



Sexual function and related factors in Iranian woman with epilepsy



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ABSTRACT

Purpose: Epileptic women are faced with many sexual challenges in their life due to medical and non-medical factors. The present study was conducted to assess sexual function in epileptic women and its related factors.

Method: The present cross-sectional study was conducted on 196 epileptic married women of reproductive age who were members of the Iranian Epilepsy Association and were selected continuously over six months through convenience sampling. The data collection tools included the Female Sexual Function Index (FSFI) and questions about the causes of sexual dysfunction. The statistical tests including: Chi-square, *t*-test, one-way ANOVA, linear and logistic regression.

Results: According to the results, 74.5% of the participants suffered from sexual dysfunction and scored the lowest in terms of the orgasm and sexual satisfaction dimensions. The factors associated with sexual dysfunction included age over 40, poor education, more than 15 years of marriage, poor economic status, history of infertility and irregular menstruation, several seizures per month, nocturnal seizures, triple or multiple drug therapies and not using anticonvulsant drugs that have no effect on the liver enzymes. From participants' perspective, the most common causes of sexual dysfunction include anxiety and stress, emotional problems with the spouse, dissatisfaction with the experience of unwanted sex and the type of drugs used.

Conclusions: Since the incidence of sexual dysfunction in epileptic women is high and multifactorial, it is recommended for experts and health service providers to not only seek to better control the patients' seizures, but also assess them in terms sexual function.

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1. Introduction

Epilepsy is the second most common neurological disorder and is recognized by sudden and recurrent seizures. Based on a meta-analysis study conducted by Sayeh-Miri et al. [1], the prevalence of epilepsy was estimated as 5% in Iran [1]. This prevalence varies from 0.3% to 0.7% in women of fertile ages [2]. Although sexual desires and function are a priority in all marriages, previous studies have shown that sexual dysfunction is common in both epileptic men and women [3]. Sexual dysfunction among women is identified as impaired desire, arousal, orgasm and pain associated with severe distress [4].

Some of the most important consequences of sexual dysfunction and sexual dissatisfaction are psychologic problems such as anger, nervousness, couple emotional separation and family problems. These problems can lead to marital disruption and divorce [5].

Accordingly, A population-based study showed, that sexual dysfunction in Iranian women was 31.5%, that would increase with ageing. Sexual dysfunction risk factors, in this study, were defined as educational level, age of marriage, marital status and chronic disease [1].

Epilepsy is one of the most important chronic neurological diseases that can affect sexual function. Due to the nature of the disease and the use of anticonvulsant drugs and their potential effect on the reproductive and sex hormones, epileptic women are faced with many reproductive (irregular menstruation and infertility) and sexual challenges [7]. Although epileptic women

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can have a normal sex life, studies have estimated that 20% to 60% of them experience impaired sexual desire or arousal and orgasmic dysfunction (8 and 9).

The interaction of epilepsy problems and drug therapy with temporal and frontal lobe involvement, hypothalamus involvement and changes in the hypothalamic-pituitary-ovarian axis can cause sexual hormone imbalance, neurovascular disorders [8] and psychological disorders [9]. Non-medical factors such as social factors, the healthy partner's reaction to the disease [10], the experience of stigmatization, emotional disorders, interpersonal problems such as social isolation and poor social competence, especially in epileptic women [11], also contribute to the sexual response mechanism in epileptic women [12].

It is worth noting that no comprehensive studies have yet been conducted on the sexual problems of Iranian epileptic women. Such problems are subjective and abstract issues that are influenced by complex medical and sociocultural factors and society's values and religion; as a result, the causes of the sexual problems and concerns experienced by this group cannot be identified and alleviated with a single tool [13]. The present study is part of a PhD thesis aiming to investigate sexual function in epileptic women and its related factors. For this purpose, the standardized Persian version of the FSFI was used along with questions posed to identify the root causes of sexual dysfunction from the perspective of the participants.

2. Methods

This descriptive cross-sectional study was conducted on a population consisting of 210 married epileptic women of reproductive ages (18–45 years) who were members of the Iranian Epilepsy Association. The inclusion criteria consisted of having epilepsy and receiving drug therapy since at least a year ago. The exclusion criteria consisted of having other chronic physical and psychological diseases (such as diabetes, hypertension, thyroid disorder, substance abuse and cognitive and neuropsychiatric disorders) and being pregnant or breastfeeding. Continuous convenience sampling was performed over six months from November 2016 to April 2017. Taking into account a type I error of 0.05, an effect size of 0.15 and an attrition of 20%, the sample size was determined as 207, and a total of 196 women were finally included in the study. The data collection tools consisted of a form inquiring about participants' demographic, disease and drug therapy details and asking questions about the causes of sexual dysfunction from participants' perspective. The Persian version of the Female Sexual Function Index was also used, which has had its validity and reliability confirmed in a study of Iranian women by Mohammadi et al. and which has a cut-off point of 28 for sexual dysfunction [15].

The score of the FSFI was obtained by multiplying the sum of the scores in each dimension by a factor number. The dimensions of sexual desire and sexual satisfaction were scored from 1 to 5 and the dimensions of sexual arousal, lubrication, orgasm and intercourse pain were scored from 0 to 5. The total score was obtained by adding the scores of all the six dimensions. The maximum score was 6 for each dimension and 36 for the entire scale. The minimum score was 1.2 for sexual desire, 0 for sexual arousal, vaginal lubrication, orgasm and intercourse pain, 0.8 for sexual satisfaction and 2 for the entire scale.

In addition to these questions, eight more questions were asked to assess the underlying causes of sexual dysfunction in epileptic women, which were scored from 1 to 5. The lower was this score, the less did the subjects consider that item an underlying cause of their sexual dissatisfaction and vice versa. After obtaining a letter of introduction from Shahid Beheshti University of Medical

Sciences and presenting it to the Iranian Epilepsy Association, the researcher was introduced to the study subjects. This research was approved by the ethics committee of the International Branch of Shahid Beheshti University (code: IR.SBMU.IASB.REC).

At the beginning of each interview, the researcher introduced herself, explained the study objectives and obtained informed consent from the participants, and ensured them of the confidentiality of the data and their right to withdraw from the study at any stage. Membership in the Iranian Epilepsy Association requires the submission of documents confirming the epilepsy diagnosis (EEG and MRI results) and referral by a trusted neurologist.

2.1. Statistics

The data collected were ultimately analyzed in SPSS-17 using descriptive statistics (mean and standard deviation) and frequency distribution. The Chi-square test was used to compare the frequency of the qualitative and ordinal variables and the independent *t*-test and the one-way ANOVA to compare the mean. The relationship between the questions about the causes of sexual dysfunction from participants' perspective and the scores of the FSFI and its dimensions was assessed using the linear regression. The logistic regression was also used to estimate the risk of sexual dysfunction based on the background variables, disease details and causes of sexual dysfunction from participants' perspective. The level of statistical significance was set at $P \ll 0.05$.

3. Results

A total of 15 of the 210 participating women withdrew from the study, including nine due to their unwillingness to answer the questions, three due to pregnancy, two due to breastfeeding and one due to the discontinuation of the medications due to recovery. The participants had a minimum age of 20 and a maximum of 45 and had a mean age of 35.73 ± 6.21 years. The majority of the subjects (54.9%) had junior high education or high school diploma, were housewife (76.9%), had a poor (45%) or moderate (41.7%) income, had irregular menstruation (39.5%) and a history of infertility (23.6%).

The subjects' mean age at the onset of the disease was 16.47 ± 7.32 years. Most participants had generalized epilepsy (50.8%) with seizures often occurring during the day and in waking hours (63.6%). Almost half of the participants had no recurrence of seizures in the past year or over a longer period (44.6%), and the majority were on single drug therapy (56.3%); (Table 1).

A significant relationship was observed between the seizure intervals and income ($X^2 = 5.90$, $P \ll 0.05$). More than half of the participants (61.5%) who experienced recurring seizures several times per month were financially struggling and those who did not experience recurring seizures as often were mostly well off.

Tables 2 and 3 present the mean and standard deviation of sexual function and its dimensions, and also the frequency of the causes of sexual dysfunction from participants' perspective. Based on the cut-off point of 28 in the FSFI Mohammadi et al. [15], 74.5% of the participants experienced sexual dysfunction. The participants received the lowest scores in the dimensions of orgasm and sexual satisfaction, in respective order, and received almost similar scores in sexual desire and arousal. In 41.5% of the participants, half of or more than half of the sexual encounters in the past month had been unwanted.

Table 4 presents the difference in the mean scores of the FSFI by background variable. The table examines the relationship of the FSFI with age, education, duration of marriage, income, history of irregular menstruation and infertility using the *t*-test and the

Table 1
The frequency of disease characteristics and drug therapy.

	Disease characteristics	N (%)
Type of epilepsy	Simple partial	31(15.9)
	Complex partial	47(24.1)
	Generalized	99(50.8)
	Myoclonic	9(4.6)
	Absence	9(4.6)
Intervals seizures	Several times in week	16(8.2)
	Once a week	8(4.1)
	Several times in month	17(8.7)
	Once a month	23(11.8)
	Several times in year	44(22.6)
	yearly	19(9.1)
free of seizures one year OR more	68(34.9)	
Duration of the disease (years)	Below 10	30(15.4)
	11–20	76(38.8)
	21–30	73(37.2)
	31 OR more	16(8.2)
type of medication regimen	Monotherapy	107 (56.3)
	Two drugs	59(31.1)
	Three drug or more	24(12.6)

ANOVA with Bonferroni's correction. Significant relationships can be observed between the scores of the FSFI and some of these variables.

Table 5 presents the difference in the mean scores of the FSFI by disease details and drug therapy. The table examines the relationship of the FSFI with seizure intervals, seizure timing, duration of the disease, types of medication used and type of drug therapy using the *t*-test and the ANOVA with Bonferroni's correction. Significant relationships can be observed between the scores of the FSFI and some of these variables.

In the present study, the participants were asked to express their views on the factors contributing to sexual dysfunction. A total of 41.5% of the participants had unwanted sex with their spouse over the past year.

As for the causes of sexual dysfunction from participants' perspective, 49.5% of them gave a score higher than 3 based on the Likert scale to anxiety and psychological tension, 34.4% to the use of anticonvulsant drugs and 46% to emotional problems with their spouse.

A significant relationship was observed between the type of drug therapy (single, double or triple drug therapy) and the contribution of drug therapy to sexual dissatisfaction ($X^2 = 7.98$, $P = 0.018$). A total of 74% of the participants who used single drug therapy did not consider their therapy the cause of sexual dysfunction and dissatisfaction, while those who were on double or triple drug therapy considered their medications a factor contributing to sexual dysfunction and dissatisfaction.

The linear regression test was used to identify the most contributing underlying causes of sexual dysfunction from

Table 2
The mean and standard deviation of the scores of the FSFI and its dimensions.

Sexual phases	Mean(SD)	Range
Desire	3.53(1.66)	1.2–6
Excitement	3.54(2.32)	0–6
Lubrication	3.61(2.30)	0–6
Orgasm	3.07(2.22)	0–6
Dyspareunia	3.16(2.17)	0–6
Satisfaction	3.26(1.80)	0.8–6
Sexual Function Index	20.16(9.29)	2–36

participants' perspective. The FSFI score was taken as the dependent variable and the causes of sexual dysfunction from participants' perspective as an independent variable. The results obtained showed that emotional problems with the spouse ($B = -0.32$, $P \ll 0.001$), anxiety and psychological tension ($B = -0.145$, $P \ll 0.027$) and dissatisfaction with unwanted sex ($B = -0.191$, $P = 0.003$) can contribute to sexual dysfunction and help predict it.

The logistic regression test was used to determine the most effective risk factor for sexual dysfunction from the examined list of demographic factors and disease details, the type of drug therapy and the factors contributing to sexual dysfunction from participants' perspective. The results showed that the likelihood of sexual dysfunction is 3.7 times higher in participants who did not use anticonvulsant drugs that had no effect on the liver enzymes, such as Lamotrigine and Levetiracetam ($P = 0.001$). Moreover, participants with several seizures per month are 10.01 times more likely to experience sexual dysfunction compared to those who have not experienced the recurrence of seizures for a year or longer ($P = 0.01$). In addition, the subjects who gave a score higher than three to anxiety and psychological tension, impaired emotional relationship with the spouse and dissatisfaction with unwanted sex were 2.86, 4.39 and 7.12 times more likely to experience sexual dysfunction compared to those who did not consider these factors a cause of sexual dysfunction ($P = 0.04$, $P = 0.04$ and $P = 0.002$; Table 6).

4. Discussion

According to this study, 74.5% of the epileptic women suffered from sexual dysfunction compared to 31.5 percent in the Safarinejad. population based study [6]. Studies conducted by Urso et al. [16] and Henning et al. [17] have reported the prevalence of sexual dysfunction in epileptic women as 31%–71% and as 73%

Table 3
The frequency of the causes of sexual dysfunction from participants' perspective.

Causes of sexual problems	Likert Scale	Frequency (%)
Unwanted sex	Never & Seldom	58.5
	Sometimes	18.6
	Almost always & Often	22.9
Experience of sexual violence	Never & Seldom	72
	Sometimes	12.2
	Almost always & Often	32.8
Anxiety and psychological tension	Never & Seldom	50.5
	Sometimes	17.9
	Almost always & Often	31.6
Fear of seizure during intercourse	Never & Seldom	77.2
	Sometimes	5.3
	Almost always & Often	17.5
The Impact of Epilepsy	Never & Seldom	78.4
	Sometimes	5.8
	Almost always & Often	15.8
The effect of anticonvulsants drugs	Never & Seldom	65.5
	Sometimes	10.6
	Almost always & Often	23.8
Emotional problems with the spouse	Never & Seldom	54
	Sometimes	13.2
	Almost always & Often	32.8
Spouse's sexual problems	Never & Seldom	78.5
	Sometimes	5.3
	Almost always & Often	13.7

Table 4
The relationship between the demographic details and the FSFI.

		Sexual function Mean (SD)	Desire Mean (SD)	Excitement Mean (SD)	orgasm Mean (SD)	satisfaction Mean (SD)	Dyspareunia Mean (SD)
Age (Year)	Below 30(1)	22.53 (8.87)	3.42(2.16)	3.42(2.16)	3.31 (2.32)	3.54(1.85)	3.54(2.20)
	31-40(2)	20.02(7.78)	3.91(2.21)	3.91(2.21)	3.48(2.12)	3.38(1.74)	3.26(1.99)
	41 or more(3)	17.82(9.11)	2.94(2.54)	2.94(2.54)	2.16(2.08)	2.83(1.82)	2.7(2.42)
	P-Value	P* = 0.006 P_{1,3}* = 0.023 P_{2,3}* = 0.012	P* = 0.642	p* = 0.04 P_{2,3}* = 0.042	p* = 0.001 P_{1,3}* = 0.029 P_{2,3}* = 0.001	P = 0.102	P = 0.142
Education	Illiterate & Elementary(1)	14.31(7.49)	2.48(1.21)	2.24(2.06)	1.68(1.82)	2.00(1.23)	2.40(2.27)
	Middle& Highschool (2)	21.84(8.53)	3.61(1.72)	3.75(2.34)	3.21(2.18)	3.48(1.82)	3.36(2.14)
	Collegiate (3)	22.52(7.85)	3.89(1.55)	3.78(2.24)	3.53(2.22)	3.51(1.75)	3.2(2.14)
	P-Value	P* << 0.001 P_{1,2}* << 0.001 P_{1,3}* << 0.001	p* = 0.001 P_{1,2}* = 0.004 P_{1,3}* = 0.001	p* = 0.004 P_{1,2}* = 0.004 P_{1,3}* = 0.009	p* = 0.001 P_{1,2}* = 0.002 P_{1,3}* = 0.001	p* << 0.001 P_{1,2}* << 0.001 P_{1,3}* << 0.001	P = 0.101
Duration of marriage (year)	Below 15	22.36(8.04)	3.64(1.65)	3.76(2.23)	3.42(2.21)	3.47(1.77)	3.28(2.07)
	Above 15	18.80(9.02)	3.36(1.68)	3.17(2.43)	2.54(2.14)	2.94(1.80)	2.97(2.33)
	P-Value	P* = 0.005	P = 0.25	P = 0.08	P* = 0.007	P* = 0.045	P = 0.33
Income	Very low(1)	19.80(8.48)	3.59(1.67)	3.09(2.32)	2.71(2.26)	3.00(1.76)	2.96(2.28)
	Low(2)	21.98(8.69)	3.46(1.65)	3.86(2.28)	3.40(2.13)	3.49(1.83)	3.49(2.09)
	Middle(3)	23.81(6.42)	3.92(1.53)	4.66(1.70)	3.87(1.89)	3.46(1.77)	3.41(1.81)
	P-Value	P = 0.07	P = 0.466	P* = 0.004 P_{1,3}* = 0.006	P* = 0.028 P_{1,3}* = 0.05	P = 0.198	P = 0.272
History of infertility	Yes	20.29(9.21)	3.95(1.8)	3.17(2.54)	3.04(2.64)	3.01(1.85)	2.80(2.21)
	No	21.12(8.43)	3.40(1.6)	3.64(2.25)	3.08(2.15)	3.34(1.87)	3.27(2.16)
	P-Value	P* = 0.573	P* = 0.053	P = 0.239	P = 0.914	P = 0.287	P* = 0.20
Irregular menses	Yes	18.67(8.74)	3.36(1.73)	2.97(2.44)	2.52(2.29)	2.89(1.75)	2.62(2.37)
	No	23.36(8.27)	3.64(1.62)	3.88(2.19)	3.41(2.12)	3.48(1.80)	3.50(2.08)
	P-Value	P* = 0.004	P = 0.277	P* = 0.008	P* = 0.007	P* = 0.026	P* = 0.006

*P value >>>0.05.

(16 and 17). The mean score of sexual function was 20.93 in the present study. In a study conducted by Sheikhalil et al. in Iran with half the sample size of the present study, the mean score of sexual function was 23.33 [18]. Zelena et al. [19] also reported the score of sexual function in epileptic women as 28.2 (6.2), which is more favorable compared to the present study [19]. Aside from cultural differences and their effect on sexual matters, a potential reason for this difference might be the higher mean age of the subjects in the present study (36 vs. 31 years). Moreover, in the present study, the orgasm dimension received the lowest score of all the dimensions of sexual function (3.07 ± 2.22). According to some studies, orgasm dysfunction is more dire than impaired sexual desire in epileptic women [20]. In contrast to the present study, the study of Duncan et al. [21] did not show any significant difference between the case and the control groups in terms of orgasm and sexual satisfaction. The possible reasons can be as the following: 1. The 20-year difference in the time period of these two studies performances, 2. the undesirable changes in the socio-economic status around the world, especially in the developing countries like Iran, and its direct impact on the quality of life of vulnerable people (like the low socio-economic classes, women with chronic diseases and etc. . .), 3. The difference between the socio-economic status of participants in these two studies (The participants of Duncan's study had more desirable socio-economic status and were independent while the participant of this study were mostly housewife and had low education), 3. The difference in the goals and tools of the sexual function measurement, 4. The difference in the social contexts and the cultural norms between these two communities (Iran and the United States), and The

difference between the mean ages of the participants in these two studies (36 years vs. 25–26 years) [21].

In the present study, the subjects over 40 received significantly lower scores in sexual function, arousal and orgasm. A study conducted by Hayes et al. [22] showed that sexual function and desire diminish significantly with age, especially in those who have suffered from sexual dysfunction from a young age [22]. In the present study, the frequency of sexual dysfunction showed a 13% ascending trend in the group below age 30 in relation to the group older than 40 (increased from 70% to 83%).

In addition, the score of the FSFI and its dimensions reduced significantly in the illiterate subjects and those with primary school education. The results of a study conducted by Aggarwal et al. [23] on infertile couples showed that both fertile and infertile illiterate women are more likely to experience sexual dysfunction. In their study, poor education was proposed as an independent factor affecting sexual function [23]. In contrast, the results of a study conducted in India showed that sexual dysfunction was more prevalent among women with average education compared to the illiterate and low-literate women (43.4% vs. 7.3%) [24]. Irrespective of cultural and social differences with India, this disparity might be due to the frequent seizures experienced in poorly-educated individuals, since the present study revealed the lack of control over seizures in the past year as 76% in the illiterate and low-literate subjects, 52.3% in those with a high school diploma and 50% in those with university education.

The findings also revealed lower scores in the orgasm and sexual arousal dimensions in the patients with very low incomes. Mohammad-Alizadeh-Charandabi et al. [25] argued that families

Table 5
The relationship of disease details with the FSFI

		Sexual function Mean(SD)	Sexual function Mean(SD)	Excitement Mean(SD)	orgasm Mean(SD)	satisfaction Mean(SD)	DyspareuniA Mean (SD)
Seizures interval	several times in month or more(1)	17.64(8.08)	3.24(1.73)	3.07(2.22)	2.42(2.12)	2.60(1.41)	2.60(2.16)
	Monthly to Several times in year(2)	21.98(8.16)	3.46(1.69)	3.70(2.81)	3.23(2.16)	3.40(1.81)	3.29(2.09)
	Annual or more than one year(3)	21.74(8.86)	3.71(1.62)	3.61(2.47)	3.25(2.28)	3.47(1.89)	3.33(2.23)
	P-Value	P[*] = 0.021 P_{1,2}[*] = 0.035	P = 0.32	p = 0.35	p = 0.11	P[*] = 0.02 P_{1,2}[*] = 0.032	P = 0.17
Duration of the disease (year)	Below 10(1)	20.32(7.32)	2.84(1.39)	3.76(1.88)	3.16(2.02)	3.0(1.59)	3.60(1.96)
	11–20 (2)	21.12(8.08)	3.50(1.62)	3.61(2.09)	3.23(2.01)	3.24(1.67)	3.29(2.00)
	21–30 (3)	22.30(9.29)	3.88(1.70)	3.74(2.57)	3.20(2.44)	3.5(1.99)	3.22(2.30)
	31 OR more(4)	14.22(8.10)	3.34(1.89)	1.60(2.29)	1.44(2.03)	2.72(1.84)	1.36(2.12)
	P-Value	P[*] = 0.014 P_{2,4}[*] = 0.033 P_{3,4}[*] = 0.007	P[*] = 0.034 P _{1,2} = 0.023	P[*] = 0.009 P _{1,4} = 0.018 P _{4,2} = 0.012 P _{4,3} = 0.006	P[*] = 0.031 P _{2,4} = 0.026 P _{3,4} = 0.03	P = 0.352	P[*] = 0.007 P _{4,1} = 0.006 P _{4,2} = 0.009 P _{4,3} = 0.014
Time of accurse Seizures	Awake	21.89(7.89)	3.60(1.67)	3.67(2.19)	3.42(2.12)	3.45(1.70)	3.38(2.04)
	Sleeping	19.26(9.55)	3.40(1.65)	3.27(2.54)	2.60(2.32)	2.35(1.93)	2.78(2.36)
	P-Value	P[*] = 0.04	P = 0.44	P = 0.25	P[*] = 0.02	P[*] = 0.05	P = 0.06
Type of anti-epilepsy drug	Ineffective drugs on liver enzymes	22.44(8.68)	3.86(1.64)	3.67(2.34)	3.45(2.31)	3.58(1.85)	3.32(2.18)
	Other anti-seizure drug	19.77(8.40)	3.27(1.64)	3.42(2.32)	2.78(2.11)	3.02(1.73)	3.04(2.17)
	P-Value	P[*] = 0.03	P[*] = 0.01	P = 0.46	P[*] = 0.037	P [*] = 0.031	P = 0.37
	Other anti-seizure drug	21.26(8.5)	3.58(1.66)	3.59(2.32)	3.14(2.21)	3.22(1.80)	3.22 (2.17)
	Primidone Drug	10.08(5.06)	1.68(0.65)	1.60(1.80)	1(1.40)	1.60(0.61)	1.40(1.92)
P-Value	P[*] = 0.004	P[*] = 0.001	P[*] = 0.003	P[*] = 0.002	P[*] = 0.002	P = 0.043	
The type of medication regimen	Monotherapy	21.15(9.13)	3.97(1.65)	3.63(2.32)	3.13(2.25)	3.20(1.84)	3.26(2.12)
	Two drugs	20.78(8.54)	3.32(1.66)	3.53(2.36)	3.02(2.21)	3.24(1.81)	3.16(2.30)
	Tree drug or more	20.56(8.28)	3.27(1.65)	3.20(2.39)	2.80(2.22)	3.45(1.67)	2.75(2.33)
	P-Value	P = 0.952	P[*] = 0.05	P = 0.618	P = 0.793	P = 0.836	P = 0.594

*P value $\gg > 0.05$.

under greater economic pressure experience marital conflicts more often and these conflicts can adversely affect their sexual function [25]. It is worth noting that most (82.1%) of the illiterate subjects or those with primary school education were very poor. This group was more concerned with the financial burden of the disease and the continuation of their marital life.

In terms of the duration of marriage, the subjects who had been married for longer than 15 years had lower scores in orgasm, sexual satisfaction and overall sexual function. Some studies conducted in Asian and African countries have shown that sexual satisfaction and function diminish after 16 years of marriage [24,26].

Almost a quarter of the participants had a history of infertility in the present study. In a prospective study conducted by Sukumaran et al. [27], the rate of infertility in epileptic women was 38.4% [27]. In the participants with irregular menstruation, sexual function had diminished significantly in all its dimensions, except for sexual desire. Epilepsy directly affects the hypothalamic-pituitary-ovarian axis and thus leads to changes in LH, FSH, prolactin and GNRH, which in turn can change the synthesis and concentration of sex hormones such as estrogen, testosterone, and dehydroepiandrosterone (DHEA). Anticonvulsant drugs can also directly and indirectly affect the metabolism of reproductive hormones [28] and in turn cause both menstrual disorders and sexual dysfunction. It is believed in the Iranian traditional medicine that menstrual disorders, especially in the form of oligomenorrhea, are associated with a reduced sexual desire and satisfaction and mood disorders and depression and that these problems are intertwined [29].

In the present study, the participants with more frequent seizures had poorer sexual function and satisfaction scores. In

addition, those who experienced nocturnal seizures or seizures in their sleep had lower mean sexual function, satisfaction and orgasm scores. The results of a study conducted in India showed a higher sexual function in epileptic women with fewer seizures [14]. Reduced sexual activity in epileptic people can be the result of seizure attacks and impairment in regions of the brain where the seizure occurs, especially where the limbic, frontal and right temporal lobes are involved [20,30] and the impact of the attacks on the central neuroendocrine system (the hypothalamic-pituitary-ovarian axis).

Also, prolonged disease duration meant significantly lower scores in the FSFI and all of its dimensions except sexual satisfaction. The results obtained by Karan et al. [14] showed a link between the duration of the disease and a poor orgasm score [14].

In the present study, there were no significant differences in the scores of the FSFI and its dimensions by the type of epilepsy (simple partial, complex partial and generalized) and the type of drug therapy (single, double, triple and multiple) and the use of liver enzyme-inducing and liver enzyme-inhibiting anticonvulsants. Nonetheless, the participants who received anticonvulsants that had no effect on liver enzymes (Lamotrigine and Levetiracetam) received significantly higher scores in sexual function, desire, orgasm and satisfaction. A study conducted by Gil-Nagel et al. [31] showed that, by changing the type of drug therapy to Lamotrigine over an eight-month period, sexual function, desire, arousal and orgasm improve significantly in epileptic men [31]. Changing the drugs prescribed and administering medications such as Valproate or Lamotrigine make no changes in the steroid

Table 6
The most effective risk factors of sexual dysfunction from the examined list of demographic factors and disease details, the type of drug therapy and the factors contributing to sexual dysfunction from participants' perspective.

		OR	CI95%	P
Age(year)	Below 30(R)			
	31–40	1.37	0.417–4.50	0.604
	41 or more	1.25	0.265–5.83	0.782
Education	Collegiate (R)			
	Illiterate & Elementary(1)	14.52	0–289	0.282
	Middle& High school(2)	0.397	0.127–1.23	0.112
Income	Middle(R)			
	Low	2.96	0.736–11.96	0.126
	Very Low	4.44	0.897–22	0.06
seizures Intervals	Annual or more than one year ®	0.911	0.32–2.51	0.85
	Monthly to Several times in year several times in month or more	10.01	1.56–63.90	0.01
Type of anti-epilepsy drug	Ineffective drugs on liver enzymes (R)			
	Other anti-seizure drug	3.7	1.28–10.6	0.01
causes of sexual problems from the perspective of participants	Dissatisfaction Of unwanted sexual anxiety and stress	7.12	2.02–25.11	0.002
	Impaired emotional relationships with wife	2.86	1.01–8.10	0.04
		4.39	1.0–18.24	0.04
	Due to AED	1.74	0.61–4.99	0.3

sex hormones, and this group of medications have no effects on the reproductive system [32]. In contrast, most liver enzyme-inducing medications (Carbamazepine, X carbamazepine, etc.) can affect changes in the sex hormone profile, but these changes can be reversed through the discontinuation or change of the medications [33,34].

In general, according to the participants, the most important factors contributing to sexual dysfunction include anxiety and psychological tension, impaired emotional relationship with the spouse and dissatisfaction with unwanted or coercive sex. The participants proposed the type of drug therapy and the type of the disease as the next major contributing factors. The results obtained by Zelená et al. showed that, of all the risk factors examined (type of epilepsy and drug therapy, etc.), only depression and anxiety were significantly related to sexual dysfunction [19]. Henning et al. [17] also showed that reduced sexual desires, orgasm dysfunction and vaginal dryness are associated with symptoms of depression in epileptic women [17]. It is worth noting that a partner's diagnosis with a chronic disease makes the healthy partner have to adopt a care role (emotional support and caregiving), which can have both positive and negative effects on marital relations. The more capable a couple is, the better can they overcome the changes in their marital life through communication skills such as verbal articulation, social skills, etc. [35]. In addition, diseases showing their signs in the patient's appearance (the lack of control over the limbs during seizures) can adversely affect women's mental image of their body and may interfere with their sexual intimacy. Nevertheless, the way the sexual partner responds to the patient's bodily changes (emotional support and caregiving) can have a greater impact on the couple's relationship [36]. Generally, chronic diseases can adversely affect couples' marital relations by causing an emotional gap in them or reducing their trust in each other, and sexual dysfunction and the lack of emotional and sincere relations are among the most common marital problems in couples with a chronically-ill partner [37].

5. Conclusion

In general, of all the risk factors contributing to sexual dysfunction, Control the recurrence of seizures over a longer

period and the use of medications with no effect on the liver enzymes were proposed as the most important factors contributing to the subjects' sex life. The more successful are the specialists in controlling the patients' seizures through the right combination of anticonvulsants (by administering drugs inhibiting the liver enzymes or having no effect on them), the higher becomes the patient's quality of life as a result of her improved quality of sex life. Moreover, the participants with a poor socioeconomic status were more concerned about the financial burden of the disease and the continuation of their marital life and received less emotional support and care from their spouses. Since anxiety and psychological tension, impaired emotional relationship and dissatisfaction with unwanted sex contribute to sexual dysfunction, psychiatric counseling, psychotherapy and couple therapy are believed to have a significant role in reducing sexual dysfunction and promoting sexual health in epileptic women.

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References

- [1] Sayehmiri K, Tavan H, Sayehmiri F, Mohammadi I. Prevalance of epilepsy in Iran using meta-analysis and systematic review. *J Zanzan Univ Med Sci* 2015;23 (97):112–21 [persian].
- [2] Viinikainen K, Heinonen S, Eriksson K, Kälviäinen R. Community-based, prospective, controlled study of obstetric and neonatal outcome of 179 pregnancies in women with epilepsy. *Epilepsia* 2006;47(1):186–92.
- [3] Luef G, Madersbacher H. Sexual dysfunction in patients with epilepsy. *Handbook Clin Neurol* 2015;130:383–94.
- [4] Raina R, Pahlajani G, Khan S, Gupta S, Agarwal A, Zippe CD. Female sexual dysfunction: classification, pathophysiology, and management. *Fertil Steril* 2007;88(November (5)):1273–84.
- [5] Westheimer RK, Lopater S. *Human Sexuality: A Psychosocial Perspective*. 2nd ed. Philadelphia: Lippincott: Williams & Wilkins; 2004 ISBN 978-0781760768.

- [6] Safarinejad MR. Female sexual dysfunction in a population-based study in Iran: prevalence and associated risk factors. *Int J Impot Res* 2006;18:382–95.
- [7] Bangar S, Shastri A, El-Sayeh H, Cavanna AE. Women with epilepsy: clinically relevant issues. *Funct Neurol* 2016;31(3):127–34.
- [8] Thomas SV, Sarma P, Nirmala C, Mathai A, Thomas SE, Thomas AC. Women with epilepsy and infertility have different reproductive hormone profile than others. *Ann Indian Acad Neurol* 2013;16(4):544.
- [9] Reiter SF, Veiby G, Daltveit A-K, Engelsen BA, Gilhus NE. Psychiatric comorbidity and social aspects in pregnant women with epilepsy—the Norwegian Mother and Child Cohort Study. *Epilepsy Behav* 2013;29(2):379–85.
- [10] Verschuren JE, Enzlin P, Dijkstra PU, Geertzen JH, Dekker R. Chronic disease and sexuality: a generic conceptual framework. *J Sex Res* 2010;47(2–3):153–70.
- [11] Piazzini A, Beghi E, Turner K, Ferraroni M. Health-related quality of life in epilepsy: findings obtained with a new Italian instrument. *Epilepsy Behav* 2008;13(1):119–26.
- [12] Calabr RS, Marino S, Bramanti P. Sexual and reproductive dysfunction associated with antiepileptic drug use in men with epilepsy. *Expert Rev Neurother* 2011;11(6):887–95.
- [13] Dennis AJ. Identifying and responding to the reproductive decision-making needs of women with epilepsy. Boston University; 2012.
- [14] Karan V, Harsha S, Keshava B, Pradeep R, Rao TS, Andrade C. Sexual dysfunction in women with epilepsy. *Indian J Psychiatry* 2015;57(3):301.
- [15] Mohammadi kh, Heidari M, Faghihzadeh S. The validity of the Persian version of the female sexual function index-FSFI as a female sexual function index. *Payesh Iran J* 2008;7(3):269–78 [Persian].
- [16] Urso L, Zummo L, Gammino M, Fierro B, Pavone C, Daniele O. Antiepileptic drugs, sexual functions and serum hormonal profile in males with epilepsy. *Med Surg Urol* 2014;3:130.
- [17] Henning OJ, Nakken KO, Train B, Mowinckel P, Lossius M. Sexual problems in people with refractory epilepsy. *Epilepsy Behav* 2016;61:174–9.
- [18] Sheikhalishahi A, Jahdi F, Neisani SL, Haghani H, Delavarkasmaei H, Sarraf P. Sexual function in women with epilepsy: a descriptive study. *Payesh* 2016;20163:301–11 [persian].
- [19] Zelená V, Kuba R, Soška V, Rektor I. Depression as a prominent cause of sexual dysfunction in women with epilepsy. *Epilepsy Behav* 2011;20(3):539–44.
- [20] Harden CL. Sexual dysfunction in women with epilepsy. *Seizure* 2008;17(2):131–5.
- [21] Duncan S, Blacklaw J, Beastall GH, Brodie MJ. Sexual function in women with epilepsy. *Epilepsia* 1997;38(October (10)):1074–81.
- [22] Hayes RD, Dennerstein L, Bennett CM, Koochaki PE, Leiblum SR, Graziottin A. Relationship between hypoactive sexual desire disorder and aging. *Fertil Steril* 2007;87(1):107–12.
- [23] Aggarwal RS, Mishra VV, Jasani AF. Incidence and prevalence of sexual dysfunction in infertile females. *Middle East Fertil Soc J* 2013;18(3):187–90.
- [24] Mishra VV, Nanda S, Vyas B, Aggarwal R, Choudhary S, Saini SR. Prevalence of female sexual dysfunction among Indian fertile females. *J Mid-Life Health* 2016;7(4):154.
- [25] Mohammad-Alizadeh-Charandabi S, Mirghafourvand M, Asghari-Jafarabadi M, Tavananezhad N, Karkhaneh M. Modeling of socio-demographic predictors of sexual function in women of reproductive age. *J Mazandaran Univ Med Sci* 2014;23(110):238–42 [persian].
- [26] Amidu N, Owiredu WK, Gyasi-Sarpong CK, Woode E, Quaye L. Sexual dysfunction among married couples living in Kumasi metropolis, Ghana. *BMC Urol* 2011;11(1):3.
- [27] Sukumaran SC, Sarma PS, Thomas SV. Polytherapy increases the risk of infertility in women with epilepsy. *Neurology* 2010;75(15):1351–5.
- [28] Hamed SA. Neuroendocrine hormonal conditions in epilepsy: relationship to reproductive and sexual functions. *Neurologist* 2008;14(3):157–69.
- [29] Akhtari E, Mokaberinejad R, Tajadini H. Treatment of menstrual disorder, depression and sexual dysfunction in a 27-year-old woman with polycystic ovary syndrome based on iranian traditional medicine. *Asian J Clin Case Rep Tradit Altern Med* 2017;1(1):43–50.
- [30] Daniele A, Azzoni A, Bizzi A, Rossi A, Gainotti G, Mazza S. Sexual behavior and hemispheric laterality of the focus in patients with temporal lobe epilepsy. *Biol Psychiatry* 1997;42(7):617–24.
- [31] Gil-Nagel A, Lopez-Munoz F, Serratos J, Moncada I, Garcia-Garcia P, Alamo C. Effect of lamotrigine on sexual function in patients with epilepsy. *Seizure* 2006;15(3):142–9.
- [32] Stephen LJ, Sills GJ, Leach JP, Butler E, Parker P, Hitiris N, et al. Sodium valproate versus lamotrigine: a randomised comparison of efficacy, tolerability and effects on circulating androgenic hormones in newly diagnosed epilepsy. *Epilepsy Res* 2007;75(2):122–9.
- [33] Lossius MI, Taubøll E, Mowinckel P, Mørkrid L, Gjerstad L. Reversible effects of antiepileptic drugs on reproductive endocrine function in men and women with epilepsy—a prospective randomized double-blind withdrawal study. *Epilepsia* 2007;48(10):1875–82.
- [34] Nappi RE, Martini E, Terreno E, Albani F, Santamaria V, Tonani S, et al. Management of hypoactive sexual desire disorder in women: current and emerging therapies. *Int J Women's Health* 2010;2:167–75.
- [35] Enzlin P, Pazmany E. Psychologische implicaties en gevolgen voor de relatie. 2008.
- [36] Scott JL, Kayser K. A review of couple-based interventions for enhancing women's sexual adjustment and body image after cancer. *Cancer J* 2009;15(1):48–56.
- [37] Cano A, Johansen AB, Leonard MT, Hanawalt JD. What are the marital problems of patients with chronic pain? *Curr Pain Headache Rep* 2005;9(2):96–100.