

## Comparison of Sleep Quality in Women with Migraine Moreover, Multiple Sclerosis

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**Abstract-** Multiple sclerosis (MS) and migraine are two common neurological disorders affecting women more than men. Sleep quality impairment has been reported in both diseases. The goal of this study was to compare sleep quality and depression between women with MS and migraine. Seventy women with migraine and 75 women with MS were enrolled in this study. Participants were asked to fill-out valid and reliable Persian versions of Pittsburg Sleep Questionnaire (PSQI) and Beck Depression Inventory (BDI). Mean age and duration of disease for MS group was  $31.1 \pm 7.6$ ,  $4.8 \pm 5$  and for second group  $31.4 \pm 5.6$ ,  $5.2 \pm 4$  years, respectively. Mean BDI score and number of patients with poor sleep ( $PSQI \geq 5$ ) were significantly higher in patients with migraine. There was significant positive correlation between PSQI and BDI scores in all participants ( $r=0.32$ ,  $P<0.001$ ), while correlation coefficient was  $0.39$ ,  $P=0.001$  in patients with migraine and  $0.35$ ,  $P=0.002$  in MS cases. Multiple linear regression analysis between the PSQI as a dependent variable and age, BDI and education level as independent variables showed that BDI is the independent predictors of PSQI in both groups. This study shows that patients with migraine suffer from poor sleep and depression more frequently than MS cases.

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### Introduction

Two common neurological problems which affect women more than men are Multiple sclerosis (MS) and migraine.

Multiple sclerosis (MS) is an inflammatory demyelinating disease of the central nervous system which affects different aspects of patient's health (1).

Migraine is a chronic devastating condition, characterized by severe headaches which lead to disability, occupation loss and decreased overall quality of life (2-4). Sleep disturbances have been reported in patients with either MS or migraine.

Literature shows that the prevalence of impaired sleep quality is between 30% to 50% in migraineurs (5,6). Also, poor sleep and sleep problems have been reported as one of the most prevalent complaints of MS patients (near 60%) (1,7).

Cause of poor sleep in patients with MS or migraine is multi-factorial, and the exact etiology is unclear. One of explanations for this association is the co-morbidity of mood disorders such as depression with MS or migraine. Depression is the most common mood problem in cases with MS that affects near 50% of cases (1). On the other hand, depression has been reported in near one-third of migraineurs (8).

It is a matter of debate if sleep disturbance is the consequence of depression or it is leading the cause of depression in affected cases with either MS or migraine.

The goal of the current study was to compare sleep quality and depression between women with MS and migraine.

### Materials and Methods

In this cross-sectional study, 70 migraineurs

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according to International Headache Society (IHS) criteria and 75 age-matched women with MS based on Mc Donald criteria who attended Outpatient Neurology Clinic of Sina Hospital affiliated of the Tehran University of Medical Sciences) were enrolled. Exclusion criteria were antidepressant treatment during last 4 weeks and active MS.

All patients filled out informed consent form before entrance to the study. The study had been approved by ethics committee of the Tehran University of Medical Sciences.

A structured questionnaire was used to collect data about education level, duration of the disease, severity of headache by means of visual analogue scale (VAS:0-10), disease course [Relapsing Remitting (RR), Primary Progressive (PP), Secondary Progressive (SP), Progressive Relapsing (PR)] and Kurtzke Expanded Disability Status Scale (EDSS).

All participants asked to fill out valid and reliable Persian Versions of Pittsburg Sleep Questionnaire (PSQI) and Beck Depression Inventory (BDI). Beck Depression Inventory (BDI) including 21 questions (each item scored 0-3) is a self-explanatory questionnaire used to evaluate subjects' feelings in the previous week. Scores from 0 to 9 indicate no depression, 10 to 18 show mild to moderate depression, 19 to 29 specify individuals with moderate to severe depression, and 30 to 63 reveal severely depressed cases. A valid and reliable Persian version of BDI was used in the study (9).

Pittsburg Sleep Questionnaire (PSQI), a self-administrative instrument, consists of 19 questions generating seven-component scores (sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction). Each component score ranged from 0 to 3 (0, not in the past month; 1, less than once per week; 2, once or twice per week; and 3, three or more times per

week). A valid and reliable Persian Version of this test was applied for assessing the quality of sleep in the current survey. The total score ranges from 0 to 21 while higher scores indicates poorer sleep quality; A total score  $\geq 5$  indicates a 'poor' sleeper (10).

Data was analyzed using SPSS version 18 and presented as Mean  $\pm$  SD. The Student's t-test applied for continuous as well as the Pearson  $\chi^2$  test with Fisher's exact test were used for categorical variables assessment, respectively. Logistic regression used for odds ratio calculation.  $P$ -value  $< 0.05$  was considered statistically significant.

## Results

Seventy women with migraine and 75 with MS participated in this study.

Mean age and duration of disease for MS group were  $31.1 \pm 7.6$ ,  $4.8 \pm 5$  and for second group  $31.4 \pm 5.6$ ,  $5.2 \pm 4$  years respectively.

Patients with migraine rated the severity of their headache  $7.06 \pm 2.4$  and median EDSS of MS cases was 2. The most common type of MS was relapsing-remitting (RR) (81.3%) followed by secondary progressive (SP) (18.7%). Mean BDI score was significantly different between two groups while mean PSQI was not statistically different (Table1).

**Table 1. Mean BDI and PSQI scores in patients with migraine or MS**

	Migraine	MS	<i>P</i> -value
<b>BDI</b>	18.1 $\pm$ 9.5	14.2 $\pm$ 9.6	0.01
<b>PSQI</b>	7.9 $\pm$ 3.6	8.9 $\pm$ 6.6	0.28

Number of patients with PSQI  $\geq 5$  were significantly higher in a migraine group than MS group while mean BDI score was significantly higher in MS patients with PSQI  $\geq 5$  (Table2).

**Table 2. Number of patients and BDI score in cases with PSQI less and more than 5**

	PSQI <5	PSQI $\geq 5$	<i>P</i> -value
<b>Number of migraine cases</b>	13	57	0.02
<b>Number of MS cases</b>	25	50	
<b>BDI of all cases</b>	12.4 $\pm$ 8.8	17.4 $\pm$ 9.7	0.006
<b>BDI in migraine cases</b>	16 $\pm$ 8.8	18.6 $\pm$ 9.7	0.3
<b>BDI in MS patients</b>	10.6 $\pm$ 8.4	16 $\pm$ 9.7	0.02

There was significant positive correlation between PSQI and BDI scores in all participants ( $r=0.32$ ,  $P<0.001$ ), while correlation coefficient was 0.39,  $P=0.001$  in patients with migraine and 0.35,  $P=0.002$  in

MS cases.

Multiple linear regression analysis between the PSQI as a dependent variable and age, BDI and education level as independent variables showed that BDI is an

independent predictor of PSQI in both groups. Results are summarized in Table 3&4.

**Table 3. Linear regression analysis predicting PSQI score in patients with migraine**

	<b>B</b>	<b>P-value</b>
<b>BDI</b>	0.38	0.004
<b>Age</b>	-0.031	0.8
<b>Education level</b>	-0.022	0.8
<b>Headache severity</b>	0.014	0.2

**Table 4. Linear regression analysis predicting PSQI score in patients with MS**

	<b>B</b>	<b>P-value</b>
<b>BDI</b>	0.34	0.004
<b>Age</b>	-0.031	0.8
<b>Education level</b>	-0.022	0.8
<b>EDSS</b>	-0.15	0.1

## Discussion

To our knowledge this is the first study comparing sleep quality in MS Patients and migraineurs.

The results of our study showed that patients with migraine suffer from depression and poor sleep (PSQI  $\geq 5$ ) more frequently than MS cases.

We also found that in whole participants the mean BDI score in poor sleepers were significantly higher than patients with PSQI less than 5. Our results also indicated a significant positive correlation between PSQI and BDI scores in all cases and patients subgroups.

In previous studies, poor sleep was reported in patients with migraine (11,12).

In seidel *et al.*, study mean PSQI score for all patients with migraine was 5.9 which was significantly higher than healthy ones' score (4.3,  $P=0.004$ ) (12).

Patients with migraine believed that sleep disturbances are leading factors for their headache attacks as two third of migraine attacks happen when patients woke up (13). In addition, higher prevalence of insomnia and shortened sleep reported by migraineurs in comparison with healthy ones (14,15).

On the other hand, patients with frequent migraine attacks had higher incidents of impaired sleep quality than patients with a lower rate of attacks (12).

Moreover, poor sleep has been reported in MS cases previously (1,16). Nocturia, pain, spasm and restless leg syndrome are possible causes of sleep problems in such cases (1). In two studies, mean PSQI score in MS cases were reported as 8.4 and 8.6 which are close to PSQI score in this study (1,7).

One of the explanations for sleep problems in patients with migraine or MS could be co-morbidity of these diseases with depression. Depression is the most common mood disorder in MS cases that are reported in about 50% of affected cases (17,18).

Brain lesions located in frontal or temporal lobes and the fatigue complaint are leading causes of depression in MS cases (19). Polymorphisms in the serotonin (5-HT) transporter, dopamine D<sub>2</sub>-receptor genotype, ovarian hormone fluctuation and central sensitization are explanations for depression symptom in patients with migraine (20-22).

We found that BDI is the independent predictor of sleep quality in both groups that are compatible with findings of Bøe Lunde in MS cases and Zhu *et al.*, in migraine cases (7,23). Thus our results, in accordance with these studies confirm that Sleep disturbances in both Migraine and M.S patients could be caused by underlying depression. Our results

Bøe Lunde evaluated 90 MS and 108 healthy controls and noticed higher mean global PSQI score in MS cases than controls (8.6 vs. 6.3,  $P=0.001$ ). They also found that fatigue, depression and female gender are associated with poor sleep in MS patients (7).

By evaluating 211 migraineurs, Zhu *et al.*, reported mean PSQI of 8 and anxiety or depression as the predicting factors for sleep quality in such cases (23).

In this study, we found that headache intensity is not an independent predictor for sleep quality in patients with migraine which is against the results of Naughton *et al.*, study (23). They evaluated 155 patients with chronic pain and found that depression and pain severity were partial mediators of sleep quality and disability (23).

Conclusion: this study shows that patients with migraine suffer from poor sleep and depression more frequently than MS cases. Clinicians should be aware of high comorbidity of sleep disturbances, and Depression in migraineurs and M.S patients, and try to address these complaints accordingly.

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