Surveying sleep quality and fatigue in multiple sclerosis patients at a multiple sclerosis center in Kermanshah, Iran, in 2017

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A B S T R A C T

Background: Multiple sclerosis (MS) is an autoimmune disease of the nervous system which appears with de-myelination of the central nervous system. Sleep disorder and fatigue are very common in MS patients and are part of the main debilitating factors in patients. The present study was conducted to survey sleep quality and fatigue in MS patients.

Methods: A descriptive-analytical study was conducted on 87 MS patients, who were referred to the Kermanshah MS Center in 2017. Data collection tools include a demographics form, fatigue severity scale, and Pittsburg sleep quality inventory. The questionnaires were self-reporting. The collected data was analyzed in SPSS23.

Results: The mean age of the participants was 35.50 ± 9.25 years and the majority of the participants were married (54; 62.1%). Quality of sleep was related to family history of MS and history of using medications (antidepressants like tricyclics, MAOIs, SSRIs, and SNRIs and anxiety drugs such as diazepam, oxazepam, and alprazolam ($p < 0.05$). Moreover, there was a significant relationship between length of sleep and history of using medicines ($p < 0.05$). Finally, the results showed that there was a strong statistical relationship between performance during the day and fatigue ($p < 0.05$).

Conclusions: The results recommend holding relaxation and exercise courses by nurses to ease fatigue in MS patients. Clinics can also play a more effective role by being more supportive and holding more efficient training programs. The program is taught by the researchers.

Trial registration: This study was carried out following the permission from Ethics Committee, Department of Research and Technology, Kermanshah University of Medical Sciences (approval number: KUMS.REC.1395.680).

1. Background

Multiple sclerosis (MS) is a complicated disease, characterized by de-myelination of the central nervous system and is the main cause of nervous debilitation in young adults in developing countries (Disanto et al., 2016). MS is a disease described by relapses, insidious progression, and notably heterogeneous in clinical course, symptomatology, and severity (Krieger et al., 2016). This disorder is a neuro-inflammation disease with progressive and clear symptoms that usually affect people in their middle age (Brenner and Piehl, 2016; Adamczyk-Sowa et al., 2014). Although progressive disease is inflammatory throughout the course, there is evidence of inflammation in the late stage of the severe disease (Magliozzi et al., 2007). Several causes have been hypothesized as the etiology of the disease, such as age, gender, genetics, high level of vitamin D, Epstein Barr infection, smoking, anxiety, stress, and depression (Beiske et al., 2008). Currently, about 2.5 million MS patients live in the world (Leonavicius and Adomaitiene, 2014); and 8000 new cases are diagnosed every year (Rashvand et al., 2013). The biggest age group of MS patients is 20–50 year olds (Brass et al., 2014). The prevalence of the disease in West Europe and USA is 1 in every 1000 individuals and the incidence rate is 5–10/1000,000 individuals/year (Koch-Henriksen and Sorensen, 2010). According to the World Health Organization, the rate of MS in Iran is 4–5/100,000 (Sarvari et al., 2012) and the prevalence of the disease, according to Valizade et al. (Valizadeh et al., 2015), is 15–30/100,000.

Although many studies suggest that Problems with sleep are a common and debilitating problem in MS patients (Milette et al., 2013; Schapiro, 2009; Tachibana et al., 1994; Merlino et al., 2009; Bøe Lunde

et al., 2012), there are no valid data to confirm this hypothesis until now except for restless legs syndrome (RLS) (Veauthier and Paul, 2014). Sleep disorders can cause fatigue and tiredness (Veauthier and Paul, 2014; Fukuda et al., 1994). More than 80% of multiple sclerosis (MS) patients suffer from fatigue (Veauthier et al., 2016). A study in 2016 reported that fatigue is the most common reported debilitating factor in MS patients; 50–80% of patients also have complaints about it (Zaini et al., 2016). Braley et al. argued that fatigue was reported by 90% of patients with MS in different stages (Braley et al., 2014); however, Čarnická et al. reported a lower figure of 38% (Čarnická et al., 2015). Fatigue may affect all aspects of one's life, such as one's job, leisure time, and taking care of children (Shahvarughi-Farahani et al., 2013). This debilitating factor leads to remarkable social-economic consequences and it is known as one of the main causes of decrease in the quality of life of MS patients (Braley et al., 2014). There are various types of neurological diseases like depression, anxiety, and anxiety in MS patients, anxiety and confusion, aggression and late sleep, and depression disrupts the mood and energy of the patient and thereby disrupts sleep. These problems make you sleep late in bed, wake up while you sleep, and make you take sleeping medications. Following these problems, the patient gets tired during the day and reduces daily function (Čarnická et al., 2015; Marrie et al., 2015). Sleep quality refers to the perception of deep sleep, which includes aspects such as long-term insomnia, adequacy of sleep, and mental aspects like depth and relaxation of sleep (Alimirzaei et al., 2015; Najafi et al., 2013). Leonavicius and Adomaitiene reported that the rate of sleep disorder in MS patients is 45.3%, and it is related to gender, age, epidemic depression and anxiety, disability caused by the disease, and physical-mental state of the patient (Leonavicius and Adomaitiene, 2014). Čarnická et al. discussed that 38% of MS patients suffer from insomnia, 18% experience severe sleepiness over the day, and 38% experience fatigue (Čarnická et al., 2015). Veauthier et al. (2015) conducted a study in Germany and concluded that a decrease in the quality of life in MS patient is related to poor sleep quality (Veauthier et al., 2015). Several studies have also reported the relationship between sleep disorder and fatigue in MS patients (Adamczyk-Sowa et al., 2014; Veauthier et al., 2015; Cote et al., 2013); Côté et al. argued that an effective way to solve fatigue in MS patients is to solve their sleep disorders (Cote et al., 2013). Obstructive apnea during sleep might intensify fatigue in MS patients, and additionally, it is a serious risk factor of cardiovascular diseases, metabolic syndrome, car accidents, reduce performance and daily activities, cognitive disorders, and low quality of life (Braley et al., 2014).

MS mostly affects the most active age group in society, with symptoms such as fatigue and sleep disorders, which negatively influence the quality of life of patients, performance of the work force, and consequently the economy of the society. Since fatigue and sleep disorders are common symptoms of MS, it is very important to survey these problems and find proper educational and occupational therapy approaches to help patients and their families. Consequently, the present study was conducted to survey sleep quality and fatigue in MS patients in Iran.

2. Methods

2.1. Study participants

Sleep quality and fatigue in MS patients and their relationship with patients' demographics at Kermanshah MS Center were examined in a descriptive-analytical study. The study was approved by the Ethics Committee affiliated with the Department of Research and Technology of Kermanshah University of Medical Sciences (approval number KUMS.REC.1395.680).

MS patients who were referred to the Kermanshah MS Center in January, February, March, and April 2017, were recruited for the study. Inclusion criteria were a medical file issued in Kermanshah, consent to

participate, at least 6 month after diagnosis of the disease, no other physical/psychological disease, using no psychiatry drugs, ability to communicate verbally or non-verbally, and ability to fill in the questionnaire. The study population were the MS patients registered in Kermanshah MS Center (n = 1025) and the subjects were selected randomly using a simple random table. A sample group size (n = 87) was determined following similar studies (Beiske et al., 2008). The Cochran formula was used to determine the sample size. In this formula, the population of the research community was 1025 and a 95% confidence level of 1.96 Z-score and P, which is the ratio of the attribute in the society, was 0.31. Also, the error margin (D) in this study was 0/1. Based on this formula, the sample size in this study was estimated to be 76, including dropping of samples at 12% and sample size of 87.

2.2. Data collection

Permission was secured from Kermanshah University of Medical Sciences. The study was performed on MS patients, who were referred to the Kermanshah MS Center. The subjects were ensured about confidentiality of their information before data collection. Data was gathered using a demographics questionnaire developed by the authors. Fatigue severity scale (FSS) (www.healthywomen.org/sites/default/files/FatigueSeverityScale.pdf) was used to measure fatigue and Pittsburgh Sleep Quality Index (PSQI) (uacc.arizona.edu/sites/default/files/psqi_sleep_questionnaire_1_pg.pdf) was used to measure sleep quality. Duration of filling the demographic information, PSQI, and FSS questionnaires took between 20 and 30 min.

The questionnaires were filled by the subjects in the presence of the authors (the authors had no role in filling out the questionnaires). The demographic questionnaire included 10 questions about demographical variables and history of MS. FSS comprised nine questions: five on quality of fatigue, three on physical and mental fatigue and its effect on one's life, and one on severity of fatigue relative to symptoms of MS. Validity and reliability of the questionnaire were examined by Shahvarughi-Farahani Az, A'zimian M, Fallah-Pour M, and Karimlou M. Reliability and Validity of the Persian Version of Fatigue Severity Scale (FSS) among persons with MS was evaluation (Quarterly Journal of Rehabilitation, 2013). Cronbach alpha showed the correlation of FSS to be equal to 0.96. To determine reputability of the translated version, the PSQI and FSS questionnaires were in English and the questionnaire was translated into Persian, and the translated questionnaires were submitted to the faculty members of Kermanshah University of Medical Sciences and after the confirmation of the professors, the questionnaires were presented to the patients. Intraclass correlation (ICC) was calculated and obtained to be equal to 0.93 (ICC > 0.7) (Shahvarughi-Farahani et al., 2013). PSQI consists of 9 statements that measure seven aspects (Sleep Quality, Sleep latency, Sleep duration, Sleep efficiency, Sleep disturbances, Use of sleep Meds, and Daytime dysfunction). The score of PSQI ranges from 0 to 21 and the higher the score, the lower the quality of sleep. Generally, PSQI score > 5 is interpreted as low quality of sleep. Validity and reliability of PSQI were examined by Arefi and Hedayat (2015), such that validity of the tool using test-retest method was equal to 0.87 and ICC was equal to 0.86 (hedayat and arefi, 2015). The collected data was analyzed in SPSS (v.23) using mean score, variance, Kolmogrov Smirnov (KS), Mann Whitney, Kruskal Wallis, and post hoc Tukey tests.

3. Results

Table 1 shows the demographics of the 87 MS patients who participated in the study. The average age of the patients was 35.50 ± 9.25 years (age range: 20–62); 31 subjects (35.6%) were unmarried, 54 subjects (62.1%) were married, and two subjects (2.3%) were widowed or divorced. Mean and standard deviation of duration of MS is 6.18 ± 5.68. Duration of the disease ranged from 3 months to 31 years: a year in 20 patients (23%); between 2 and 4 years in 22 patients

Table 1
Demographic variables (n = 87).

Variable	Values	N (%)
Gender	Male	26 (29.9)
	Female	61 (70.1)
Age (years)	< 30	28 (32.2)
	30–40	34 (39.1)
	> 40	25 (28.7)
Marital status	Single	31 (35.6)
	Married	54 (62.1)
	Widow or divorced	2 (2.3)
Education	Grade school	5 (5.7)
	Middle school	22 (25.3)
	High school	35 (40.2)
	College	25 (28.7)
Job	Housekeeper	49 (56.3)
	Jobless	17 (19.5)
	Businessman	13 (14.9)
	Office employee	5 (5.7)
	Retired	3 (3.4)
Economic condition USD/Month	Poor (Less than 166)	26 (29.9)
	Average (166–333)	46 (52.9)
	Good(More than 333)	15 (17.2)
History of other diseases except MS	Yes	24 (27.6)
	No	63 (72.4)
Family history	Yes	11 (12.6)
	No	76 (87.4)
Smoking	Yes	7 (8)
	No	80 (92)
Physical activity A month later	Yes	40 (46)
	No	47 (54)

(25.5%); and more than 5 years in 45 patients (51.7%).

Forty patients (46%) had a history of physical activities a month later. Average time of physical activity was 56 ± 30.40 min with minimum and maximum time equal to 20 and 120 min, respectively.

3.1. Hypothesis

There is a relationship between the aspects of PSQI and demographic information of MS patients in the Kermanshah MS Center.

Table 2 shows the mean score and standard deviation of PSQI scores based on the aspects and scores of fatigue in the subjects. The mean score of quality of sleep was 51.63 ± 37.72 and FSS was 39.19 ± 14.37. In total (fatigue rating is, less than 20 is fatigue, 20–40 is a moderate fatigue, and higher than 40 is fatigue is severe) (Shahvarughi-Farahani et al., 2013). Twenty-two of patients (25.3%) were ranked as no fatigue and 65 (74.7%) were ranked as fatigue.

Based on KS test results, all variables of the PSQI were not normally distributed, while fatigue score is normally distributed (Table 2).

Table 3 shows that there is no significant relationship between sleep quality score (PSQI) and fatigue (FSS). However, there is a positive, strong, and significant relationship between sleep disturbance and

Table 2
Mean and standard deviation and Kolmogrov Smirnov test of PSQI and FSS (n = 87).

PSQI	Mean (SD)	Sig.
Sleep Quality	0.977 (0.749)	0.001*
Sleep latency	32.21 (37.12)	0.001*
Sleep duration	7.03 (2.48)	0.001*
Sleep efficiency	3.26 (40.40)	0.001*
Sleep disturbances	7.67 (5.42)	0.001*
Use of sleep Medication	0.701 (1.09)	0.001*
Daytime dysfunction	1.20 (1.48)	0.001*
Total PSQI score	51.63 (37.72)	0.001*
Severity of fatigue (FSS)	39.19 (14.37)	0.161**

* Significant Kolmogrov Smirnov test (non-parametric variable).
** Non-significant Kolmogrov Smirnov test (parametric variable).

Table 3
Correlation between the aspects of sleep quality and fatigue.

PSQI	Fatigue	
	R	P-value
Sleep Quality	0.024	0.825
Sleep latency	0.006	0.957
Sleep duration	-0.095	0.380
Sleep efficiency	-0.006	0.956
Sleep disturbances	0.250*	0.020*
Use of sleep Medication	0.118	0.275
Daytime dysfunction	0.320*	0.002*
Total PSQI score	0.044	0.690

* Significant correlation.

fatigue (FSS). also There is a strong, direct, and significant relationship between Daytime dysfunction and fatigue.

Results of Mann Whitney test showed that there is a significant relationship between history of the disease and effectiveness of sleep (p < 0.05). Moreover, there are significant relationships between history of using medicine and effectiveness of sleep (p < 0.05); between quality of subjective sleep and smoking habits (p < 0.05); and between smoking habits and sleep disorders (p < 0.05). There was no significant relationship between other demographical variables and sleep quality score (p > 0.05).

Kruskal Wallis test showed that there is a significant relationship between economic condition of the subjects and Daytime dysfunction (p < 0.05). Results of Mann Whitney supplementary test revealed that Daytime function was lower in patients with lower economic classes. The results showed that there was no significant relationship between the other variables and the aspects of sleep (p > 0.05).

Variance analysis results showed that there is a significant relationship between marital status and severity of fatigue (FSS) (p < 0.05). Tukey Test showed that Mean fatigue score was higher in married people. There is no significant difference in FSS in terms of other variables.

4. Discussion

Several studies have focused on the demographics of MS patients, symptoms, side effects of the disease, and effects of the disease on the mental and physical conditions of the patients. Sleep quality and fatigue in MS patients were examined in the present study. Among all 87 MS patients, 70.1% were female and most of the sample groups were between 30 and 40 years old. Previous studies conducted have not dealt with comparing the prevalence of MS among married and unmarried individuals that This is important due to effect of SD and Fatigue on family status. Marrie et al. (2016) reported that 75.2% of MS patients were women with mean age of 48.6 years old (Marrie et al., 2015); Bayas et al. (2016) reported that women constituted 82% of the sample group and the mean age of incidence of MS in female patients was 41.8 years old (Bayas et al., 2016); Amtmann et al. (2016) showed that 80% of the subjects were women and 70% were married or had a partner (Amtmann et al., 2015). As shown in the results and literature review, MS is more prevalent in women and the disease mainly affects individuals when they are in their active years of life; this means serious economic, social, and familiar consequences for the patient and the society, especially when the disease features physical and mental side effects.

The present results showed that 74.7% of the patients suffered from fatigue, with a mean score of sleep quality of 51.63 ± 37.72, that is, low quality of sleep. The high prevalence of fatigue must be taken seriously, as fatigue interferes with patients' activities of daily living, has a notable negative impact on quality of life, and is a main reason for early dysfunction. Consistently, Zaini et al. (2016) reported the prevalence of fatigue in MS patients at 50–80% (Zaini et al., 2016), while

Yaldizli et al. (2016) stated that 76 and 65% of their subjects suffered from physical and mental fatigue, respectively. Mental fatigue is correlated with mental conditions like depression (Yaldizli et al., 2016). Carnicka et al. (2015) mentioned in their literature review that prevalence of sleep disorders in MS patients ranged from 25-54% (Čarnická et al., 2015). Veauthier et al. (2015) concluded that 49 out of 66 patients (74%) suffered from sleep disorders (Veauthier et al., 2015). The results of the present study showed that there was no significant relationship between quality of sleep and fatigue, which is consistent with previous studies (Beiske et al., 2008; Braley et al., 2014; Veauthier et al., 2015; Cote et al., 2013). Veauthier report significant relationship between fatigue and sleep disorders (Veauthier et al., 2011). This contrast between results can be due to the measurement scales and tools and difference of participants. This Moreover, the results showed that sleep disturbance, Daytime dysfunction, and married status were significantly related to fatigue (p < 0.05). Clearly, as shown in the results, family history of the disease, history of using medicines, and smoking were related to different aspects of sleep; while demographical factors did not affect sleep. Leonavicius et al. (2014), argued that there was a relationship between female gender and older age with sleep disorders (Leonavicius and Adomaitiene, 2014).

The results of this study showed that fatigue and sleep quality disorder are present in MS patients. This should be dealt with by providing proper support and education services for these patients. The treatment of underlying sleep disorders, drug therapy, exercise therapy, and cognitive behavioral therapy may be effective against MS-related fatigue (Veauthier et al., 2016). Training programs that can help to reduce fatigue and improve sleep quality include balancing activity and rest, exercising regularly such as 30 min of walking, teaching progressive muscle relaxation to patients, not doing activities like heavy and hard work in patients. Moreover, inconsistent results showed the necessity of more and wider studies. As shown in the results, there was a direct relationship between Daytime dysfunction and fatigue. Therefore, if the patient's fatigue increases, then her daily life will decrease. Moreover, factors like economic condition, smoking habits, and history of using medicines were effective on sleep quality and fatigue of the subject. Given the growing trend of prevalence of MS in the world and the effects of factors like quality of sleep and fatigue on quality of life of the patients, future works can examine proper interventions to ease fatigue and improve quality of sleep of the patients. Data gathering was done through self-reporting, which raises questions about authenticity of the information. To deal with this, the subjects were completely familiarized with the study process.

Declarations

Ethic's approval and consent to participate

This study was carried out following the permission from Ethics Committee, Department of Research and Technology, Kermanshah University of Medical Sciences (approval number, KUMS.REC.1395.680). The participants were thoroughly informed about the objectives of the study and how to fill out the questionnaires. They were also ensured about confidentiality of their information.

Consent to publish

No applicable.

Availability of data and materials

The identified datasets used during the current study are available from the corresponding author on reasonable request.

Authors' contributions

MJ and SK, AA, HK and PAS contributed in designing the study, MJ, PAS and SK collected the data, and analyzed by AA, the final report and manuscript were written by MJ, SK, AA, HK and PAS. All the authors read and approved the version for submission.

Declaration of competing interest

The authors declare that they have no conflict of interest.

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