ORIGINAL ARTICLE

Women's sexual functioning and sex life after spinal cord injury

M Kreuter^{1,2}, C Taft³, A Siösteen¹ and F Biering-Sørensen^{4,5}

¹The Sahlgrenska Academy at the University of Gothenburg, Institute of Neuroscience and Physiology, Gothenburg, Sweden;

²Sahlgrenska University Hospital, Gothenburg, Sweden; ³The Sahlgrenska Academy at the University of Gothenburg, Institute of Health and Care Sciences, Gothenburg, Sweden; ⁴Clinic for Spinal Cord Injuries, The Neuro Science Centre, Rigshospitalet, Copenhagen, Denmark and ⁵Faculty of Health Science, University of Copenhagen, Copenhagen, Denmark

Study design: Cross-sectional, mail-back questionnaire study.

Objectives: To describe women's experiences of sexual functioning and sex life after spinal cord injury (SCI).

Setting: Sweden, Denmark, Norway, Finland, and Iceland.

Methods: All community-living SCI women treated at spinal cord centres in Sweden, Denmark, Norway, Finland, and Iceland meeting inclusion criteria ($n=963$) were mailed the study-specific SCI Women Questionnaire. Out of the 532 respondents, 392 reported having had sex after injury and were thus included in the study. The included women had a mean age of 42 years (range 18–68) and a mean time since injury of 11 years (range 2–54).

Results: The SCI women reported that the injury caused many changes in their sex life and affected many aspects of their sexuality negatively. Some changes were of a physical nature (for example, decreased, lost, or changed sensation; difficulties to achieve orgasm; bladder or bowel problems; and difficulties to move and position oneself) whereas other changes were of a psychological nature (for example, feeling unattractive or less attractive, having less self-confidence, and difficulties to meet or find a partner).

Conclusion: Successful SCI rehabilitation requires a holistic approach, taking into account the patient's physical, psychological, and interpersonal circumstances. Given that many women with SCI remain sexually active but often experience less satisfaction after injury, it is important that rehabilitation efforts address this aspect of the patient's life. Our results elucidating strategies applied by women with SCI to compensate for loss of genital sensation and cope with physiological impairment during sexual activity may serve to help professionals in developing rehabilitation programmes for women with SCI.

Spinal Cord (2011) 49, 154–160; doi:10.1038/sc.2010.51; published online 11 May 2010

Keywords: sexuality; compensation; self-report; Spinal Cord Injury Women Questionnaire SCIWQ

Introduction

Spinal cord injury (SCI) is a traumatic event that affects many facets of the injured person's life. One such aspect is sexual functioning.¹ Sexual functioning is a fundamental aspect of health and well-being for all individuals. It should thus be addressed in all spinal units and rehabilitation centres and should be given the same consideration as other important issues.² Nonetheless, previous research has shown that the majority of women with SCI are dissatisfied with the amount and quality of information about sexual functioning and sex life provided at these centres.^{3–6} Comparatively, few

studies have investigated the sexual functioning and sex life of SCI women, as opposed to that of SCI men; however, a general finding is that most SCI women continue to be sexually active after injury, but to a lesser extent than before injury.^{4,5,7–11} It has also been shown that many SCI women have difficulty becoming psychologically as well as physically aroused.¹² Laboratory-based studies have provided detailed knowledge about how specific injury patterns affect specific aspects of the female sexual response.¹³

In-depth knowledge about how SCI women experience their sexual functioning and sex life may serve to improve the quality of information provided to these women, as well as to aid health professionals in their attempts to address the SCI women's sexual concerns. The purpose of this study was thus to describe SCI women's experiences of different aspects of sexual functioning and sex life after injury.

Correspondence: Associate Professor M Kreuter, The Sahlgrenska Academy at the University of Gothenburg, Institute of Neuroscience and Physiology, Box 455, Gothenburg SE-40530, Sweden.

E-mail: Margareta.Kreuter@gu.se

Received 3 March 2010; revised and accepted 8 April 2010; published online 11 May 2010

Methods

Study group

Names and addresses of 1011 women with SCI were provided by the heads of spinal cord centres in the five Nordic countries: Sweden ($n=375$), Denmark ($n=163$), Norway ($n=215$), Finland ($n=236$), and Iceland ($n=22$). Exclusion criteria were known recovery (Frankel Grade E/ASIA Impairment Scale E),^{14,15} injured less than 2 years, brain injuries and psychiatric diseases, and inability to understand the Nordic language in question. The inclusion criterion was age between 18 and 70 years. Questionnaires with a letter describing the rationale for the study were mailed to the potential participants. They were guaranteed the complete confidentiality of their responses and were offered the possibility to return the questionnaires anonymously. Two reminders were sent to optimize the number of responses.

Out of the 1011 women, 52 were excluded: 4 because of death, 7 were recovered, 3 with language difficulties, 8 had congenital injuries, 3 because of psychiatric disease, 18 because of other severe illness, and 9 could not be located. The total eligible sample thus comprised 963 women.

Out of the 532 women who returned evaluable questionnaires (response rate 55%), 392 (73.7%) reported having had sex together with a partner after injury and were thus included in this study. Sociodemographic and clinical characteristics are given in Table 1.

Ethical considerations

The local ethics committees in the five Nordic countries approved the study. The ethic committees in Norway and Iceland approved the study under the condition that the questionnaires were to be returned anonymously. The ethics committees in Sweden, Denmark, and Finland did not make this stipulation; however, the women in these three countries were also given the option to return the questionnaires anonymously. The Swedish women were offered 100 Swedish Crowns (approximately 13 US dollars) for their participation, whereas the ethics committees in the other countries did not approve this kind of compensation.

Measurements

Sexual functioning and sexual life. The SCI Women Questionnaire (SCIWQ),⁵ comprising 104 items, was designed to assess different dimensions of sexuality. Details about the development of the SCIWQ are described elsewhere.⁵ Responses to 10 open-ended questions from the SCIWQ were analysed in this study.

Results

Changes in sex life after injury

Responses ($n=356$, 91%) to the question 'Describe in your own words how your sex life has changed after the SCI' were grouped as shown in Table 2. Changes of a physical, psychological, and practical nature were reported. Although most women reported that their sex life had been affected negatively, 7 women (2%) considered that it was better and

Table 1 Sociodemographic and clinical characteristics of the women with spinal cord injury (SCI)

Background and clinical characteristics	SCI women (n = 392)
Age	
Mean (s.d.)	42.3 (11.5)
Median (range)	43.0 (18–68)
Age at lesion	
Mean (s.d.)	28.5 (12.0)
Median (range)	29 (4–64)
Duration of disability	
Mean (s.d.)	11.4 (9.1)
Median (range)	10 (2–53)
Cause of injury n (%)	Missing 1
Trauma	329 (84)
Non-traumatic	62 (16)
Neurological classification n (%)	Missing 7
Tetraplegia complete	37 (9.6)
Tetraplegia incomplete	81 (21.0)
Paraplegia complete	99 (25.7)
Paraplegia incomplete	168 (43.6)
Mobility n (%)	
Wheelchair dependent	262 (66.8)
Walking with aids	42 (10.7)
Walking without aids	88 (22.4)
Years education after compulsory school	
Mean (s.d.)	4.8 (2.8)
Median (range)	4 (1–14)
Educational level n (%)	Missing 2
Compulsory level (7–9 years)	57 (14.5)
High school degree	193 (49.2)
University degree	130 (33.2)
Marital status n (%)	
Married	226 (57.6)
Stable partner	72 (18.4)
Single	94 (24)
Area of residence n (%)	Missing 3
Countryside	141 (36.2)
Town (<100 000 inhab)	119 (30.6)
Larger city (>100 000 inhab)	129 (33.1)

Mean (s.d.)/median (range) or n (%).

of greater importance after the injury and 38 (11%) reported either no major changes or that their sex life functioned well. A total of 91 women (26%) had sex less frequently after injury, 45 women (13%) claimed that they had no or less sexual desire, need, or longing, and 27 claimed (8%) that they had difficulties to achieve orgasm. Twenty-five of the respondents (7%) reported that they had had no sexual experience before the injury, primarily because of young age, and therefore could not make retrospective comparisons.

How to compensate for decreased sensibility

Totally, 173 women (44%) answered the question 'If you have impaired sensibility, can you then describe what you do to compensate for the decreased sensibility?' As shown in

Table 2 The open-ended question 'Describe in your own words, how your sex life has changed after the spinal cord injury', was answered by 356 women

	n
None or no major changes/works well	38
Sex life does not work at all (four not because of the spinal cord injury (SCI))	65
Less sex life after SCI	26
More difficult to move/position oneself/less active/fewer positions/less spontaneous/need more planning/more impractical/less flexible	69
No, less or changed sensibility	52
No or less desire/need/longing	45
No, less intense, more difficult to achieve or changed orgasm	27
Pain/unpleasant feelings	17
Bladder problems/incontinence/must empty/feeling of voiding/urinary tract infection	17
Bowel problems/flatul	7
Take longer time/must concentrate/work more with foreplay/ more ready	7
Need stronger stimulation/vibrator/masochism-pain	3
No or less vaginal moistness/wetness	2
Autonomic dysreflexia/headache just before orgasm	2
More need/appreciation of closeness/kissing/touching/hugging/confidence	22
Feel unattractive or less attractive, less self confidence, do not know my body	16
More satisfaction from caresses of other areas (erogenous zones) than the genitals, including around and above the level of lesion	14
Afraid/insecure to show own body/meet new partner	9
Need to know partner more/more interested partner	6
Use fantasy more	5
More tense, difficult to relax	5
Fewer partners/difficult to meet or find partner	4
Have to explain more/greater cooperation	3
Miss a partner/mostly at home	4
Lack of time, other things take longer time	4
Age may mean less activity/children around	4
Being divorced/deserted	2
Has become better/is of greater importance/more interesting	7
Desire still there or increased	7
Training/searching/working with it makes it better	5
More experimenting/creative	4
More open/honest talk with partner	4
More intense orgasm	2
Better with age	2

Several gave a mixture of answers, which have been grouped as seen in the table. Therefore, there are many more answers than women who answered. Only answers given by at least two women are included, that is nine answers are excluded.

Table 3, many women compensated by fantasizing and thinking about how sex was before the injury ($n = 51$, 30%). Other ways to compensate for decreased sensibility included 'kissing', 'touching', and 'caressing' other erogenous zones than the genitals ($n = 38$, 22%); 'watching the act directly or with the help of a mirror' ($n = 11$, 6%); and 'longer foreplay and stronger stimulation of the clitoris, and so on' ($n = 9$, 5%). Some ($n = 37$, 21%) answered that they did nothing, did not know what to do, or could not do anything.

The experience of having an orgasm

Out of the 234 women who answered the question 'If you have had orgasm, or something like orgasm after the injury, how would you describe that experience', 19 women (8%) experienced orgasm in the same way as before the injury and 59 (25%) described it as 'like being in heaven', 'flying', and 'unbelievable and very strong feelings'. Thirty-eight women (16%) felt that they had fewer orgasms, that it was more difficult and required more time to achieve orgasm or that it

was weaker than before injury, whereas 31 (13%) mentioned that they were satisfied with the quality of their orgasms. Thirty-one women (31%) described their orgasms as 'relaxing', whereas others described them as a 'vibrating, pulsating, shaking sensation', or as a 'pressure wave' ($n = 16$, 7%); 'warm sensation' ($n = 13$, 6%), 'like emptying the bladder' ($n = 3$, 1%), and 'contractions' ($n = 4$, 2%). Negative sensations, such as pain, unpleasantness ($n = 7$, 3%), cramps ($n = 7$, 3%), spasticity ($n = 4$, 2%), and autonomic dysreflexia and headache ($n = 6$, 3%) were also experienced. Nineteen women (8%) stated that they did not experience anything like an orgasm.

The best thing the sexual partner can do

In response to the question 'What is the best thing your sexual partner can do to help you to relax and enjoy sex?' 104 women (38%) mentioned physical stimulation, such as 'caressing', 'kissing', 'licking of areas with sensibility', 'take your time' and 'long and good foreplay' ($n = 39$, 14%), and

Table 3 The open-ended question 'If you have impaired sensibility, can you then describe what you do to compensate for the decreased sensibility', was answered by 173 women

	n
Have no impaired sensibility	12
Functions well as it is/do the same	2
Nothing/ do not know/cannot/cannot remember how it was	37
Use fantasy/thinking about how it was before injury	51
Use kissing/touching/caressing other areas (erogenous zones) than the genitals, including around and above the level of lesion, not least the breasts, stimulate more places at the same time	39
Use sight/eyes/mirror	11
Long foreplay/stronger stimulation including on clitoris, use the fingers	10
Caress/feel with the hands	8
Use vibrator/massage equipment/dildo	6
Try to satisfy my partner	4
Find positions to increase sensation	3
Talk in a sexually arousing manner about what is happening	3
Massage	2
Relax	2
Slow movements during intercourse	2
Oral sex	2
Talk in a sexually arousing manner/about what is happening	2
Anal sex	1
Concentrate on the movements of the man	1
Concentrate on other issues	1
Try to compensate	1
Cannot be explained	1
Important to feel secure	1
More active	1
Give more tenderness and love	1

Several gave more answers, which have been grouped as seen in the table. Therefore, there are more answers than women who answered.

'massage' ($n = 18$, 7%), see Table 4. Many women considered that being shown 'love', 'closeness', 'romance', 'tenderness', and 'warmth' were of great importance, as were the partner showing 'understanding', 'consideration', 'attention', 'honesty', and 'acceptance'.

Tips for improving sexual pleasure

Many women recounted ways that they found were helpful in improving their sexual relationship and/or sexual pleasure, see Table 5. The most frequently mentioned tips were that SCI women should openly discuss with their partner what they find pleasurable, what the partner can do to help them attain pleasure, and how they can experiment to compensate for physiological impairments ($n = 41$). Other tips were that the partner should be 'patient', 'respectful', 'understanding', and 'put the woman first' ($n = 16$). Other useful tips included 'try to relax', 'use your fantasy', 'work with and try to accept your body image', 'experiment and explore', and 'use aids such as a vibrator, dildo, and massage apparatus'.

Partner's reaction to bladder or bowel leakage during sex

Out of the 206 women who answered the question 'How has your partner reacted if you had leakage during sex', 51 (25%) answered that the partner had reacted with understanding and had been supportive and positive. Others answered that

Table 4 The open-ended question 'What is the best your sexual partner can do for you to relax and enjoy sex', was answered by 273 women

	n
Caress, kiss, lick, stimulation, including of areas with sensibility (breast, upper body, etc.) and clitoris	104
Long or good foreplay/take your time	39
Massage	18
Oral sex	9
Variation in the sex act	3
As before the injury/usual sex	4
Use oil, ice, cream, or a feather on the body	4
Use dildo	1
Show he likes me/wants me/loves me/I am worth it	47
Closeness/romance/tenderness/warm feelings/see and hear me, involvement	31
Take it easy/patiently/carefully	19
Understanding/consideration/attention/acceptance/honesty	16
Relaxed	10
Talk, to get me in the right mood	8
Be good to me/make it good for me/be aware of my needs/signals	8
Make me confident	8
Enjoy having sex	5
Be open-minded	4
Concentrate on me/let me be selfish	3
Humour	3
Fantasy	2
Wait until I am in the right mood/have a desire	2
Be yourself	2
Do not ask for something, do not ask too much	3
Take command	2
Encourage and inspire with courage	1
Involvement	1
Let me be selfish	1
Tie me, so it is not due to my injury I cannot move	1
Be clean/shaved/bathe together	5
Be spontaneous	1
See my partner enjoy	1
Dimmed lighting	4
Smell good	3
Music	2
Use your eyes, eye contact	2

Several gave more answers, which have been grouped as seen in the table. Therefore, there were more answers than women who answered. As 14 answers did not answer the question, we have listed those giving some advice, which may be useful for others. Ten actually answered, 'don't know'.

the partner had 'done nothing', 'made no comments', or 'did not react much' ($n = 39$, 19%). Some mentioned that they had 'joked and laughed about it' ($n = 10$, 5%). Others reacted by 'cleaning up', 'changing bed linen', 'bathing together', 'pointing out that washing machines exist', or 'reacting less than feared' ($n = 10$, 5%). Some had 'considered it normal', 'reacted quietly and calmly', and 'been comforting' ($n = 12$, 6%). A total of 20 women (10%) reported that the partner had reacted negatively, becoming 'frustrated', 'irritated', 'anxious', 'afraid', 'disgusted', or 'loosing interest as well as erection'. Sixty-two women (30%) answered that they had never experienced leakage during sex.

Ways to handle stomas and catheters during foreplay and intercourse

Of the 24 women who answered the question 'How do you handle urostomy or colostomy during sexual togetherness',

Table 5 The open-ended question 'Do you have something/some positive tips, which for yourself helped the sexual relationship and/or the sexual pleasure', was answered by 196 women

	n
Experiment/explore, including positions	8
Use aids like vibrator, dildo, massage apparatus	7
Training, learn with time	4
Long foreplay	4
A pillow under the lower back/bottom	3
Go to the toilet before	3
Oil massage	2
Lubricating cream	2
Oral sex	2
Pornography	2
Do something to satisfy the man	2
Be active/participate/take the initiative yourself	2
Lay on your stomach or on your side/the missionary is from behind	2
Talk about what is good/teach each other to know how to/be open/about how to compensate	41
Partner to show patience/respect/understanding/'putting you first'	16
Relax	14
Enjoy as much as possible here and now	9
Fantasy	8
Work with your image of yourself/body perception/acceptance/development	8
Respect/confidence/honesty	7
Closeness/harmony/feelings/romance/tenderness	6
Caress	6
Having plenty of time	3
Concentrate	2
Humour	2
Be attractive	2

Several gave more answers, which have been grouped as seen in the table. Therefore, there were more answers than women who answered. As 13 answers did not answer the question, we have listed those below implying some ideas, which may be useful for other women; 63 actually answered 'no' or 'don't know'. Only answers given by at least two women are included, that is 17 answers are excluded.

most reported that they emptied the stoma bag before sexual activity. Other solutions were to 'put on a new and clean bag', 'change the stoma bandage and use a body-dress', 'attach a little stop-bag', and 'empty and tape the bag'. To avoid a permanent urethral or suprapubic catheter from loosening, 11 women (46%) reported that they 'tape the catheter to the stomach or thigh' or 'put it on the side'.

Birth control methods

Totally, 253 women answered the question regarding the use of birth control methods. Practiced birth control methods were p-pills ($n=119$, 47%), IUD—including hormones ($n=81$, 32%), condoms ($n=80$, 32%), sterilization ($n=17$, 7%), p-syringe ($n=16$, 6%), mini-pills ($n=12$, 5%), interrupted coitus ($n=5$, 2%), p-stick ($n=2$), safe periods ($n=2$), hysterectomized ($n=2$), preventive drug in capsule form ($n=1$), and day-after pills ($n=1$).

Discussion

This study showed that most women continue to be sexually active after their injury and that they consider sex to still be

an important part of their lives. Although many aspects of their sexual functioning and sex life were negatively affected by the injury, the women in our study reported various means to compensate for the physiological impairments induced by the injury.

Some changes in the women's sexual functioning and sex life were primarily of a physical nature, such as decreased or lost sensation, difficulties to achieve orgasm, and to move and to position oneself. Other changes were of more a psychological nature, such as feeling unattractive or less attractive, less self-confidence, and difficulties to meet or find a partner. Many of the women had sex less frequently after injury; their willingness to engage in sexual activity was affected by bladder or bowel problems, pain, or other unpleasant feelings. The women emphasized the importance of talking openly and honestly with their partner about their sexual needs and desires and of the partner being understanding and sensitive to those needs. Other studies have shown that women with SCI are also concerned about their ability to satisfy their partner, to cope emotionally with changes in sexual functioning, and to help their partner cope emotionally with their sexual limitations.⁷

Owing to decreased or absent sensation below the level of injury, women with SCI may be unable to respond to the same sexual stimuli that had been pleasurable before injury and the physical stimuli generating subjective arousal may be insufficient.¹² Many of the women in our study also reported decreased or absent sensation; however, many of the women compensated for this by fantasizing and thinking about how sex had been before the injury, engaging in longer foreplay and more powerful stimulation, relying on input from other senses and exploiting non-genital erogenous zones.

Sexual intercourse and caressing of the genitals were less important after injury. On the other hand, many of the women emphasized that caressing, kissing, licking, stimulation of areas with sensation, massage, and foreplay as the best their sexual partner could do for them to relax and enjoy sex. Many women also considered that being shown love, closeness, romance, tenderness, and warm feelings were of great importance, as were the partner's understanding, consideration, attention, honesty, and acceptance. Most of the women thought that hugging, kissing, and caressing (also body parts with no sensation) were essential and pleasurable ingredients of the sexual experience.

In agreement with other studies,^{6,7} some of the women in our study reported that they could no longer experience orgasm. This may naturally be due to a total loss of sensation in the vagina and clitoris.¹² On the other hand, most of those who were able to achieve orgasm described it either as very pleasurable or, in a small number of cases, as painful, unpleasant, and incomplete and therefore frustrating. Even if physiological orgasm for some is not possible, rewarding, or pleasant, the sexual experience may be completed by psychological satisfaction. A warm and close relationship and deep feelings of affection for the partner may compensate for not reaching orgasm during sexual activity. Many women stated that orgasm was less intense and took longer to achieve than before injury, and therefore highlighted the

importance of their partner taking time and being considerate of their needs when making love. They also pointed out that memories and fantasies helped to enhance their pleasure. Increased time to achieve orgasm has also been found by Sipski *et al.*¹⁶

Urinary and/or bowel incontinence are a cause of great anxiety for women with SCI.^{3,10,17} A bladder or bowel accident may occur at any time and may be most embarrassing if it happens during sexual activity. Only about 10% of the women in our study reported that their partner had reacted negatively (irritated, frustrated, and so on) to such incidents and a few partners had lost interest in sex. However, there were considerably more partners that had reacted with understanding and consideration and some had even been able to joke about it. Certain practical measures were used to avoid 'accidents' during sexual togetherness, such as emptying the bladder or bag before sexual activity or taping the catheter to the stomach or thigh. The respondents stressed the importance of discussing these issues with their partner and sharing their feelings, anxieties, and fears.

As in any mail-back questionnaire study, there is a possibility that our sample was selective and hence may not be representative for the target population (SCI women in the Nordic countries). Possible reasons for non-response are that some women may be too embarrassed to answer questions about their sex life or that women with a poor and unsatisfying sexual life may feel less motivated to answer questions than do those with an active and satisfying sex life. However, our sample was heterogeneous, encompassing a wide range of ages, length of times since injury, neurological status, and marital status, and therefore we believe the experiences expressed by this sample are salient to women with SCI.

Issues relating to sexual functioning and sex life in women after SCI have received relatively little attention in the scientific literature or in clinical rehabilitation efforts. If the goal of rehabilitation is to restore the injured person as fully as possible to their premorbid level of functioning, this must apply to sexuality as well. It is important that all staff have adequate knowledge about sexual functioning after SCI and feel comfortable raising the issue of sexuality to allow the patients opportunities to discuss this topic. Sex information/education programmes should be an integral component of the rehabilitation and during life-long follow-up because sexually related needs and concerns might change over time. The many tips from the women in this study to compensate for the physiological impairments induced by the injury should be communicated in these programmes. Our results are supported by the suggestions for information provided in the 'Clinical Practical Guidelines on Sexuality and Reproductive Health for Adults with SCI' published by the Consortium for Spinal Cord Medicine.¹⁸

Conclusions

Successful SCI rehabilitation requires a holistic approach, taking into account the patient's physical, psychological, and interpersonal circumstances. Given that many women

with SCI remain sexually active but often experience less satisfaction after injury, it is important that rehabilitation efforts address this important aspect of the patient's life. Our results elucidating strategies applied by women with SCI to compensate for loss of genital sensation and cope with physiological impairment during sexual activity may serve to help professionals in developing rehabilitation programmes for women with SCI.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgements

We thank the heads of the spinal cord centres in the Nordic countries for providing the names and addresses for the women with SCI. Above all else, we express our sincere thanks to all women participating in the study and to the women in the kNORR (kNORR was formed in 2001 to draw attention to the particular problems confronting women with SCI. The members of kNORR are women with SCI living in the Nordic countries) for initiating this study and for their input in developing the questionnaire. This work was supported by grants from Swedish National Associations of People Disabled by Road Accidents and Polio (RTP), Norrbacka-Eugenia Foundation, the Association of Cancer and Road Accident Victims (CTRF), Sweden, Landsforenningen af Polio-, Trafik-og Ulykkesskadede (PTU), and Bevica Foundation (previously Sahva Foundation), Denmark.

References

- 1 Trieschman RB. *Spinal Cord Injuries. Psychological, Social and Vocational Rehabilitation*. Demos Publication: New York, 1988.
- 2 Esmail S, Knox H, Scott H. Sexuality and the role of the rehabilitation professional. In: Stone JH, Blouin M (eds). *International Encyclopedia of Rehabilitation*. Center for International Research and Exchange (CIRRIE): Buffalo, New York, 2010.
- 3 Charliefue SW, Gerhart KA, Menter RR, Whiteneck GG, Scott Manley M. Sexual issues of women with spinal cord injuries. *Paraplegia* 1992; **30**: 192–199.
- 4 Richard E, Tepper M, Whipple B, Komisaruk BR. Women with complete spinal cord injury: a phenomenological study of sexuality and relationship experiences. *Sex Disabil* 1997; **15**: 271–283.
- 5 Kreuter M, Siösteen A, Biering-Sørensen F. Sexuality and sexual life in women with spinal cord injury: a controlled study. *J Rehabil Med* 2008; **40**: 61–69.
- 6 Forsythe E, Horsewell JE. Sexual rehabilitation of women with a spinal cord injury. *Spinal Cord* 2006; **44**: 234–241.
- 7 Ferreiro-Velasco ME, Barca-Buyo A, de la Barrera SS, Montoto-Marques A, Vazquez XM, Rodriguez-Sotillo A. Sexual issues in a sample of women with spinal cord injury. *Spinal Cord* 2005; **43**: 51–55.
- 8 Sipski ML, Alexander CJ. Sexual activities, response and satisfaction in women pre- and post spinal cord injury. *Arch Phys Med Rehabil* 1993; **74**: 1025–1029.
- 9 White M, Rintala D, Hart KA, Fuhrer MJ. Sexual activities, concerns and interests of women with spinal cord injury living in the community. *Am J Phys Med Rehabil* 1993; **72**: 372–378.
- 10 Jackson AB, Wadley V. A multicenter study of women's self-reported reproductive health after spinal cord injury. *Arch Phys Med Rehabil* 1999; **80**: 1420–1428.

- 11 Matzaroglou C, Assimakopoulos K, Panagiotopoulos E, Kasimatis G, Dimakopoulos P, Lambiris E. Sexual function in females with severe cervical spinal cord injuries: a controlled study with the Female Sexual Function Index. *Int J Rehabil Res* 2005; **28**: 375–377.
- 12 Anderson KD, Borisoff JE, Johnson RD, Stiens SA, Elliot SL. Spinal cord injury influences psychogenic as well as physical components of female sexual ability. *Spinal Cord* 2007; **45**: 349–359.
- 13 Sipski ML, Arenas A. Female sexual function after spinal cord injury. *Prog Brain Res* 2006; **152**: 441–447.
- 14 Frankel HL, Hancock DO, Hyslop G, Melzak J, Michaelis LS, Ungar GH *et al*. The value of postural reduction in the initial management of closed injuries in the spine with paraplegia and tetraplegia. *Paraplegia* 1969; **7**: 179–192.
- 15 Marino RJ, Barros T, Biering-Sørensen F, Burns SP, Donovan WH, Graves DE *et al*. International standards for neurological classification of spinal cord injury. *J Spinal Cord Med* 2003; **26**: 50–56.
- 16 Sipski ML, Alexander CJ, Rosen R. Sexual arousal and orgasm in women: effects of spinal cord injury. *Ann Neurol* 2009; **49**: 35–44.
- 17 Westgren N, Hultling C, Levi R, Seiger^o, Westgren M. Sexuality in women with a traumatic spinal cord injury. *Acta Obstet Gynecol Scand* 1997; **76**: 977–983.
- 18 Ducharme S, Kewman DG, Chase T, Creasey G, Elliot SL, Goetz LL *et al*. Clinical Practice Guidelines: Sexuality and Reproductive Health in Adults with Spinal Cord Injury: A Clinical Practice Guidelines for Health Care Professionals. Consortium for Spinal Cord Medicine. Paralyzed Veterans of America, 2010, 1–47.