



Evaluation of Sexual Dysfunction in Hospitalized Post-Stroke Rehabilitation Patients

Hastanede Yatan İnme Sonrası Rehabilitasyon Hastalarında Cinsel İşlev Bozukluğunun Değerlendirilmesi

Ali Nail Demir¹, Sanem Aslıhan Aykan², Uğur Güngör Demir³, Hakan Tunç⁴

¹Mersin City Hospital, Department of Rheumatology, Mersin, Turkey

²Yeditepe University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Istanbul, Turkey

³Mersin City Hospital, Department of Physical Medicine and Rehabilitation, Mersin, Turkey

⁴Ankara City Hospital, Department of Physical Medicine and Rehabilitation, Ankara, Turkey

Abstract

Introduction: Stroke-related factors seem to have significant effects on sexual functions in physical, biological, and psychosocial areas. This study aims to evaluate the factors affecting the sexual functions of patients after stroke.

Material and Method: This study consisted of 51 (53.1%) male and 45 (46.9%) female patients. Sociodemographics and clinical features of the patients were documented. Sexual functions evaluated with Arizona Sexual Experiences Scale (ASES), International Index of Erectile function (IIEF) and Female Sexual Function Index (FSFI).

Results: The mean age of men and women were 57.76±7.57, and 60.13±12.71 years, respectively. When the ASES cut-off point was 11, we found that 88.5% of the participants (84.3% in men and 93.3% in women) had sexual dysfunction. There was no significant difference between the frequency of sexual dysfunction in women and men (p=0.166, Pearson Chi-square Test). According to univariate ANOVA results, age (p=0.028) and BDI (p<0.001) values had a significant effect on ASES. The side of stroke (p=0.030), Brunnstrom motor evaluation (upper extremity) (p=0.028) and Beck Depression Scale (p<0.001) values had a significant effect on IIEF total values. BDS (p=0.001) values significantly affected FSFI total values.

Conclusion: The data obtained from our study showed that post-stroke sexual dysfunctions are significantly high in Turkish rehabilitation inpatient clinics. Post-stroke sexual dysfunctions are linked to multiple etiologies, both organic (hemispheric lesion side, etc.) and psychosocial (depression, etc.).

Keywords: Stroke, sexual dysfunction, function, psychology

Öz

Giriş: İnme ile ilişkili faktörlerin fiziksel, biyolojik ve psikososyal alanlarda cinsel işlevler üzerinde önemli etkileri olduğu görülmektedir. Bu çalışma inme sonrası hastaların cinsel fonksiyonlarını etkileyen faktörleri değerlendirmeyi amaçlamaktadır.

Gereç ve Yöntem: Bu çalışmaya 51 (%53,1) erkek ve 45 (%46,9) kadın hasta dahil edildi. Hastaların sosyodemografik ve klinik özellikleri belgelendi. Arizona Cinsel Deneyimler Ölçeği (ASES), Uluslararası Eretil İşlev İndeksi (IIEF) ve Kadın Cinsel İşlev İndeksi (FSFI) ile cinsel işlevler değerlendirildi.

Bulgular: Erkeklerin ve kadınların yaş ortalaması sırasıyla 57,76±7,57 ve 60,13±12,71 idi. ASES kesme noktası 11 olduğunda, katılımcıların %88,5'inin (erkeklerde %84,3 ve kadınlarda %93,3) cinsel işlev bozukluğu olduğunu bulduk. Kadınlarda ve erkeklerde cinsel işlev bozukluğu sıklığı arasında anlamlı fark yoktu (p=0,166, Pearson Ki-kare Testi). Tek değişkenli ANOVA sonuçlarına göre yaş (p=0,028) ve BDÖ (p<0,001) değerlerinin ASES üzerinde anlamlı bir etkisi vardı. İnme tarafı (p=0,030), Brunnstrom motor değerlendirme (üst ekstremité) (p=0,028) ve Beck Depresyon Skalası (p<0,001) değerlerinin IIEF toplam değerleri üzerinde anlamlı etkisi vardı. BDS (p=0,001) değerleri FSFI toplam değerlerini önemli ölçüde etkilemiştir.

Sonuç: Çalışmamızdan elde edilen veriler, Türkiye'deki rehabilitasyon yataklı kliniklerinde inme sonrası cinsel işlev bozukluklarının anlamlı derecede yüksek olduğunu göstermiştir. İnme sonrası cinsel işlev bozuklukları, hem organik (hemisferik lezyon tarafı vb.) hem de psikososyal (depresyon vb.) olmak üzere birçok etiyojijle bağlantılıdır.

Anahtar Kelimeler: İnme, cinsel işlev bozukluğu, fonksiyon, psikoloji



INTRODUCTION

Stroke is the primary cause of disability that can impair sexual functions and physical, linguistic, and cognitive functions.^[1] Among the categories of disability after stroke, sexual dysfunctions are often overlooked. After a stroke, there is a significant decrease in sexual activity in men and women.^[2-4]

Post-stroke physical problems and pain prevent some physical activities that may affect the quality of sexual activity.^[5,6] In particular, hemiparesis and spasticity are physical conditions that affect sexual activity.^[7] Studies show that the severity of disability due to stroke negatively affects sexual functions.^[7-9] However, sexual dysfunction may develop even when physical disability is minimal or absent after stroke.^[10] Various studies have shown a relationship between post-stroke depression and the occurrence of sexual dysfunction.^[3] Another study found that the severity of post-stroke depression was an independent predictor of the development of sexual dysfunction in both men and women.^[7] Apart from depression that develops directly due to the stroke lesion,^[11] reactive depression that occurs due to the consequences of a stroke may also negatively affect sexual functions.^[12] The recurrence of stroke during sexual activity is one of the biggest fears of patients. 24% of stroke patients did not engage in sexual activity due to this fear of stroke recurrence.^[7] There is evidence that clinical conditions observed after stroke, such as urinary/fecal incontinence, may interfere with sexual intercourse.^[13]

This study investigates whether factors such as sociodemographic characteristics, physical disability, etiology and side of stroke, presence of chronic disease, depression, stroke recurrence, and time elapsed after stroke contribute to sexual dysfunction in men and women after stroke.

MATERIAL AND METHOD

Informed consent was obtained from all the patients, and the local ethics committee approved this study of Ataturk Physical Therapy and Rehabilitation Hospital, Turkey (22.12.2014). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Participants

This cross-sectional study included hospitalized 96 post-stroke patients in inpatient Physical Therapy and Rehabilitation Clinics. A post-hoc power analysis for sexual dysfunction in stroke patients revealed 90% of the power with an 0.5% error.

The inclusion criteria included diagnosing stroke, having a sexual partner, being cooperated-orientated, and being hospitalized for rehabilitation. The exclusion criteria were diagnosis of dementia (mini-mental test <24), having pressure sore, fecal incontinence, neglect syndrome, and neurological disease other than stroke.

Assessment

Socio-demographics of the patients such as sex, age, marital status, and the number of children and clinical features (i.e., comorbidities, use of medicine, lesion site, etiology of the stroke (ischemic or hemorrhagic), recurrence of stroke, duration of time from the first stroke) were documented.

Assessment of Physical Functions and Cognition

Ambulation ability was evaluated by the Functional ambulation scale (FAS).^[14] This scale comprises 0-5 stages where 0 is no ambulation and five can ambulate without any help. To scale the patient's spasticity, the modified Ashworth spasticity scale (ASS) is used with scoring from 0 to 4; a higher number indicates increased spasticity.^[15] Motor staging of the stroke patients is classified by Brunnstrom motor evaluation (BME), where stage I is a flask with no motor movement, and stage VI is the isolated movement of the joint.^[16] Barthel's index evaluates functional loss after stroke; higher scores indicate independence.^[17] Beck Depression Scale (BDS) is applied to patients to assess the depression risk, and scores over 17 link with depression.^[18] Mini-Mental test (MMT) evaluates cognitive functions quantitatively; the highest point from the test is 30.^[19]

Assessment of Sexuality

Arizona Sexual Experiences Scale (ASES) is developed to assess sexual dysfunctions. It is composed of five Likert types of a questionnaire for both sexes.^[20] This scale aims to evaluate the sexual functions baring sexual orientation and relationship with the partner. Lower scores indicate the sexual response is strong, easy, and satisfying. Turkish validation has been executed by Soykan et al., and score ≥ 11 concludes with sexual dysfunction.^[21] International Index of Erectile function (IIEF) is designed for male subjects to evaluate achievement, maintaining, and satisfaction of erection.^[22] According to IIEE, erectile dysfunction (ED) is staged as mild (17-25 points), moderate (11-16 points), and severe (6-10 points), and Turkish validation has been done.^[23] Female Sexual Function Index (FSFI) evaluates the sexual function of the last four weeks and is composed of desire, arousal, lubrication, orgasm, satisfaction, and pain subscales. Lower scores associated with more dysfunction, Turkish validity has been done.^[24]

Statistics

Statistical Package for the Social Sciences 20.0 was used for performing the statistical analysis. Descriptive statistics (frequency, mean, and standard deviation) were used for analyzing the sociodemographic and clinical features. Categorical parameters were assessed through Chi-Square and Fisher's exact test. The Pearson and Spearman correlation was used to analyze the relationship of quantitative data to each other. Linear regression analysis and Analysis of Variance (ANOVA) were used to test factors affecting the ASES and FSFI. Logistic regression analysis was performed to test the factors on IIEE. The results were analyzed using a 95% confidence interval and a significance level of $p < 0.05$.

RESULTS

Socio-demographics Variables

This study consisted of 51 (53.1%) male and 45 (46.9%) female patients. The mean age of all cases, men and women, were 58.88 ± 10.32 , 57.76 ± 7.57 , and 60.13 ± 12.71 years, respectively. All of the cases were married. Of the men, 15 (29.4%) were working, nine (17.7%) were unemployed, and 27 (52.9%) were retired. One (2.2%) of the women was working, 41 (91.2%) were unemployed, and three (6.7%) were retired. Of all cases, 16 (16.7%) were working, 50 (52.1%) were not working, and 30 (31.2%) were retired.

Clinical Variables

The mean time for men and women in the study after stroke was 18.27 ± 21.79 and 19.02 ± 24.91 months. Stroke was right-sided in 23 (45%) men and 17 (37.8%) women. The stroke etiology was ischemic in 35 (68.6%) men and 39 (86.7%) women. The presence of re-stroke was present in three men (5.9%) and eight women (17.8%). The mean FAS scores of men and women were 3.10 ± 1.43 and 2.91 ± 1.66 , respectively. According to MMT evaluation; there was no cognitive loss in 29 (56.9%) men and 20 (44.4%) women. According to BDS evaluation; minor depression was found in 17 men (33.3%), mild depression in 11 men (21.6%), moderate depression in 18 men (35.3%), and severe depression in five men (9.8%). Minor depression was found in 10 women (22.2%), mild depression in 11 women (24.4%), moderate depression in 17 women (37.8%), and severe depression in seven women (15.6%). According to the Barthel index; one (2%) of the men was entirely dependent, 11 (21.6%) severely dependent, 22 (43%) moderately, and 11 (21.6%) mildly dependent. Three (6.7%) of the women were entirely dependent, 10 (22.1%) severely dependent, 16 (35.6%) moderately, and 12 (26.7%) mildly dependent. Clinical and demographic features of patients according to gender groups are summarized in **Table 1**.

Evaluation of Sexual dysfunction in All Cases

The mean ASES of all cases was 18.29 ± 6.02 , for women and men were 16.94 ± 5.92 and 19.82 ± 5.84 , respectively. When the ASES cut-off point was 11, we found that 88.5% of the participants (84.3% in men and 93.3% in women) had sexual dysfunction. There was no significant difference between the frequency of sexual dysfunction in women and men ($p=0.166$, Pearson Chi-square Test). According to univariate ANOVA results, age ($p=0.028$) and BDI ($p<0.001$) values had a significant effect on ASES. An increase in age values and a decrease in FAS values increased ASES values. Etiology*BDI ($p=0.051$, $\eta^2=0.143$) interaction was also predictive for ASES. The increase in ischemic etiology and BDS scores increased ASES scores (**Table 2**).

Evaluation of Sexual dysfunction in Men

Two of the men (4%) had no sexual activity. According to the IIEF ED subscale, there were seven (13.8%) men with severe, 17 (33.3%) moderate, 11 (21.6%) men with mild-moderate, and 10 (19.6%) men with mild ED. Erectile dysfunction was impaired in 45 (88.2%) of the men. The total mean of IIEF in men was

43.35 ± 16.44 , the mean of desire subscale was 5.96 ± 1.87 , the mean of orgasm subscale was 6.76 ± 2.62 , the mean of sexual satisfaction subscale was 7 ± 3.07 , and the mean of general satisfaction subscale was 5.67 ± 2.62 . According to univariate ANOVA results; side of stroke ($p=0.030$), BME (upper extremity) ($p=0.028$) and BDS ($p<0.001$) values had a significant effect on IIEF total values. Decreased IIEF total scores are associated with the stroke's left side, decreased BME values, and high BDS scores (**Table 3**).

Table 1. Clinical and demographic features of patients according to gender groups

	Male (n=51)	Female (n=45)
Age (years, mean, SD)	$57.76 \pm 7.57^*$	$60.13 \pm 12.71^*$
Time after stroke (month, mean, SD)	18.27 ± 21.79	19.02 ± 24.91
Side of deficit		
Right (%)	23 (45)	17 (37.8)
Left (%)	28 (55)	28 (62.2)
Type of last stroke		
Ischemic (%)	35 (68.6)	39 (69.7)
Hemorrhagic (%)	16 (31.4)	6 (13.3)
Recurrence of stroke (%)	3 (5.9)	8 (17.8)
Presence of urinary incontinence (%)	3 (5.9)	2 (4.4)
FAS (mean, SD)	3.10 ± 1.43	2.91 ± 1.66
MMT		
27-30 (normal, %)	29 (56.9)	20 (44.4)
24-27 (mild, %)	22 (43.1)	25 (55.6)
BDS (mean, SD)	2.39 ± 1.60	2.6 ± 1.01
Barthel's index (mean,SD)	3.20 ± 0.98	4.98 ± 13.01
BME		
UE (mean, SD)	3.35 ± 1.57	3.22 ± 1.44
Hand (mean, SD)	3.12 ± 1.7	3.07 ± 1.36
LE (mean, SD)	3.73 ± 1.2	3.62 ± 1.19
ASS		
UE (mean, SD)	1.16 ± 1.08	0.78 ± 0.77
LE (mean, SD)	1.06 ± 1.07	0.62 ± 0.75

ASS, Ashworth spasticity scale; BDS, Beck depression scale; BME, Brunnstrom motor evaluation; FAS, functional ambulation score; LE, lower extremity; MMT, mini-mental test; SD, standard deviation; UE, upper extremity. *Normally distributed data.

Table 2. Variance analysis of Arizona Sexual Experiences Scale

Variables	df	Mean Square	F	p	η^2
Model	45	66.535	7.332	<0.001	0.868
Intercept	1	285.416	31.451	<0.001	0.386
Sex	1	10.631	1.171	0.284	0.023
Age	1	46.234	5.095	0.028	0.092
Chronic Disease	1	2.461	0.271	0.605	0.005
Side of stroke	1	1.026	0.113	0.738	0.002
Etiology	1	12.372	1.363	0.249	0.027
Reccurrence of stroke	1	7.206	0.794	0.377	0.016
Time elapsed after stroke	1	6.018	0.663	0.419	0.013
Urinary incontinence	1	16.207	1.786	0.187	0.034
BME (UE)	1	5.179	0.571	0.454	0.011
ASS (UE)	1	34.873	3.843	0.056	0.071
BDS	3	126.460	13.935	<0.001	0.455
FAS	1	0.208	0.023	0.880	0.000

ASS, Ashworth spasticity scale; BDS, Beck depression scale; BME, Brunnstrom motor evaluation; FAS, functional ambulation score; UE, upper extremity

Table 3. Variance analysis of International Index of Erectile function

Variables	Df	Mean Square	F	p	η^2
Model	25	468.505	6.475	<0.001	0.866
Intercept	1	799.707	11.052	0.003	0.307
Age	1	162.323	2.243	0.147	0.082
Chronic disease	1	39.868	0.551	0.465	0.022
Side of stroke	1	383.08	5.294	0.03	0.175
Etiology	1	174.733	2.415	0.133	0.088
Reccurence of stroke	1	60.222	0.832	0.37	0.032
Time elapsed after stroke	1	166.522	2.301	0.142	0.084
Urinary Incontinence	1	120.916	1.671	0.208	0.063
BME (UE)	1	393.343	5.436	0.028	0.179
ASS (UE)	1	303.436	4.193	0.05	0.144
BDS	3	970.181	13.407	<0.001	0.617
FAS	1	170.128	2.351	0.138	0.086

ASS, Ashworth spasticity scale; BDS, Beck depression scale; BME, Brunnstrom motor evaluation; FAS, functional ambulation score; UE, upper extremity

Evaluation of Sexual Dysfunction in Women

Ten of the women (22.2%) had no sexual activity. In women, the total mean FSFI was 41.69 ± 16.77 . The mean desire, arousal, lubrication, orgasm, satisfaction, and pain subscale were 4.27 ± 1.81 , 7.11 ± 4.71 , 8.29 ± 5.60 , 4.64 ± 3.10 , 6.40 ± 4.22 , and 6.87 ± 4.92 , respectively. According to univariate ANOVA results, BDS ($p=0.001$) values significantly affected FSFI total values. The increase in BDS values resulted in a decrease in FSFI total score values. Age ($p=0.048$) and BDI ($p=0.025$) values had a significant effect on FSFI lubrication subscale values. The increase in age and BDI values resulted in a decrease in the FSFI lubrication subscale values. Age ($p=0.041$), time elapsed after stroke ($p=0.035$) and BDS ($p=0.009$) values had significant effects on FSFI satisfaction subscale values. An increase in age, decreased time after stroke, and increase in BDS values resulted in decreased FSFI satisfaction subscale values (**Table 4**).

Table 4. Variance analysis of Female Sexual Function Index

Variables	df	Mean Square	F	p	η^2
Model	24	395.263	2.736	0.013	0.767
Intercept	1	2397.512	16.596	0.001	0.453
Age	1	141.965	0.983	0.333	0.047
Chronic disease	1	76.606	0.530	0.475	0.026
Side of stroke	1	10.483	0.073	0.790	0.004
Etiology	1	142.624	0.987	0.332	0.047
Reccurence of stroke	1	0.692	0.005	0.945	0.000
Time elapsed after stroke	1	9.522	0.066	0.800	0.003
Urinary incontinence	1	10.063	0.070	0.795	0.003
BME (UE)	1	9.245	0.064	0.803	0.003
ASS (UE)	1	26.194	0.181	0.675	0.009
BDS	3	813.865	5.634	0.006	0.458
FAS	1	128.741	0.891	0.356	0.043

ASS, Ashworth spasticity scale; BDS, Beck depression scale; BME, Brunnstrom motor evaluation; FAS, functional ambulation score; UE, upper extremity

DISCUSSION

Post-stroke sexual dysfunction is common in both men and women. Even in approximately 50% of stroke patients without physical disability or mild physical disability, sexual dysfunctions such as decreased libido, decreased frequency of sexual intercourse, decreased sexual arousal, orgasm problems, and sexual satisfaction problems are observed.^[10] According to analyses based on ASES cut-off point, our results showed that the prevalence of sexual dysfunction after stroke was 88.5% in all participants (84.3% in men and 93.3% in women). The rates of sexual dysfunction after stroke in literature are between 20 and 75%.^[25] We found a higher rate of sexual dysfunction than the results in the literature. This increase can be explained by the differences in the studies' exclusion criteria and the differences in other study patterns. Patients with depression in one of the studies were not included.^[26] The fact that the patients included in our study were hospitalized, in need of rehabilitation, and were dependent or under the supervision of individuals.

ED is a significant problem in male patients after stroke. One study found that 75% of male patients had ED after stroke.^[3] The same investigators objectively evaluated erectile function in male patients after stroke and found that 55% of the cases had impaired erection. Our results showed that 88.2% of men after a stroke had impaired erections. These subjects had experienced mild to severe ED within the past four weeks. This study only assessed only the last four weeks of sexual activity might help us to explain the high rate we found.

Studies have shown no independent relationship between age and gender and the presence of post-stroke sexual dysfunction.^[3,8,13,26] This study showed an association between advancing age and sexual dysfunction after stroke, but gender is not effective in developing sexual dysfunction.

The results of studies evaluating the hemispheric lesion side and the frequency of development of sexual dysfunction are not consistent. Various studies have shown a positive association between sexual dysfunction and left hemisphere lesions.^[8,27] In some studies, sexual dysfunction is more common with right hemispheric lesions than those with left hemispheric lesions.^[28,29] Sexual reaction time is affected more significantly in right hemispheric strokes than in left hemispheric strokes.^[30] The right hemisphere plays an essential role in the activation/direction of libido and erectile functions.^[30] Emotional disturbances are more common in right hemisphere lesions,^[11,31] and response to erotic sensations may be difficult due to sensory/perceptual neglect.^[5] In addition, post-stroke sexual dysfunctions have been attributed to an imbalance of sympathetic hyperactivity and parasympathetic hypoactivity.^[32,33] The high frequency of sexual dysfunctions in patients with right hemispheric stroke has drawn attention. The view of autonomic dysfunction seems plausible given the inhibition of erection by the sympathetic pathways and the pro-

erectile properties of the sacral parasympathetic pathways.^[34] In this study, the left-sided (right hemispheric lesion) stroke worsened the sexual functions in men not in women. In some other studies, no association was found between the lesion side and sexual dysfunction.^[26,35] The results of these studies support our findings regarding women.

Stroke causes physical disability due to spasticity, conditions that limit proper body position and movements, and diffuse pain affect the positioning and specific sexual functions (desire, arousal, orgasm, and genital pain). In stroke cases, it becomes difficult to participate in sexual activity by hugging, caressing, touching, or other stimulating movements due to the hemiparetic extremity.^[5] After stroke; numerous adverse clinical conditions such as spasticity, limb weakness, and loss of dexterity significantly affect sexual activities.^[6] Fifty patients and their spouses were followed for six months after stroke in a prospective study. Those included in this study attributed their difficulties with sexual life to hemiparesis (55%) and spasticity (29%).^[9] In our study, retardation of upper extremity motor development in male hemiplegic patients was associated with worsening sexual functions. However, we found that spasticity had no effect on sexual functions in men. We discovered that upper extremity motor development level or spasticity had no impact on sexual functions in women. The mean spasticity levels evaluated with the ASS were 0.98 and 0.85 for the upper and lower extremities, respectively. The fact that the spasticity level of the patients was low in general in our study may help us explain the non-adverse effects of spasticity on sexual functions.

The results of the studies support a relationship between post-stroke depression and the sexual dysfunction.^[3,36] The severity of post-stroke depression was an independent predictor of the development of sexual dysfunction in both men and women.^[8] A study evaluating 67 patients after stroke showed that 78% of the patients were depressed. Although this study did not evaluate not all aspects of sexual dysfunction, post-stroke depression was found to be related with sexual dysfunction.^[37] We found that 71.9% of patients met the criteria for depression. Apart from depression of biological origin caused by stroke,^[11,31] physical problems due to the consequences of stroke, changes in social roles caused by disability, and severe changes in identity can exacerbate reactive depression and impair sexual functioning.^[12] In this context, the contribution of depression to sexual dysfunctions in stroke patients is expected to be more pronounced than the stroke lesion itself.^[8,13] This study showed that depression has a negative effect on sexual functions at almost every stage of the sexual response cycle, especially in women.

CONCLUSION

The current study showed that post-stroke sexual dysfunctions are significantly high in Turkish rehabilitation inpatient clinics. Post-stroke sexual dysfunctions are linked to multiple etiologies, both organic (hemispheric lesion side,

etc.) and psychosocial (depression, etc.). Post-stroke sexual dysfunction is a condition that occurs more frequently than is thought and escapes the attention of health professionals, which patients have difficulty in bringing up. Psychosocial factors contribute significantly to the etiology. Accordingly, the use of the obtained findings in clinical practice is also limited. The natural course of post-stroke sexual dysfunction after recovery is not fully understood. Post-stroke sexual adjustment assessment tools that can be clinically meaningful should be developed. Sexual dysfunctions should be evaluated and managed with a multidisciplinary approach. Adding the definitive diagnosis and treatment of sexual dysfunctions in stroke patients to the current stroke rehabilitation protocol will contribute to the treatment outcomes of stroke patients emotionally and functionally.

Abbreviations: ANOVA: Analysis of Variance, ASES: Arizona Sexual Experiences Scale, ASS: Ashworth spasticity scale, BDS: Beck Depression Scale, BME: Brunnstrom motor evaluation, ED: Erectile dysfunction, FAS: Functional ambulation scale, FSFI: Female Sexual Function Index, IIEF: International Index of Erectile function, LE: Lower extremity, MMT: Mini-Mental test, SD: Standard deviation, UE: Upper extremity

ETHICAL DECLARATIONS

Ethics Committee Approval: The local ethics committee approved this study of Ankara Physical Therapy and Rehabilitation Hospital, Turkey (22.12.2014).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Haacke C, Althaus A, Spottke A, Siebert U, Back T, Dodel R. Long-term outcome after stroke: evaluating health-related quality of life using utility measurements. *Stroke*. 2006;37(1):193-8.
2. McLaughlin J, Cregan A. Sexuality in stroke care: a neglected quality of life issue in stroke rehabilitation? A pilot study. *Sexual Disabil* 2005;23(4):213-26.
3. Korpelainen JT, Nieminen P, Myllylä VV. Sexual functioning among stroke patients and their spouses. *Stroke*. 1999;30(4):715-9.
4. Tamam Y, Tamam L, Akil E, Yasan A, Tamam B. Post-stroke sexual functioning in first stroke patients. *Eur J Neurol* 2008;15(7):660-6.
5. Rees PM, Fowler CJ, Maas CP. Sexual function in men and women with neurological disorders. *Lancet*. 2007;369(9560):512-25.
6. Soyuer F, Öztürk A. The effect of spasticity, sense and walking aids in falls of people after chronic stroke. *Disabil Rehabil* 2007;29(9):679-87.
7. Korpelainen JT, Kauhanen ML, Kemola H, Malinen U, Myllylä VV. Sexual dysfunction in stroke patients. *Acta Neurologica Scandinavica*. 1998;98(6):400-5.

8. Kimura M, Murata Y, Shimoda K, Robinson RG. Sexual dysfunction following stroke. *Compr Psychiatry*. 2001;42(3):217-22.
9. Sjögren K, Fugl-Meyer AR. Adjustment to life after stroke with special reference to sexual intercourse and leisure. *J Psychosomat Res* 1982;26(4):409-17.
10. Cheung RT. Sexual functioning in Chinese stroke patients with mild or no disability. *Cerebrovasc Dis* 2002;14(2):122-8.
11. Heilman KM, Bowers D, Valenstein E, Watson RT. The right hemisphere: neuropsychological functions. *J Neurosurg* 1986;64(5):693-704.
12. Schmitz MA, Finkelstein M. Perspectives on poststroke sexual issues and rehabilitation needs. *Top Stroke Rehabil* 2010;17(3):204-13.
13. Giaquinto S, Buzzelli S, Nolfi G. Evaluation of sexual changes after stroke. *J Clin Psychiatry*. 2003;64(3):0-.
14. Holden MK, Gill KM, Magliozzi MR. Gait assessment for neurologically impaired patients: standards for outcome assessment. *Physical Ther* 1986;66(10):1530-9.
15. Rw B, Smith M. Interrater reliability of a modified Ashworth scale of muscle spasticity. *Phys Ther* 1987;67(2):206-7.
16. Sawner KA, LaVigne JM, Brunnstrom S. Brunnstrom's movement therapy in hemiplegia: a neurophysiological approach: Lippincott; 1992.
17. Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index: a simple index of independence useful in scoring improvement in the rehabilitation of the chronically ill. *Md State Med J*. 1965.
18. Hisli N. Beck depresyon envanterinin universite ogrencileri icin gecerlilik, guvenilirligi.(A reliability and validity study of Beck Depression Inventory in a university student sample). *J Psychol*. 1989;7:3-13.
19. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975;12(3):189-98.
20. A. McGahuey AJG, Cindi A. Laukes, Francisco A. Moreno, Pedro L. Delgado, Kathy M. McKnight, Rachel Manber, Cynthia. The Arizona sexual experience scale (ASEX): reliability and validity. *J Sex Marital Ther* 2000;26(1):25-40.
21. Soykan A. The reliability and validity of Arizona sexual experiences scale in Turkish ESRD patients undergoing hemodialysis. *Int J Impot Res* 2004;16(6):531-4.
22. Rosen RC, Riley A, Wagner G, Osterloh IH, Kirkpatrick J, Mishra A. The international index of erectile function (IIEF): a multidimensional scale for assessment of erectile dysfunction. *Urology*. 1997;49(6):822-30.
23. TURUNÇ T, DEVECİ S, GÜVEL S, PEŞKİRCİOĞLU L. Uluslararası cinsel işlev indeksinin 5 soruluk versiyonunun (IIEF-5) Türkçe geçerlilik çalışmasının değerlendirilmesi. *Türk Üroloji Derg/Turk J Urol* 2007;33(1):45-9.
24. Aygin D. The Turkish adaptation of the female function index. *Turkiye Klinikleri J Med Sci*. 2005;25:393-9.
25. Park J-H, Ovbiagele B, Feng W. Stroke and sexual dysfunction—a narrative review. *J Neurologic Sci* 2015;350(1-2):7-13.
26. Choi-Kwon S, Kim JS. Poststroke emotional incontinence and decreased sexual activity. *Cerebrovasc Dis* 2002;13(1):31-7.
27. Sikiru L, Shmaila H, Yusuf GS. Erectile dysfunction in older male stroke patients: correlation between side of hemiplegia and erectile function. *African J Reprod Health*. 2009;13(2):49-54.
28. Monga TN, Lawson JS, Inglis J. Sexual dysfunction in stroke patients. *Arch Physical Med Rehabil* 1986;67(1):19-22.
29. Coslett HB, Heilman KM. Male sexual function: impairment after right hemisphere stroke. *Arch Neurol* 1986;43(10):1036-9.
30. HOWES D, BOLLER F. Simple reaction time: evidence for focal impairment from lesions of the right hemisphere. *Brain*. 1975;98(2):317-32.
31. Ley RG, Bryden M. A dissociation of right and left hemispheric effects for recognizing emotional tone and verbal content. *Brain Cognit* 1982;1(1):3-9.
32. Korpelainen JT, Sotaniemi KA, Myllylä VV. Autonomic nervous system disorders in stroke. *Clin Auton Res* 1999;9(6):325-33.
33. Korpelainen JT, Sotaniemi KA, Suominen K, Tolonen U, Myllylä V. Cardiovascular autonomic reflexes in brain infarction. *Stroke*. 1994;25(4):787-92.
34. Giuliano F, Rampin O. Neural control of erection. *Physiol Behav* 2004;83(2):189-201.
35. Sjögren K. Sexuality after stroke with hemiplegia. II. With special regard to partnership adjustment and to fulfilment. *Scand J Rehabil Med* 1983;15(2):63-9.
36. Trompeter SE, Bettencourt R, Barrett-Connor E. Sexual activity and satisfaction in healthy community-dwelling older women. *Am J Med* 2012;125(1):37-43. e1.
37. Kim J-H, Kim O. Influence of mastery and sexual frequency on depression in Korean men after a stroke. *J Psychosom Res* 2008;65(6):565-9.