious restraints. This study can also be included in the group of few studies that have investigated the relation between vascular complications as a physical factor and sexual impairment in female SSc patients.

Conclusion

It is concluded that SSc patients have significantly higher rates of SD compared with the normal population. This finding was true for all domains of sexual performance except lubrication and pain. Moreover, patients with the limited form of the disease had significantly lower sexual performance scores compared with those with the diffuse type. No significant association was found between vascular involvements and sexual complications in patients in the current study.

Acknowledgments

The authors thank all those who helped them writing this paper.

Conflict of Interest

The authors declare no conflicts of interest.

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