J Surg Med. 2020;4(9):779-783.
DOI: 10.28982/josam.800830

Research article
Araştırma makalesi

Journal of Surgery and Medicine
e-ISSN=2602-2079

Sexual dysfunction and associated risk factors in multiple sclerosis

Multipl sklerozda seksüel disfonksiyon ve ilişkili risk fakörleri

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Ethics Committee Approval: Approval was obtained from the Ethics Committee of Bakirkoy Training and Research Hospital for Psychiatry and Neurological Disorders, University of Health Sciences on 5/7/2019 with a decision number of 318. All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.
Etik Kurul Onayı: Çalışma onayı Sağlık Bilimleri Üniversitesi Bakırköy Ruh Sağlığı ve Sinir Hastalıkları Eğitim ve Araştırma Hastanesi Etik Kurulu'ndan 318 sayılı karar ile 07.05.2019 tarihinde alınmıştır. İnsan katılımcıların katıldığı çalışmalardaki tüm prosedürler, 1964 Helsinki Deklarasyonu ve daha sonra yapılan değişiklikler uyarınca gerçekleştirilmiştir.

Conflict of Interest: No conflict of interest was declared by the authors.
Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemişlerdir.

Financial Disclosure: The authors declared that this study has received no financial support.
Finansal Destek: Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

Published: 9/30/2020
Yayın Tarihi: 30.09.2020

Abstract

Aim: Sexual dysfunction (SD) is quite common in multiple sclerosis (MS), and exhibits a multifactorial pattern. This study was set out to evaluate the frequency of SD and explore the related factors to support the quality of MS patients' lives.

Methods: This cross-sectional study included 96 volunteer RRMS patients between 18 and 60 years of age who were diagnosed with MS according to the Mc Donald criteria between 2018 and 2019 in our hospital. Multiple sclerosis intimacy and sexuality questionnaire-19 (MSISQ-19), Arizona Sexual Experience Scale (ASEX), Multiple Sclerosis Inventory of Cognition (MUSIC) and Beck Depression Inventory (BDI) questionnaires were used.

Results: Mean age of the patients was 38.46 (8.47) (min-max:20 – 60 years) years, and mean disease period was 77.02 (70.62) (3–324 months) months. Mean Extended Disability Status Scale (EDSS) score was 2.1 (1.33) (0-5) with a standard deviation of 80.5%. A negative correlation was observed between MUSIC cognitive and EDSS (P=0.017; r=-0.273), and BDI scores (P=0.003; r=-0.306). A significant and positive correlation was detected between MSISQ score (P<0.001; r=0.476) and BDI (P<0.001; r=0.529) in MUSIC fatigue test results. A negative and poor correlation was found between MUSIC fatigue and MUSIC cognitive score (P<0.001; r=-0.365). In patients with depression, mean MUSIC cognitive scores were lower (P=0.009), while MUSIC fatigue scores were higher (P<0.001). Age, educational status, presence of secondary SD were independent risk factors.

Conclusion: SD, a quite common condition in MS, may be decreased to increase the quality of lives of patients through treatment of psychosocial factors associated with cognitive state.

Keywords: Multiple sclerosis, Sexual dysfunction, Cognitive impairment, Depression

Öz

Amaç: Cinsel işlev bozukluğu (CİB), multipl sklerozda (MS) sık görülen multifaktöryel bir durumdur. Bu çalışma, MS'de CİB sıklığını değerlendirmek ve ilgili faktörleri araştırmak amacıyla düzenlenmiştir.

Yöntemler: Kesitsel özellikteki bu çalışmaya, 2018-2019 yıllarında,18 ile 60 yaşları arasında Mc Donald kriterlerine göre kesin relapsing remitting multipl skleroz (RRMS) tanısı alan 96 hasta gönüllü olarak çalışmaya dahil edildi. Multiple sclerosis intimacy and sexuality questionnaire-19 (MSISQ-19), Arizona Sexual Experience Scale (ASEX), Multiple Sclerosis Inventory of Cognition (MUSIC) ve Beck Depresyon Ölçeği (BDI) anketleri uygulandı.

Bulgular: Hastaların yaş ortalaması 38,46 (8,47) (min-maks: 20 - 60 yıl) yıldı; ortalama hastalık süresi 77,02 (70,62) (3 - 324 ay) aydı. Ortalama Genişletilmiş Özürlülük Durumu Ölçeği (EDSS) puanı 2,1 (1,33) (0-5) ve standart sapma %80,5 idi. MÜZİK bilişsel puanı ile EDSS puanı (P=0,017; r=-0,273) ve MÜZİK bilişsel ve BDÖ puanı arasında (P=0,003; r=-0,306) negatif bir korelasyon görüldü. Müzik yorgunluk testi sonuçlarında MSISQ skoru (P<0,001; r=0,476) ile BDÖ (P<0,001; r=0,529) arasında anlamlı ve pozitif bir ilişki tespit edildi. Müzik yorgunluğu ile müzik bilişsel puanı arasında negatif ve zayıf ilişki bulundu (P<0,001; r=-0,365). Ortalama MUZİK bilişsel puanı depresyonu olanlarda daha düşüktü (P=0,009); MÜZİK yorgunluk puanları depresyon grubunda daha yüksek saptandı (P<0,001). Yaş, eğitim durumu, ikincil seksüel disfonksiyon (SD) varlığı bağımsız risk faktörleriydi.

Sonuç: SD, MS'te çok yaygındır. Kognitif durumla da ilişkili olan psikososyal faktörlerin tedavisi ile SD oranı azaltılarak hastaların yaşam kalitesi arttırılabilir.

Anahtar kelimeler: Multipl skleroz, Seksüel disfonksiyon, Kognitif bozukluk, Depresyon

How to cite/Atıf için: Köseoğlu M, Çelik RGG, Tütüncü M, Bingöl A, Erbaş B, Deringöl D, Ataklı D. Sexual dysfunction and associated risk factors in multiple sclerosis. J Surg Med. 2020;4(9):779-783.

Introduction

Multiple sclerosis (MS) is a chronic inflammatory disease which usually affects young adults with relapse and remission periods. Although its pathophysiology is not clear, the most important characteristic is axonal demyelination. Relapsing remitting MS (RRMS), which progresses with attacks, is the most common clinical form. Tiredness, cognitive disorder, and physical disability significantly affect the quality of life in younger ages. There are many articles on MS patients in the literature [1]; however, there are limited number of studies investigating sexual dysfunctions. The cause for that may be explained in two forms: First, MS is a chronic disease which affects young adults and causes severe disability. Therefore, clinicians prefer to focus on the main treatments of the patients to reduce disability and increase the quality of life. Also, sexuality is an area of intimacy associated with familial factors, relations between individuals, marriage/partner status, and cultural characteristics. The patient abstains from informing the physician about this subject or the physician is not aware about the importance of the issue. Therefore, each basic treatment to improve the quality of life remains insufficient when other factors are not considered [2,3].

Sexual dysfunction (SD) prevalence in MS is between 16.9% and 95% [4]. This rate varies between 40% and 80% in females, and 50% and 90% in males [3]. The most common complaints for SD include erectile dysfunction and ejaculation problems in male patients, loss of vaginal lubrication and libido in female patients, and orgasm problems in both genders [2,5]. Etiology of SD in MS is not clear. Previous studies suggest primary, secondary, and tertiary SD for classification. Primary SD (PSD) is defined as that caused by the disease, namely, demyelinated plates in the brain and spine; secondary SD (SSD) occurs as a result of indirect causes regarding sexual organs including fatigue, spasticity, coordination dysfunction, and side effects of medications prescribed for MS. Tertiary SD (TSD) is caused by psychosocial and cultural factors such as fear of rejection by sexual partner, problems with partners, and depression [2].

Since SD is a multifactorial disease and there is no objective test to detect it, different results are obtained due to cultural and social factors. For instance, two different studies from two different countries detected that SD is associated with gender difference in MS [2,6]; however, Demirkıran et al. [5] did not detect any gender difference in their study.

Previous studies in the literature state that PSD is prominent in MS, and urinary bladder / bowel dysfunction is more responsible than other causes. [2,5,7] Furthermore, recent reviews report that SD in MS is associated with patient age, lower educational level, unemployment, long lasting marriage, menopause, chronic disease, and unhappiness in relationship [4,8].

The aim of the present study was to reveal causes of SD in MS patients, investigate SD-associated factors, and differently from the literature, its association with cognitive functions.

Materials and methods

The study included 96 volunteer patients with RRMS between 18 and 60 years of age who were diagnosed with MS according to Mc Donald criteria. Patients without any sexual partners, those with sexual dysfunction due to different co-morbidities, and severe neurological / psychiatric diseases were excluded from the study. The Kurtzke Extended Disability Status Scale (EDSS) [9] was used for disability evaluation. The Multiple Sclerosis Intimacy and Sexuality Questionnaire 19 (MSISQ-19), Arizona Sexual Experience Scale (ASEX), Multiple Sclerosis Inventory of Cognition (MUSIC), and Beck Depression Inventory (BDI) of voluntary forms were performed on all participants. Clinical and demographic data of the participants were obtained from the files and recorded in a table format.

Approval was obtained from the Ethics Committee of Bakirkoy Training and Research Hospital for Psychiatry and Neurological Disorders, University of Health Sciences on 07.05.2019 with the decision number of 318.

Tests:

Multiple sclerosis intimacy and sexuality questionnaire-19 (MSISQ-19)

It is a self-report form consisting of 19 Foley and Iverson questions to understand sexual dysfunction in patients with multiple sclerosis. Sexual dysfunction is categorized into three levels: Primary, secondary, and tertiary [10].

Arizona Sexual Experience Scale (ASEX)

The self-reported assessment of McGahey and his friends (2000) is intended to assess sexual changes and disorders in patients using psychotropic medicines. It has two distinct forms, male and female, and consists of five questions. Growing questions in the scale explores sexual motivation, psychological excitement, physiological stimulation, orgasmic potential, and orgasm satisfaction. Each question is scored from 1 to 6, with a total score of 5 to 30. When the overall score is 19 or higher, any item is scored 5 or 6 points, or 3 or more items are scored 4 points, sexual dysfunction is highly related to clinically-defined sexual dysfunctions [11].

Multiple Sclerosis Inventory of Cognition (MUSIC)

Calabrese and his friends developed this test. Developmental MUSIC test, which is based on empirical studies, offers the opportunity of consistency and monitoring of the most commonly affected cognitive performance areas in MS disease in the shortest period (8-10 minutes). The highest possible score is 30 points, and it has a cut-off value of 20 [12]. It consists of two parts: 1. Cognitive activity performance analysis: It covers areas of verbal memory (long-term and short-term), word fluence, attention focus and memory maintenance. 2. Fatigue Scale: Measures fatigue over 7 points by asking people questions. The maximum and minimum scores are 21, and 3, respectively.

Statistical analysis

Data were analyzed through IBM SPSS V23. Kolmogorov-Smirnov and Shapiro-Wilk tests were used to evaluate conformity to normal distribution. Chi-square and Fisher's exact test were used to compare categorical variables according to groups (age, gender, educational status, disease period, age of disease onset, EDSS). Independent two sample t test was utilized to compare normally distributed quantitative

data according to binary groups; non-normally distributed data were compared by Mann-Whitney U test. One-way variance analysis was used to compare normally distributed quantitative data in three and more groups. Non-normally distributed data were compared by Kruskal Wallis test. Pearson's correlation coefficient was used to evaluate the association between normally distributed quantitative data. Binary logistic regression analysis was used to review independent risk factors affecting SD. Logistic regression analysis was performed as univariate and multivariate; inclusion of independent risk factors in multivariate model was performed with the Backward: Wald method. Quantitative data were expressed in mean ± standard deviation and median (minimum-maximum) whereas categorical data were expressed in frequency (percentage). Significance level was $P<0.05$.

Sample Size and Power Analysis: Correlation analysis was used for relational analysis for basic hypotheses to be validated in the study, and independent samples t test was utilized in group comparisons. According to the large effect size targeted in the T test (r=.80), with the α error probability of 0.05 and the 1-β error probability of 0.95, the required minimum sample number was calculated with the G-Power 3.0.10 program. For the presence / absence of sexual dysfunction, the group ratios were determined as 1 to 2 (n=non-sexual dysfunction group, 2n= Group with sexual dysfunction) and the critical t in the comparison to be made with groups of 31 to 63 people was determined as 1.986. This is the study of 94 people, which amounts to a power of 95,034. Considering this information, 98 people were included in the study and the rate of sexual dysfunction presence / absence was partially preserved (81,19). According to the number of these groups, the analysis was determined to be at critical t: 1.285 and 87,622 power, and the required and targeted effect / power size was obtained in the two group comparisons.

Results

A total of 96 RRMS patients including 69 (71.9%) females were enrolled in the study. MSIS-Q results revealed that 80.5% of the participant patients had MS.

Mean age of the patients was 38.46(8.47) (min-max:20 – 60 years) years, and mean disease period was 77.02(70.62) (3 – 324 months) months. Mean EDSS score was 2.1(1.33) (0-5). Majority of the patients were elementary school graduates (58.5%); 25.5% of the patients were high-school graduates, and 15.9% were had bachelor's degrees. Mean onset age of the disease was 32.13 years (median: 32 years; min-max.: 14-49). There was no statistically significant difference regarding other sociodemographic characteristics according to educational status ($P>0.05$).

Mean MSISQ score was 39.72 (17.41) (min-max:18 - 82). Mean scores for PSD and SSD were 32.13 (7.81) (min-max:14-49) and 20.44(8.3) (min-max: 9 – 42), respectively. Mean score for TSD was 8.93(5.28) (min-max:5-25). As expected, each three SD types were significantly associated with each other ($P<0.01$). Mean ASEX score was 16.1 (median:16, min-max:0-30); mean MUSIC cognitive score was 16.08 (median 17; min-max: 3-29); and mean MUSIC fatigue score was 12.61 (median 12.5; min-max: 3-21).

PSD, SSD and TSD were detected in 10.42%, 19.84%, and 8.30% of female participants, respectively. Such rates were 10.19%, 21.92%, and 10.50%, respectively in male participants. There was no significant correlation between gender and SD (including sub-types of SD) (38.9% in female vs 42.58% $P=0.324$ *P*-value for primary SD: 0.870, secondary: 0.350, tertiary: 0.124; independent samples T test). The only parameter for gender difference was the onset age of the disease. Mean age of onset was 33.32 years in females, which was higher than the mean age of onset in males (29.11) ($P=0.017$). There was no statistically significant difference between other quantitative parameters with respect to gender ($P>0.05$) (Table 1).

Elaboration of MSISQ scores and sociodemographic characteristics revealed a positive and moderate correlation between disease period and MSISQ score ($P<0.001$; r=0.414). Review of the association between disease period and SD subtypes exposed a significantly positive and poor association between disease period and PSD ($P=0.004$; r=0.303), a significantly positive and moderate association between disease period and SSD ($P<0.001$; r=0.409), and a significantly positive and poor association between disease period and TSD ($P<0.001$; r=0.377). When the SD group (n:70) and non-SD group (n:10) were elaborated, there was no significant differences in age (0.300), gender, EDSS (0.105) ($P=0.005$) (Table 2).

A positive correlation was detected between MUSIC fatigue and MSISQ scores ($P<0.001$; r=0.476). Same correlation was also valid for Arizona test ($P=0.006$; r=0.302). A statistically significant and positive correlation was found between fatigue and PSD ($P=0.008$; r=0.281), SSD ($P<0.001$; r=0.599), and TSD ($P=0.004$; r=0.303) (Table 2).

The patients were divided into two groups depending on presence of depression: Medians of disease period were statistically different with regards to the presence of depression ($P=0.012$). A significant difference was observed in mean EDSS scores ($P=0.018$). In those with depression, the mean MUSIC cognitive score was lower ($P=0.009$), while MUSIC fatigue scores were higher ($P<0.001$) (Table 3).

Table 1: Comparison of quantitative parameters according to the gender

		Female (n=69)	Male (n=27)	Total (n=96)	*P*-value
Age	Mean (SD)	38.96 (8.84)	37.19 (7.44)	38.46(8.47)	0.359*
	Mean (Min-max)	39 (20 - 60)	38 (24 - 52)	38 (20 - 60)	
Disease period	Mean (SD)	69.22 (65.36)	96.67(80.41)	77.02(70.62)	0.088*
	Mean (Min-max)	48 (0 - 240)	84 (0 - 324)	60 (0 - 324)	
EDSS	Mean (SD)	1.94 (1.38)	2.44 (1.19)	2.1(1.33)	0.126*
	Mean (Min-max)	2 (0 - 5)	3 (0 - 5)	2 (0 - 5)	
Beck depression	Mean (SD)	15.91(12.22)	18.48 (13.86)	16.64(12.68)	0.385**
	Mean (Min-max)	13 (0 - 52)	16 (0 - 57)	13 (0 - 57)	
Primary sexual dysfunction	Mean (SD)	10.42 (6.18)	10.19(5.56)	10.36(5.98)	0.826**
	Mean (Min-max)	8.5 (4 - 25)	8 (5 - 25)	8 (4 - 25)	
Secondary sexual dysfunction	Mean (SD)	19.84 (7.43)	21.92(10.14)	20.44(8.3)	0.350*
	Mean (Min-max)	18 (9 - 40)	18.5 (10 - 42)	18 (9 - 42)	
Tertiary sexual dysfunction	Mean (SD)	8.3 (4.6)	10.5(6.5)	8.93(5.28)	0.142**
	Mean (Min-max)	6 (5 - 24)	8 (5 - 25)	6 (5 - 25)	
MSISQ	Mean (SD)	38.56(16.07)	42.58 (20.39)	39.72(17.41)	0.375*
	Mean (Min-max)	33.5 (18 - 82)	34.5 (20 - 82)	33.5 (18 - 82)	
ASEX	Mean (SD)	16.52(6.97)	14.91 (5.07)	16.1 (6.53)	0.323*
	Mean (Min-max)	16 (0 - 30)	14 (9 - 28)	16 (0 - 30)	
Music cognitive	Mean (SD)	16.65 (5.48)	14.58(6.52)	16.08(5.82)	0.122*
	Mean (Min-max)	17 (3 - 29)	13.5 (5 - 29)	17 (3 - 29)	
Music fatigue	Mean (SD)	12.22 (5.42)	13.68 (5.08)	12.61(5.34)	0.243*
	Mean (Min-max)	12 (3 - 21)	15 (3 - 21)	12.5 (3 - 21)	
Disease onset age	Mean(SD)	33.32 (7.88)	29.11 (6.87)	32.13 (7.81)	0.017*
	Mean (Min-max)	33 (16 - 49)	29 (14 - 43)	32 (14 - 49)	

SD: Standard deviation, * Independent two sample t test statistics, ** Mann-Whitney U test

Table 2: The association of sexual dysfunction sub-types with sociodemographic characteristics and test scores

	Primary sexual dysfunction		Secondary sexual dysfunction		Tertiary sexual dysfunction		MSISQ	
	r	*P*-value	r	*P*-value	r	*P*-value	r	*P*-value
Age	0.184	0.082	0.133	0.212	0.117	0.274	0.161	0.128
Disease period	0.303	0.004	0.409	<0.001	0.377	<0.001	0.414	<0.001
EDSS	0.179	0.129	0.224	0.057	0.191	0.105	0.230	0.051
Beck depression	0.457	<0.001	0.687	<0.001	0.571	<0.001	0.658	<0.001
Music cognitive	-0.077	0.472	-0.215	0.043	-0.181	0.089	-0.184	0.084
Music fatigue	0.281	0.008	0.599	<0.001	0.303	0.004	0.476	<0.001
ASEX	0.467	<0.001	0.302	0.006	0.403	<0.001	0.428	<0.001

Table 3: Comparison of quantitative parameters according to the depression

		Absent (n=60)	Present (n=36)	Total (n=96)	*P*-value
Age	Mean (SD)	38.52 (8.2)	38.36 (9.01)	38.46 (8.47)	0.931*
	Mean (Min-max)	38 (21 - 60)	38.5 (20 - 54)	38 (20 - 60)	
Disease period	Mean (SD)	66.34 (70.88)	94.53 (67.55)	77.02 (70.62)	0.012**
	Mean (Min-max)	36 (0 - 324)	60 (3 - 264)	60 (0 - 324)	
EDSS	Mean (SD)	1.8 (1.19)	2.52 (1.42)	2.1 (1.33)	0.018*
	Mean (Min-max)	2 (0 - 4)	3 (0 - 5)	2 (0 - 5)	
Beck depression	Mean (SD)	8.68 (5.07)	29.89 (10.2)	16.64 (12.68)	<0.001*
	Mean (Min-max)	8.5 (0 - 17)	26 (18 - 57)	13 (0 - 57)	
Primary sexual dysfunction	Mean (SD)	8.47(4.9)	13.31(6.38)	10.36(5.98)	<0.001*
	Mean (Min-max)	6 (4 - 25)	12 (5 - 25)	8 (4 - 25)	
Secondary sexual dysfunction	Mean (SD)	17.02 (6.86)	25.83 7.53	20.44 (8.3)	<0.001*
	Mean (Min-max)	16 (9 - 42)	26 (11 - 40)	18 (9 - 42)	*
Tertiary sexual dysfunction	Mean (SD)	6.96 (3.45)	12.03 6.15	8.93 (5.28)	<0.001*
	Mean (Min-max)	5 (5 - 20)	11 (5 - 25)	6 (5 - 25)	*
MSISQ	Mean (SD)	32.44 (13.11)	51.17 17.31	39.72 (17.41)	<0.001*
	Mean (Min-max)	29 (18 - 78)	47 (26 - 82)	33.5 (18 - 82)	*
Music cognitive	Mean (SD)	17.27 (5.55)	14.06 5.8	16.08 (5.82)	0.009*
	Mean (Min-max)	18 (6 - 29)	14 (3 - 27)	17 (3 - 29)	
Music fatigue	Mean (SD)	10.73 (4.63)	15.77 5.01	12.61 (5.34)	<0.001*
	Mean (Min-max)	10 (3 - 21)	16 (3 - 21)	12.5 (3 - 21)	
ASEX	Mean (SD)	14 (6.11)	19.61 5.72	16.1 (6.53)	<0.001*
	Mean (Min-max)	14 (0 - 30)	19 (11 - 30)	16 (0 - 30)	
Disease onset age	Mean (SD)	33.22 (7.52)	30.33 8.05	32.13 (7.81)	0.080*
	Mean (Min-max)	33 (16 - 49)	31 (14 - 44)	32 (14 - 49)	

The association of tests with each other were reviewed (Table 4). According to the results, a negative correlation was observed between MUSIC cognitive and EDSS score (*P*=0.017; r=-0.273), and BDI score (*P*=0.003; r=-0.306). A significant and positive correlation was detected between MSISQ score (*P*<0.001; r=0.476) and BDI (*P*<0.001; r=0.529) scores in MUSIC fatigue test results. A negative and poor association was found between MUSIC fatigue and MUSIC cognitive scores (*P*<0.001; r=-0.365).

The independent risk factors affecting SD were analyzed through binary logistic regression analysis as univariate and multivariate models. Risk of SD was 0.178-fold less in associate graduates than elementary school graduates, based on univariate analysis (*P*=0.042). Age was an independent risk factor according to multivariate analysis; increase of the age increased the risk of SD by 0.9-fold (*P*=0.045). Furthermore, among sub-types of SD, secondary SD was an independent risk factor; and an increase in secondary sexual dysfunction increased the risk of SD by 1.178-fold (*P*=0.038). Other independent risk factors affecting SD were not statistically significant (*P*=0.802, *P*=0.625) (Table 5).

Table 4: Correlation of tests with each other and disease onset age

		MSIASQ	EDSS	Beck depression	Music cognitive	Music fatigue	Acyo
EDSS	r	0.230					
	P-value	0.051					
Beck depression	r	0.658	0.189				
	P-value	<0.001	0.100				
Music cognitive	r	-0.184	-0.273	-0.306			
	P-value	0.084	0.017	0.003			
Music fatigue	r	0.476	0.185	0.529	-0.365		
	P-value	<0.001	0.109	<0.001	<0.001		
ASEX	r	0.428	0.060	0.403	-0.166	0.205	
	P-value	<0.001	0.623	<0.001	0.137	0.065	
Disease onset age	r	-0.146	-0.156	-0.164	-0.086	-0.213	0.188
	P-value	0.173	0.179	0.112	0.409	0.040	0.091

r: Pearson's correlation coefficient

Discussion

The remarkable features of our outcomes were higher SD rates of 80.5% in MS patients regardless of MS. Presence of depression was the most determinant factor for all sub-types of SD in MS. Age, educational level, and presence of SSD were detected as independent risk factors for SD in MS. Cognitive influence was significant, especially in secondary SD. Other factors associated with SD may be summarized as phatic and disease period.

Different outcomes may be obtained in the literature due to diagnostic difficulties with sexual dysfunction and multifactorial influence. For instance, we detected higher SD rates than average in the patients with RRMS compared to previous studies; however, a recent review reported that SD may reach up to 80% in males, and 90% in females [4,13,14]. Another difference is that SD in MS was observed more in females in a similar study conducted on MS patients in a different territory of our country in 2013 [2]. Results of the present study were not significant for SD in MS in terms of gender.

Physical disability may be associated with psychosocial factors and cause SD in MS. Mood disorders may affect emotional and sexual functions in MS patients due to physical disability; and patients experience fear of rejection in sexual intercourse, decreased self-respect image, lack of confidence, and higher stress [5,15]. Rocco et al. [14] suggested in another updated research conducted in 87 patients with RRMS in 2018 that EDSS does not play a leading role for sexual dysfunction. Another longitudinal research performed in Belgrade reported that the factors affecting SD in MS are associated with disease period, depression, anxiety, and fatigue [15,16].

Table 5: Logistic regression analysis of parameters affecting sexual dysfunction

	Univariate				Multivariate			
	Beta	OR (%95 CI)	*P*-value	DSO	Beta	OR (%95 CI)	*P*-value	DSO
Age	-0.036	0.964 (0.9 - 1.033)	0.298	80.5	-0.105	0.9 (0.813 - 0.998)	0.045	87.7
Gender	-0.455	0.635 (0.205 - 1.964)	0.430	80.5				
Education Status (Reference: primary school)								
Education status high school)	0.506	1.658 (0.404 - 6.798)	0.483	81.2				
Education status (university)	-1.728	0.178 (0.034 - 0.938)	0.042					
Education status (undergraduate)	0.351	1.421 (0.152 - 13.325)	0.758					
Duration of disease	0.001	1.001 (0.994 - 1.009)	0.719	80.2				
EDSS	-0.37	0.691 (0.441 - 1.082)	0.106	80.6				
Beck depression score	0.028	1.028 (0.981 - 1.078)	0.246	80.5				
Primary sexual dysfunction	0.058	1.06 (0.951 - 1.18)	0.294	82.9				
Secondary sexual dysfunction	0.069	1.072 (0.986 - 1.165)	0.104	82.9	0.163	1.178 (1.009 - 1.375)	0.038	
Tertiary sexual dysfunction	0.046	1.047 (0.927 - 1.182)	0.462	82.9				
MSIASQ	0.027	1.027 (0.988 - 1.068)	0.178	82.9				
MUSIC cognitive	-0.016	0.985 (0.894 - 1.084)	0.751	81.4				
MUSIC fatigue	0.067	1.069 (0.966 - 1.184)	0.196	81.2				
ASEX	0.072	1.075 (0.976 - 1.183)	0.143	82.7	0.136	1.146 (0.991 - 1.324)	0.065	
Disease onset of age	-0.043	0.958 (0.892 - 1.028)	0.234	80.2				
Diagnosis of depression	1.253	3.5 (0.922 - 13.284)	0.066	80.5				

ACR: Accurate classification rate, independent risk factors were included into the multivariate analysis through Backward: Wald method

Moreover, another study conducted in our country revealed that SSD plays a significant role in MS. It was advocated that SD occurs due to problems in the urinary bladder and intestines, spasticity, exhaustion, pain, and decrease in sexual desire, all of which affect quality of life of the patients during progress of MS. Our results also support this hypothesis; there was no significant correlation between SD and EDSS; EDSS scores were higher in MS patients with depression; and MS patients with depression are more diagnosed with SD. This supports the assumption that EDSS may cause SD through psychosocial diagnoses. Furthermore, we concluded that there is a positive correlation between SD and disease period, fatigue, and depression.

A positive correlation was found between lower educational level and SD in the literature. In line with previous studies, our findings suggested that SD was significantly lower in the associate graduate group [4,8].

Cognitive functions may depend on physical injury such as cortical atrophy occurring during the disease or cognitive loss concomitant to mood disorders may be observed. In addition to the key role of SSD in MS patients, a negative association with cognitive functions was detected. MUSIC cognitive tests were lower in all SD patients who enrolled in the present study; however, other sub-types were not significant. This reminded the importance of SSD and revealed that clinicians should consider it. Moreover, cognitive functions were significantly lower in MS patients with depression when compared with those without. Demirkıran et al. [5] evaluated the cognition of 67 MS patients by the Minomen test and detected lower cognitive scores in the patients with SD. Ashtari et al. [17] demonstrated that memory and concentration problems were higher in MS patients with SD (64%) when compared with those without (39.5%).

Several studies indicated the role of diseases such as depression and anxiety in sexual dysfunction in MS patients [18-20]. In line with the literature, our study showed that the results have been higher compared to the ones who were not diagnosed with depression in the group with SD. Furthermore, MS was also detected as a risk factor for SD. Therefore, physical disability is not the primary cause for SD in MS patients [14]; monitoring and treatment of depressive symptoms in these patients are most important steps during SD counteracting.

Limitation

This is a single-center study and it cannot be generalized. The findings reported for cultural reasons are focused on the individual's own statement, i.e. the results of the survey and objective diagnostic tests have not been carried out on the people because of costs and shyness. Studies conducted with larger patient groups consisting of MS patients in different hospitals and different regions will enable us to better understand the importance of this issue and obtain more information.

Conclusions

SD in MS is a multifactorial condition. Along with unchangeable factors such as age, disease period, and physical disability, psychosocial factors such as depression play a key role in this diagnosis. Furthermore, SD significantly affects cognitive functions and negatively affects the quality of life. The present study serves as the first study that evaluates the SD-associated factors and the association between SD and cognition.

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