

ORIGINAL ARTICLE

Spinal cord injury and women's sexual life: case–control study

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Study design: This is a case–control study.

Objective: The objective of this study was to estimate the magnitude of association between spinal cord injury (SCI) and women's quality of sexual life and sexual function.

Setting: This study was conducted in the Brain and Spinal Cord Injury Research Center, Tehran University of Medical Sciences, Tehran, Iran.

Methods: From the referral university-based clinics, we used simple random sampling to recruit 62 women: 31 women with SCI and 31 women without SCI. Socio-demographic and reproductive traits questionnaire, Sexual Quality of life-Female (SQOL-F), Female Sexual Function Index (FSFI) and Spinal Cord Independence Measure (SCIM) were completed using telephone and face-to-face interviews in the cases and controls. After univariate analyses, multivariate linear and proportional odds regression models were conducted to investigate the relation between SCI and women's quality of sexual life, as well as sexual function.

Results: The mean age of cases and controls was 35.42 ± 6.51 and 33.77 ± 4.02 years. Most women were high school-educated and housewives. Adjusting for probable confounders, the proportional odds regression model showed a significant relationship between the spinal cord injury (AOR = 4.2, 95% CI: 1.8–9.2), non-college-educated (AOR = 3.1, 95% CI: 1.2–5.9) and employed (AOR = 1.8, 95% CI: 1.1–1.8) variables and being in one of the moderate or poor quality of life classes. Scores of SQOL-F and FSFI domains, except satisfaction, were significantly worse in cases versus controls ($P < 0.001$).

Conclusion: Although our participants showed low sexual dysfunction, they tended to report moderate to poor quality of sexual life. Our findings support the implication that sexual rehabilitation must be provided for women with SCI soon after injury.

Spinal Cord (2017) **55**, 269–273; doi:10.1038/sc.2016.106; published online 12 July 2016

INTRODUCTION

Spinal cord injury (SCI) resulting in disability affects the sexuality of the affected individual.¹ In the United States, the annual incidence of SCI is up to 40 cases per million.¹ In Iran, the point prevalence of SCI is estimated to be 4.4 (95% CI = 1.2–11.4) per 10 000.² The extent of sexual response changes depends partly on the location and degree of the SCI.^{3,4} Because of a high prevalence of SCI in men, their sexual function post SCI has been widely studied. However, little attention has been given to women's sexuality post SCI. The sexual performance of women may be subject to greater impairment after SCI than men.⁵ Decreased sexual arousal and orgasmic problems are common sexual problems reported by women post SCI.^{3,4} Throughout post SCI life, psychological and emotional factors have an essential role in women's sexual response cycle.⁶ It has been highlighted that women are more prone to depression and psychological disorders after injury than men.⁷

On the basis of our knowledge, limited research has been conducted with Iranian women with SCI because (1) as in other developing

countries, women only comprise approximately 25% of SCI cases;⁸ (2) because of the potential changes in physical, psychological and social role functioning within marital relationships following SCI, marital dissolution may occur post SCI, making it more difficult to conduct research in this population of women,⁹ and women may be easily abandoned post SCI; (3) limited culturally appropriate tools are available to measure women's sexual behaviors, SCI women in particular.^{10,11} However, several invaluable studies have reported sexually related problems in women with SCI.^{12–14} On the basis of recent studies, the prevalence of female sexual dysfunction is estimated to be 87.6% for Iranian women with SCI, and lack of vaginal lubrication was found to be the women's main sexual dysfunction.¹⁵

It seems that the main complaint of women post SCI is partnership dissatisfaction and impairment of intimacy rather than genital experiences. Dissatisfaction adversely affects the quality of women's sexual lives, because sexuality is strongly associated with physical, emotional and psycho-social variables.¹⁶ The aim of this study was to assess the sexual life of women with SCI in two aspects: quality of

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Received 1 August 2015; revised 11 June 2016; accepted 13 June 2016; published online 12 July 2016

sexual life and sexual function. In addition, we tried to determine influencing factors associated with impaired quality of sexual life among women with SCI.

MATERIALS AND METHODS

In this case-control study, 31 Iranian women with SCI and 31 female controls entered the study from August 2014 to February 2015. Women with SCI were recruited by simple random sampling from the Brain and Spinal Injury Research Center registry system in Imam Khomeini Hospital, Tehran/Iran. Brain and Spinal Injury Research Center is a referral center from all parts of Iran, which offers a variety of facilities such as physiotherapy, occupational therapy, psychological consultations, sexual health division, family counseling, and neurosurgery division, urology, proctology, pain clinic and rehabilitation specialists. All women were contacted via their cell phones. Inclusion criteria were at least 18 years of age, sexually active, injury in thoracic or lumbar area, at least 1 year passed since injury and no medical diseases other than SCI affecting their health. Of 205 women with SCI approached via telephone screening, 44 were found to be eligible to enter the study and 161 women were not qualified to be interviewed. The majority of women did not fit our selection criteria because of various factors: 98 women were single (they did not declare sexual activity even if they may have had sexual encounters); 36 women had brain injury; and 27 had cervical (vertebral) injury. Of the 44 eligible women, 31 agreed to participate in the study. The main reason that women gave for declining participation, among 13 women, is that they did not want to report their ideas about sexual life. The control group was recruited from individuals referred to the four health centers affiliated with the Tehran University of Medical Sciences. We randomly selected these centers from health centers scattered across geographical zones, north, south, west and east in the city of Tehran. Using simple random sampling, 31 healthy women entered into the study. All women in the study completed the Sexual Quality of Life-Female (SQOL-F), Female Sexual Function Index (FSFI) and Spinal Cord Independence Measure (SCIM); the case group completed the interviews over the telephone because they could not easily reach the sampling center because of mobility restrictions, whereas women in the control group completed the questionnaires in person. One of the researchers was always present at the research site to answer any questions women might have had.

Measures

Socio-demographic and reproductive traits questionnaire. This questionnaire (10Qs) that was filled out by the woman included information on both herself and her spouse. Measures included age, length of marriage, education, occupation, number and mode of childbirth. This tool also had three questions about clinical features related to the spinal injury, including time since injury (months), level of lesion and the reason for the SCI, as well as neurological status of the woman using the American Spinal Injury Association Impairment Scale¹⁷ recorded in her medical profile.

SQOL-F. The SQOL-F questionnaire is a short measure that specifically assesses the relationship between female sexual dysfunction and quality of life, which was developed by Symonds and colleagues. The basis for generating this measure was Spitzer's Quality of Life (QOL) model that involved physical, emotional, psychological and social components.¹⁸ The SQOL-F questionnaire consists of 18 items, and each item is rated on a six-point response. A higher score indicates better female quality of sexual life. The Iranian version of the SQOL-F has been found to be a valid and reliable measure, and it contains four subscales: psycho-sexual feelings, sexual and relationship satisfaction, self-worth and sexual repression.¹⁹ The domain of psycho-sexual feelings in the SQOL-F questionnaire assesses psychological and sexual senses related to the sexual relationship. The sexual and relationship satisfaction scale also evaluates the level of fulfillment related to the sexual and marital relationship. The domains of self-worth and sexual repression also assess feelings of self-esteem related to one's sexuality and the guilt or shame being associated with sexual impulses, respectively. The measure is a useful instrument to assess female quality of sexual life, with categorical ratings of poor (score range from 18 to 51), moderate (score range from 51 to 84) and good (score > 84).

FSFI. The 19-item FSFI is a multidimensional measure to assess female sexual function. The measure was developed by Rosen *et al.*²⁰ and contains six subscales: sexual desire, arousal, lubrication, orgasm, satisfaction and pain. Each item is rated on a six-point response, with higher scores indicating normal sexual function. The Iranian version of the FSFI has been found to be a valid and reliable measure to assess female sexual dysfunction, with a cutoff value of < 27.²¹

SCIM. The SCIM is a disability scale developed by Catz *et al.* in 1997 specifically for individuals with SCI in order to describe their ability to accomplish activities through their daily life and to make an assessment of those functions with particular regard to changes post SCI.²² In this study, we applied the SCIM version III including 19 items in 3 subscales: self-care rating from 0 to 20, respiration and sphincter management rating from 0 to 40 and mobility rating from 0 to 40. The mobility subscale is subdivided to assess mobility 'in room and toilet' and 'indoors and outdoors, on an even surface'. The total SCIM score ranges from 0 to 100.²²

Statistical analysis

Continuous baseline socio-demographic and questionnaire-based data are presented as mean \pm s.d. and grouped data as frequencies and percentages. Chi-square test or Fisher's exact test were used to determine the independence of the two categorical variables. One-way ANOVA, followed by the LSD test, was undertaken to investigate the mean difference between different FSFI and SQOL-F scores. Pearson's and Spearman's correlation coefficients were used to investigate the correlation between the studied variables and outcome and other independent variables.

The multivariate linear and proportional odds regression models were applied to identify the magnitude of association between the predictor variables and impaired quality of sexual life, as well as function. A forward selection method was used in the analysis, entering all variables that were significant in univariate analysis at $P < 0.20$ into the model at one time.²³ Multicollinearity was checked by calculating the tolerance collinearity statistics and the variance inflation factor, where a tolerance less than 0.2 and variance inflation factor > 5 indicate problems.²³ Statistical analyses were performed by using SPSS 21 (SPSS version 21, IBM, Armonk, NY, USA).

Ethics

The Ethics Committee of Tehran University of Medical Sciences approved the study. All participants were informed about the research objectives by the trained research assistant. The participants were assured that their confidentiality would be maintained. Verbal and written informed consent was obtained from all participants.

RESULTS

The mean age of participants in the case and control groups was 35.42 ± 6.51 and 33.77 ± 4.02 years, respectively. Most women were housewives: 29 (93.5%) cases and 23 (74.2%) controls. Twenty-three (74.2%) and 21 (67.7%) participants had completed high school education in the case and control groups, respectively. The socio-demographic characteristics and reproductive traits of the study sample are shown in Table 1.

In the case group, the mean time since injury was 36.32 ± 19.21 months and the frequency of ASIA grade was A in 13 (41.9%), B in 10 (32.3%), C in 5 (19.9%) and D in 3 (5.9%). The most frequent underlying causes of SCI were traffic injuries in 23 (74.2%), fall in 6 (19.3) and side effect of surgery in 2 (6.5%).

The total mean score of SQOL-F was 60.47 ± 1.53 and 75.99 ± 1.52 in the women with SCI group and control group, respectively (Table 2). The score of sexual repression was the minimum score from all SQOL-F domains in the two groups. Our findings from independent sample *t*-tests indicated that the SQOL-F total was significantly lower in the case group compared with the control group ($P < 0.001$). This significant difference between groups was observed in

Table 1 Socio-demographic characteristics and reproductive traits of the study sample

Variables	SCI group (n = 31)	Control group (n = 31)	P-value
Age (mean ± s.d.)	35.42 ± 6.51	33.77 ± 4.02	0.23 ^a
Spouse's age (mean ± s.d.)	39.23 ± 7.07	39.23 ± 5.31	1 ^a
Length of marriage (mean ± s.d.)	13.83 ± 9.37	13.03 ± 5.96	0.68 ^a
Economic index (mean ± s.d.)	30.62 ± 15.58	29.32 ± 11.83	0.05 ^a
<i>Education (N%)</i>			
High school	23 (74.2%)	21 (67.7%)	0.05 ^b
College	8 (25.8%)	10 (32.3%)	
<i>Occupation (N%)</i>			
Housewife	29 (93.5)	23 (74.2)	0.06 ^b
Employed	2 (6.5)	8 (25.8)	
<i>Number of childbirth (N%)</i>			
0-2	23 (74.2)	27 (87.1)	0.91 ^a
≥3	8 (25.8)	4 (12.9%)	
<i>Type of delivery (N%)</i>			
Nulliparous	4 (12.9)	4 (12.9)	0.10 ^b
Normal vaginal delivery	14 (45.2)	5 (16.1)	
Cesarean section	13 (41.9)	22 (71)	
<i>Spouse's education (N%)</i>			
High school	22 (71%)	19 (61.3)	0.31 ^b
College	9 (29)	12 (38.7)	
<i>Spouse's occupation (N%)</i>			
Office-employed	10 (32.2)	14 (45.2)	0.56 ^b
Non-office-employed	21 (67.8)	17 (54.8)	

^aStudent's *t*-test.

^bChi-square test.

all domains of SQOL-F: sexual repression, self-worth, sexual and relationship satisfaction and psycho-sexual feelings ($P < 0.001$, $P < 0.006$, $P < 0.02$, $P < 0.007$). A total of 3 (9.7%) women with SCI had poor SQOL, 21 (67.7%) had moderate SQOL and only 7 (22.6%) had good SQOL. However, corresponding values in the control group were as follows: 1 (3.2%) poor, 7 (22.7%) moderate and 23 (74.2%) good SQOL.

The total mean score of FSFI in the cases and controls was 50.54 ± 11.35 and 68.06 ± 19.02 , respectively (Table 2). Of all the FSFI domains, the minimum mean score was for the domain of desire: 3.89 ± 1.56 in the cases and 5.41 ± 1.3 in the controls. By considering the cutoff value < 27 in the Iranian version of the FSFI, 3.2% of women in both groups had sexual dysfunction. Results from independent *t*-tests indicated that FSFI total and subscale scores, except satisfaction, were significantly lower in the case group compared with the controls ($P < 0.001$).

Results from the Pearson's correlation coefficient indicated that there was a strong significant negative correlation between the average score of SQOL-F in the case group and length of marriage ($P = 0.001$, $r = -0.54$), number of childbirths ($P = 0.01$, $r = -0.42$) and spouse's age ($P = 0.03$, $r = -0.29$), indicating that an increase in the length of marriage, number of childbirths and spouse's age correlates with a decrease in the quality of sexual life in women. In the case group, there was a significant positive correlation between SCIM score and the

Table 2 FSFI and SQOL-F domains and scores between women with SCI and controls

Domains	SCI group (n = 31)	Control group (n = 31)	P-value
<i>Mean ± s.d.</i>			
<i>FSFI</i>			
Desire	3.89 ± 1.56	5.41 ± 1.31	< 0.001
Arousal	7.90 ± 3.31	11.70 ± 3.73	< 0.001
Lubrication	7.36 ± 3.05	12.42 ± 3.89	< 0.001
Orgasm	6.12 ± 2.04	8.79 ± 3.25	< 0.001
Satisfaction	9.20 ± 1.82	9.38 ± 3.05	0.77
Pain	5.76 ± 2.66	8.47 ± 2.86	< 0.001
Total score	50.54 ± 11.35	68.06 ± 19.02	< 0.001
<i>SQOL-F</i>			
Psycho-sexual feelings	24.13 ± 8.57	31.84 ± 7.49	< 0.001
Sexual and relationship satisfaction	17.89 ± 3.97	21.03 ± 4.15	0.004
Self-worthlessness	9.63 ± 4.02	11.76 ± 3.01	0.02
Sexual repression	8.80 ± 2.23	11.35 ± 3.21	< 0.001
Total score	60.47 ± 1.53	75.99 ± 1.52	< 0.001

mean score of FSFI ($P = 0.02$, $r = 0.40$) and SQOL-F ($P < 0.001$, $r = 0.87$), respectively, suggesting that higher levels of independence correlate with better sexual function and quality of sexual life in women with SCI.

Our findings from Spearman's correlation coefficients showed that there was a significant positive correlation between education and the average score of SQOL-F ($P < 0.001$, $r = 0.65$) and FSFI ($P = 0.04$, $r = 0.36$) in the case group. It is interpretable that educated people with SCI tend to gather sexually related information from networks, press and the media. Our results therefore indicate that education correlates with better sexual function and quality of sexual life. In addition, there was a significant correlation between spouse's education ($P = 0.008$, $r = 0.46$) and spouse's occupation ($P = 0.04$, $r = 0.36$) with the quality of sexual life in women with SCI.

Results from multivariate linear regression models indicated that spinal cord injury ($P < 0.001$, $\beta = 0.47$), participant's education ($P = 0.003$, $\beta = 0.45$) and occupation ($P = 0.091$, $\beta = -0.24$) were variables affecting the quality of sexual life. In addition, considering possible confounding variables, the results from the proportional odds regression model showed that spinal cord injury (AOR = 4.2, 95% CI: 1.8–9.2), occupation (AOR = 1.8, 95% CI: 1.1–1.8), education (AOR = 3.1, 95% CI: 1.2–5.9) and duration of SCI (AOR = 1.4, 95% CI: 1.1–2.8) had maximum effect on the quality of sexual life. These results indicate that women with SCI had 4.2 times the odds of being in the poor or moderate quality of sexual life category, compared with the good quality category, relative to controls. In addition, the corresponding odds increased by 80% in employed women compared with housewives. In non-college-educated women, the odds of poor or moderate quality of sexual life is increased 3.1 times. Finally, in the case group, passing of 1 year from injury was increasing 42% the risk of being in the poor or moderate quality of sexual life category versus the good category.

DISCUSSION

Sexuality in women with SCI has received little attention from scholars, compared with the volume of research on men living with

SCI. In the present study, we examined two important aspects of women's sexual lives: sexual function and quality of sexual life. Only a small number (3.2%) of women with SCI participating in this study revealed sexual dysfunction, which is less than that reported in another recent study conducted in Iran.¹⁵ Variations in sample size and study design may be possible explanations for this discrepancy. Similarly, sexual dysfunction was reported less frequently than has been observed in other contexts.^{12,14} However, there is no question that sexual responses become profoundly impaired post SCI. Research has frequently emphasized the fact that SCI deregulates vaginal blood flow.²⁴ In addition, there is no doubt that, following damage to the spinal cord, not only sexual arousal but psychogenic sexual desire is markedly diminished.^{3,24}

In the present study, the satisfaction domain of FSFI did not differ between groups. One reason for this finding could be that sexual satisfaction, as a subjective phenomenon, is a multidimensional experience. In other words, sexual satisfaction is not solely limited to orgasm, but emotional bonds, intimacy and fulfillment from the interpersonal relationship can be other components of sexual satisfaction,^{25,26} which may remain intact even post SCI.

The majority of women with SCI did not show significant sexual dysfunction in our study; however, compared with the control group, they tended to report poor or moderate quality of sexual life. This finding is in line with the results of Kreuter *et al.*,²⁷ indicating that it was possible for women with SCI to have an active and satisfying sexual life. According to the female sexual response model developed by Basson, positive sexual motivation is considered an important pre-requisite for a woman to become sexually aroused and be sexually active.⁶ However, she has pointed out that sexual stimuli *per se* do not necessarily lead to subjective arousal. For women's sexual fulfillment, sexual stimulation and its context must be mentally exciting and pleasurable.²⁸ Very similar to our findings, almost half of the women who participated in Kreuter *et al.*'s research reported a degree of problems in sexual arousal post injury. Damaged sexual sensuality after SCI explains women's insufficient subjective arousal at the time of physical stimulation through a sexual encounter.²⁷ However, creating a good linkage between objective and subjective arousal and pleasure can be possible through engaging in longer foreplay and powerful stimulation.⁶ Most of the women made the mentioned linkage by hugging, kissing and caressing to achieve a pleasurable sexual experience. On the basis of Basson's model,⁶ positive emotional feedback from the current sexual experience, including a joyous feeling and self-confirmation, produces objective arousal. Psychological factors such as distractions of daily living, low sexual self-confidence and lack of emotional intimacy with the partner may obviously have a negative impact on sexual responses and one's pleasure.²⁸ As Anderson *et al.*²⁹ suggested, the woman and her partner need to explore 'new' erogenous zones and use all senses to make sexual stimulation efficient.²⁹

In conclusion, considering the role of injury, education, occupation and SCI duration as predictive variables, rehabilitation teams can provide better care by integrating sexuality education and counseling with other health-related care services for women with SCI beginning in the first years after injury. To achieve this aim, professionals should discuss and review personal values and attitudes regarding sexuality before and after SCI and empower clients to adjust sexual behaviors and expectations after injury. In addition, improvement of sexual life in women with SCI can be possible if rehabilitation specialists train them and their partner in sexual skills.

Limitations

Despite numerous strengths, we would acknowledge some limitations. First, women with SCI participating in this study cannot be fully representative of the Iranian population living with SCI because of the small sample size, method of data collection (telephone interview) and recruitment from one site. Second, the telephone interview, as a data collection method in the case group, may have decreased the accuracy of the data. We had cultural restrictions to perform home visit to cover this limitation. We should also acknowledge information bias, especially recall bias, as one of the study limitations. Therefore, future longitudinal studies with a larger sample and self-report data collection are suggested.

CONCLUSION

We conclude that although SCI significantly alters women's sexual capacity it does not necessarily result in sexual dysfunction. Sexual capacity alterations had an impact on women's quality of sexual life, resulting in poor or moderate scores for quality of sexual life. Although sexual capacity is decreased because of SCI in women, it seems that they can still have an active and pleasurable sexual life if they are informed about sexual response changes post injury, accept the sexual behavior changes and apply various sexual skills to their post injury lives. For this, sexuality education and counseling soon after SCI is recommended. These services would be delivered by rehabilitation team members or sexual health professionals to women and their spouses during initial caregiving and ongoing through time as needed.

DATA ARCHIVING

There were no data to deposit.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

We appreciate the Vice Chancellor of Research at Tehran University of Medicine Sciences for approval and funding of this project. Our special thanks to the women with SCI and the control women without SCI who genuinely shared their sexual life details with the researchers.

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