

The effect of overuse of smartphone on sleep quality in patients with multiple sclerosis

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Abstract

Aim: The aim of this study was to investigate the relationship between sleep quality and smartphone use in patients with MS.

Material and Methods: Expanded Disability Status Scale (EDSS) was administered to evaluate MS related disability in patients. Sleep quality was assessed by Pittsburgh Sleep Quality Index (PSQI). Smartphone addiction scale (SAS) was used to measure the frequency of smartphone use.

Results: Fifty-six MS patients with a mean age of 36.35 ± 8.03 were included in the current study. All patients had relapsing remitting MS and EDSS scores were detected lower than 3. Sleep disorder was found in 22 patients (39.3%). No significant difference was found in MS patients with sleep disorder in terms of patient age and sex compared to MS patients without sleep disorder (p values respectively 0.687; 0.057). No significant difference was found in terms of duration of disease, medication and EDSS score (1.000; 0.256; 0.406). The mean SAS scores was found significantly higher in MS patients with sleep disorder ($p=0.001$).

Conclusion: Overuse of smartphones in patients with MS may reduce sleep quality.

Keywords: Multiple sclerosis; sleep quality; smartphone overuse.

INTRODUCTION

Multiple sclerosis (MS) is a chronic progressive disease characterized by widespread demyelinating lesions of central nervous system, generally causing loss of labor in adolescents. While the prognosis of the disease is different in each patient, clinical symptoms arise as loss of strength, spasticity, fatigue and cognitive impairment over time (1). Sleep disorders are commonly seen in MS patients as well and considered to be around 25-54% in studies (2). The most important sleep disorders are insomnia, restless legs syndrome, and periodic limb movement disorders (3). Sleep disorders also disturb the quality of life of MS patients (2). Our MS patients have reported sleep disturbances following long term mobile usage. Considering the sales figures of smartphones in recent years, we can say that these are increasing every day. There are more than 1.5 billion smart phone users in the world (4). Smartphone addiction is defined as excessive use of smart phones to the extent of disturbing the daily lives of users (5). In light of this information, the evaluation of sleep quality and smartphone use of MS patients has been researched in this study.

MATERIAL and METHODS

The study was approved by the Ethics Committee of University of KTO Karatay where the study was performed (approval number: 41901325-050.99). Fifty-six patients who have been diagnosed with 2017 McDonald MS diagnostic criteria and who are being treated in our clinic was included in our study (6). The patients with sleep disorders caused by other diseases were excluded. The patients were informed about the study and their informed consents were obtained. Patients' demographic data, duration of the disease, type of disease (primary progressive, secondary progressive, relapsing-remitting) and treatments that they received were recorded. Patients' examinations were done by a neurology specialist Expanded Disability Status Scale (EDSS) was evaluated (7). Pittsburgh Sleep Quality Index (PSQI) was used in our study to evaluate the quality of sleep of the patients. PSQI is a test consisting of 19 questions and 7 components evaluating the quality of sleep and 18 items and 7 components are included in scoring. Each item is evaluated on a score of 0-3 and the total score 7 components gives the PSQI score. A total PSQI score of 5 or less indicates

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good sleep quality and a score of more than 5 indicates poor sleep quality. The validity and reliability study of the test have been conducted (8). Smartphone usage was evaluated with smartphone addiction scale (SAS). SAS is a scale of 33 questions and participants give each question a score between 1 and 6. High scores indicate excessive use of smartphones. The validity and reliability study of the test have been conducted (9).

Statistics: Entire statistical analysis of the study was done by using SPSS (Statistical Package for the Social Sciences) version 22.0. The Kolmogorov Smirnov test was used to determine whether the data fit the normal distribution. T-test and Mann Whitney-U test were used to evaluate the groups. A p value of <0.05 was considered significant for all variables.

RESULTS

Fifty-six MS patients were included in the study. The mean age of the patients was 36.35 ± 8.03 . All patients had relapsing-remitting MS and EDSS scores were less than 3. All patients were on prophylactic treatment (Table 1). 22 patients (39.3%) had sleep disturbance and 34 (60.7%) had no sleep disturbance.

Table 1. Drugs used by patients

	Number of Patients	%
Teriflunomide 14 mg	22	60.7
Fingolimod 0.5 mg	16	28.6
Interferon beta-1b 0,3 mg	4	7.1
Interferon beta-1a 44 mcg	1	1.8
Dimethyl fumarate 120mg	1	1.8
Glatiramer acetate 40 mg/ml	12	21.4
Total	57	100

Table 2. Characteristics of Multiple Sclerosis Patients and Their Relationship with Smartphone Use

	MS patients with sleep disorder	MS patients without sleep disorder	p
Gender			0.057
Female	13	28	
Male	9	6	
Age	36.36 ± 7.51	36.35 ± 8.46	0.687
Disease duration	5.45 ± 2.89	5.61 ± 2.73	1.000
EDSS score	1.90 ± 0.33	2.01 ± 0.55	0.406
SAS score	79.00 ± 19.93	63.79 ± 12.39	0.001

There was no significant difference in terms of patient age, sex, duration of disease and EDSS score between MS patients with sleep disorders than those without sleep disturbances. SAS scores were significantly higher in the group with sleep disorders (Table 2). No difference was

also observed between the groups in terms of drug use ($p = 0.256$). No significant difference was seen in terms of educational level and monthly income of the patients. No significant difference was observed in the correlation analysis of SAS and EDSS scores. ($p = 0.101$)

DISCUSSION

Excessive use of smartphones was found to be able to decrease quality of sleep of MS patients according to our study. Bad quality of sleep was observed to be around 47.5% in a study in which MS patients were evaluated with PSQI (10). Sleep disorders also disturb the quality of life of MS patients (3). Finding the cause of sleep disorders is important in order to improve the quality of life of the patient. Sleep disturbances were found to be more common in female MS patients than male patients in some studies evaluating the sleep disturbances in relation to patients' demographic features, no difference was observed in some of those studies (11-14). No difference was found in our study as well. Even though some studies in literature have shown an association between sleep problems and disease duration, age and educational level, some studies have not found any difference in terms of disease duration, active employment status and marital status of MS patients (12, 14). No significant difference was determined between MS patients with low quality of sleep and the other group in terms of patient age, sex, disease duration and EDSS score in our study. But the reason behind this finding might be the fact that all patients in our study had relapsing-remitting MS and EDSS scores below 3. Smartphones cause continuous exposure to light to the patients. Excessive use might be a factor causing a decrease in sleep quality in MS patients according to the results of our study. Pathophysiologically, photophobia seen in MS patients might be the reason behind this. The light tolerability of MS patients was found to be significantly less than the control group in a recent study. Besides this, it is determined to have no association with clinical disability and previous optic neuritis episodes (15). The reason of decreased light tolerability of MS patients is explained in the literature through various mechanisms. One of these is that the inflammation related to MS can alter ipRGC axon neurotransmission and therefore causing photophobia. In another hypothesis, it is thought to be associated with increased synaptic activity instead of structural damage. According to another hypothesis, some writers argue that the photosensitivity seen in migraine patients may be related to calcitonin gene-related peptide (CGRP) and pituitary adenylate cyclase-activating polypeptide (PACAP) (16). This hypothesis was supported by later studies. Alterations in CGRP and PACAP levels were observed as a result of neuroinflammatory damage in a study conducted with animal models (17). There is a need of further specialized studies to determine the pathophysiology of photophobia and sleep disturbances due to long term exposure to light in MS patients. The limitation of our study is that all MS patients had relapsing-remitting MS and therefore the study did not provide any information on patients with primary progressive and

secondary progressive MS. Nevertheless, as relapsing-remitting type is the most common type of MS, our study will make an important contribution to the literature.

CONCLUSION

In conclusion, the reason behind disturbances of quality of sleep in MS patients may be the excessive use of smartphones. Therefore, it may be useful to question the use of smartphones and lower to a normal level in patients with disturbances of quality of sleep.

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