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Investigation of depression, coping with stress, and sleep quality according to relapse status in patients with relapsing-remitting multiple sclerosis

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Abstract

The aim of the study was to investigate depression, coping with stress and sleep quality in relapsing-remitting multiple sclerosis (RRMS) patients according to relapse status. A total of 74 patients (35.27±8.06 years) with RRMS were included in this cross-sectional study. Patients were separated into two groups as relapse group (n=37) and non-relapse group (n=37) within 6 months. Depression level, mood and other psychological stress coping level and sleep quality level of the patients were evaluated by Beck Depression Inventory (BDI), Ways of Coping with Stress Inventory (WCSI) and Pittsburgh Sleep Quality Index (PSQI), respectively. There was a statistically significant difference between the relapse group and non-relapse group in BDI and PSQI scores (for both, $p<0.001$). There was a considerable statistically difference between the two groups in terms of self-confidence, submissive, helples styles and optimistic scores of WCSI subscales, no statistically significant difference was observed in seeking of social support subscale (social support subscale; $p=0.497$, other subscales; $p<0.001$). A moderate positive correlation was observed between PSQI and BDI scores ($r=0.593$, $p<0.001$). PSQI and BDI scores showed a moderate negative correlation with self-confident ($r=-0.558$, $r=-0.642$, $p<0.001$, respectively) and optimistic scores of WCSI subscales ($r=-0.413$, $r=-0.456$, $p<0.05$, respectively) whereas a moderate positive correlation was observed with submissive ($r=0.426$, $p<0.05$; $r=0.537$, $p<0.001$, respectively), and helpless styles scores ($r=0.531$, $r=0.573$, $p<0.001$, respectively). In the 6-month period, it was determined that depression and sleep quality were lower and coping with stress was better in RRMS patients who did not relapse compared to those who did. Increasing depression may reduce sleep quality and stress coping levels in RRMS patients.

Keywords: Multiple sclerosis, depression, sleep quality, coping with stress, relapse

Introduction

Multiple sclerosis (MS) is an autoimmune central nervous system disease characterised by inflammatory, demyelinating and axonal disruption [1]. MS may have a progressive course with or without relapses. After relapses, sequelae may remain or complete recovery may be observed. MS is divided into types according to the clinical processes of relapse, remission and progression, which differ between individuals in terms of clinical course. Radiological Isolated Syndrome and Clinical Isolated Syndrome types have been added to Relapsing Remitting MS (RRMS), Primary Progressive MS, Secondary Progressive MS, Relapsing Progressive MS types [2]. Indicators of a better prognosis in MS patients are female gender, early age of onset

and very mild disability during the first five years after onset. The indicators of worse prognosis are male gender, late age of onset, frequent relapses, short interval between the first two relapses, incomplete recovery after the first relapse, rapidly developing disability and cerebellar involvement. [3]. The most common disease progression (RRMS) is more prevalent in young adults [2]. RRMS is a form of MS in which the relapse period ends with complete recovery or recovery with deficit, the patient is neurologically stable in the period between relapses and does not demonstrate clinical progression [2].

In addition to different types of progression, the disease has multi-system effects and a wide spectrum of symptoms. Sensory deficits such as paresthesia, pain and motor effects such as

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spasticity, decreased muscle strength are observed. In addition to these, fatigue, sensory-state problems, emotional problems and sleep problems are observed in patients [4]. In MS, which is a chronic disease, patients' symptoms spread over a long period of time, pain and fatigue cause patients to be negatively affected psychologically. Depression is more prevalent in MS patients than in the population at large and depression is one of the important aspects affecting the quality of life of these patients [5]. Structural brain changes, immune-inflammatory, genetic and psychosocial factors may also contribute to depression in MS [6]. Stress is known to be a risk factor for the onset of disease relapses and there is a consistent correlation between stress and relapses [7,8]. Patients with relapses may be used to having attacks in the long term and may be combative. As the duration of the disease increases, the stress burden increases and coping with stress increases [9].

Impaired sleep quality in MS patients may have negative effects on cognitive functions and the general progression of the disease [10]. MS and sleep quality have a complex relationship, especially during relapse periods. The incidence and severity of sleep disorders increase in MS patients, especially during relapse periods [11]. When assessing the relationship between sleep and cognitive outcomes in patients with MS, it has been suggested that impaired sleep quality has negative effects on cognitive functions and the overall course of the disease [10].

In the literature, there is evidence that depression and stress cause decreased sleep quality and reduce quality of life in patients with MS, and that stress coping methods determine depression and sleep quality [7-11]. However, information on the levels of depression, sleep quality and coping with stress according to relapse status is limited. Therefore, addressing the relapse situation will help to approach patients integrally and to understand the non-motor aspects that form part of the progression. Accordingly, the aim of this study was to investigate depression, stress coping and sleep quality in RRMS patients according to relapse status. Our secondary findings are to provide evidence for the relationship between depression, stress coping and sleep quality.

Material and Methods

Study Design and Participants

This cross-sectional study was carried out at SANKO University Sani Konukoğlu Application and Research Hospital between May and October 2023. This study was approved by SANKO University Non-Interventional Research Ethics Committee (March 2023, approval number: No: 2023/02-02). The inclusion criteria were as described below; diagnosis of MS according to generally acceptance criteria [12], a relapsing disease course without signs of progression (a period of deterioration caused by inflammatory and demyelinating causes, during which new neurological findings are detected for at least 24 hours, with new findings or an increase in pre-existing findings) [12],

between the ages of 18-65, patients with Expanded Disability Status Scale (EDSS) score ≤ 6 [13], had no other neurological problems (i.e. Parkinson's, stroke, etc.). According to whether the patients had a recurrence within 6 months or not, the patients who had a relapse were defined as the Relapse Group and the patients who did not have a relapse were defined as the Non-relapse Group. A minimum number of 73 participants was required for a moderate relationship between the two variables to be significant ($\alpha=0.05$ and test power=0.80), as calculated by a power analysis performed in G*Power version 3.1 [14]. Declare that consent was obtained from the participants and that the research was carried out in accordance with the Declaration of Helsinki.

Measurement

Demographic information (gender, age) was recorded. EDSS was recognised to identify the disability status of patients with MS [13]. This scale used in individuals with MS determines the degree of neurological impairment and the functional capacity of patients. It assesses the functions of eight functional systems of the central nervous system (pyramidal, cerebral, brainstem, visual, bladder and bowel, sensory and cerebral). Each of these systems is given a score according to the severity of the impairment in their function. After adding the limitations in activities of daily living to these functional system scores, an EDSS score ranging from 0 to 10 is obtained [13].

Beck Depression Inventory (BDI) was evaluated to assess the severity of depression. It is a scale that evaluates the characteristic features and symptoms of depression in individuals. Turkish validity and reliability was performed by Hisli. The BDI consists of 21 parameters, with scores ranging from 0 to 63 [15]. An increase in the score indicates an increase in the severity of depression.

Ways of Coping with Stress Inventory (WCSI) is a 4-point Likert scale designed to measure the association between emotional conditions such as anxiety, loneliness, depression and other symptoms of psychological stress. The factor analysis applied for the construct validity of the scale reflected the existence of five subscales. Turkish adaptation was made by Şahin and Durak. These are; self confident, submissive, helpless styles, optimistic, seeking of social support. It consists of a total of 30 items. Scores for each factor are calculated separately by splitting the total score of the questions by the number of items for that factor. No total score is calculated. An increase in optimism and seeking social support scores indicates effective stress coping, while an increase in helplessness and submissive approach scores suggests ineffective methods. Optimistic approach: 0-15 points, Self-confident : 0-21 points, Helpless style: 0-24 points, Submissive: 0-18 points, Seeking social support: 0-12 points [16].

The Pittsburgh Sleep Quality Index (PSQI) was employed to assess sleep status. The Turkish validity and reliability was

performed by Ağargün et al. PSQI consists of 19 questions and 7 components to assess sleep disorders and sleep quality in the last month. The total score varies from 0 to 21. A high score reflects poor sleep quality and a high level of sleep disruption. A total score of more than 5 implies clinically poor sleep quality [17].

Statistical Analysis

SPSS 25 Package Software (Chicago, IL, USA) was applied for statistical analyses. Descriptive data were shown as mean (M) and standard deviation (SD) or median (min-max). The suitability of the normal distribution of the data was analysed by Shapiro-Wilk Test. In group comparisons, independent t-test was used for continuous variables specified by measurement. The relationship between two constant variables was evaluated by Pearson correlation coefficients. The correlation between two continuous variables was analysed by Pearson correlation coefficients and categorised as low (0.26-0.49), moderate (0.5-

0.69), strong (0.7-0.89) or very strong (0.9-1.0) [18]. P<0.05 was considered statistically significant.

Results

A total of seventy-nine MS patients were evaluated for the study. Five patients were out of the study because of EDDS score >6. A total of 74 patients were included in the study (relapse group n=37, non-relapse group n=37). Demographic and clinical characteristics of the patients are reported in Table 1. There was a statistically significant difference between the relapse group and non-relapse group in BDI score (p<0.001) and PSQI score (p<0.001). There was a considerable statistically difference between the two groups in terms of self-confidence, submissive, helpless styles and optimistic scores of WCSI subscales, no statistically significant difference was observed in seeking of social support subscale (social support subscale; p=0.497, other subscales; p<0.001, Table 2).

Table 1. Demographic and clinical characteristics of MS patients

	Relapsing group (n=37)	Non-relapsing group (n=37)	p-value
Age (years)	36.54±9.1	34±6.7	0.177
Disease duration (years)	9.18±5.06	7.34±4.3	0.113
Gender (n, female/male)	28/9	30/7	
Number of relapse in the last 6 months (n, median/min- max)	1 (1-3)	0 (0-0)	
EDSS score (median/min-max)	4 (3-5.5)	4 (3-5.5)	
P<0.05 independent t-test			

Table 2. Comparison of depression, sleep quality and coping with stress according to groups

	Relapsing group (n=37)	Non-relapsing group (n=37)	p-value
	Mean±SD	Mean±SD	
BDI (score)	22.4±7.61	8.54±1.98	p<0.001
PSQI (score)	5.91±2.38	2.97±1.21	p<0.001
WCSI			
Self confident (score)	11.45±2.6	18.42±1.7	p<0.001
Helpless styles (score)	16±3.22	9.3±2.16	p<0.001
Submissive (score)	12.46±1.81	7.68±1.84	p<0.001
Optimistic (score)	8.81±1.92	11.67±2.19	p<0.001
Seeking of social support (score)	10±1.98	9.75±1.83	0.497

SD: standard deviation, n: number of people, * P<0.001, independent t-test, BDI: Beck Depression Inventory, PSQI: Pittsburgh Sleep Quality Index, WCSI: Ways of Coping with Stress Inventory

The relationship between the PSQI, BDI and WCSI subscales of all RRMS patients is given in Table 3. There was a moderate positive correlation between BDI score and PSQI score (r=0.593, p<0.001). Self confident and optimistic were negatively correlated with PSQI score (r=-0.558, p<0.001; r=-0.413,

p=0.003, respectively). and BDI score (r=-0.642, p<0.001; r=-0.456 p=0.002, respectively). Submissive and helpless styles scores were positively correlated with PSQI score (r=0.426, p=0.002; r=0.531, p<0.001, respectively, Table 3). and BDI score (r=0.537, p<0.001; r=0.573, p<0.001, respectively, Table 3).

Table 3. Correlation of depression, sleep quality and coping with stress levels of MS patients

		BDI	Self confident	Submissive	Helpless styles	Optimistic	Seeking of social support
PSQI	r	0.593##	-0.558##	0.426#	0.531##	-0.413#	0.014
BDI	r		-0.642##	0.537##	0.573##	-0.456#	-0.015
Self confident	r			0.636##	-0.720##	0.430#	-0.152
Submissive	r				0.625##	-0.465##	-0.154
Helpless styles	r					-0.404#	0.001
Optimistic	r						0.008

P<0.05, ## P<0.001, r: Pearson correlation rank test, PSQI: Pittsburgh Sleep Quality Index, BDI: Beck Depression Inventory

Discussion

In this current study, it was detected that sleep quality decreased and depression severity increased in RRMS patients who had a relapse within 6 months compared to those who did not. In addition, it was observed that patients with relapse had lower self-confidence and optimistic approach scores, higher helpless approach and submissive approach scores, and similar scores in social support in the scale of coping styles with stress compared to patients without relapse. Our secondary results showed that patients with RRMS have higher severity of depression and poorer sleep quality, and that sleep quality and depression affect stress coping styles.

Depressive symptoms in auto-immune diseases are often associated with psychosocial stress, long-term disability, chronic pain, immune irregularity and even structural brain defects or medications. [19]. It has been stated that the incidence of depression and anxiety in MS patients increases during relapse periods and decreases after relapse [4]. Previous research on the effect of MS relapses on mood symptoms has yielded inconsistent results. In a small-sample study conducted during relapse, none of the participants were found to meet the criteria for depression. [20]. In contrast, there is evidence of high levels of evidence of clinically significant depression symptoms during relapse in a wide group of patients with long follow-up. In the same study, the possible association of psychological symptoms with relapse at 6-month follow-up was reported [4]. In the present study, MS patients who had a relapse within a 6-month period had higher depression scores than those who did not, supporting the previous longitudinal study.

In a systematic review on coping styles of MS patients with stress, it was reported that patients generally used emotion-orientated and escape strategies, whereas they used problem-orientated active coping approaches at a smaller rate than the total population. In the same study, it was reported that behavioural aspects should be addressed in rehabilitation services to cope with disease-related symptoms [21]. In another study, it was found that MS patients used problem-directed approaches (self-confident approach, optimistic approach, and seeking social support) more frequently in coping with stress [22]. In the present study, the significant difference in stress coping styles of MS patients who

had a relapse within 6 months compared to those who did not may reflect the behavioural effects of symptoms on the disease. In addition, the fact that no significant difference was detected in the seeking social support subscale, may indicate that they cope with stress with social support in problem-oriented approaches.

Because sleep disturbances are associated with an elevated proinflammatory state, it is thought that sleep disturbances may provide to the onset or relapses of MS, as demyelination is a known mechanism in MS [23]. One study advised that sleep disturbance may be one of the adverse effects of corticosteroid treatment during relapse in MS [24]. It has been reported that sleep disturbance in patients with MS may induce or contribute to chronic depression in these people [25]. Another study reported that the severity of MS relapse and the course of the disease may be affected by sleep quality and that the assessment of sleep quality can be used to obtain reliable prognostic information in RRMS patients [26]. Furthermore, another study reported that poor sleep quality was observed in 87.5 per cent of those with relapse and 50 per cent of those without relapse [27]. In the current study, the sleep quality of relapsing RRMS patients was found to be worse than that of non-relapsing RRMS patients. However, the significant correlation between sleep quality and depression in the whole sample may indicate that sleep quality is a factor affecting depression.

As a limitation of the study, we think that focusing on RRMS type provided homogeneity in terms of defining the effects of relapse on depression, stress and quality of sleep. However, conducting the same study in different MS types could have contributed to a better understanding of the effects of relapses. Evaluation of the measurement methods also during relapse periods would have enabled us to know to what extent the disease is effective on psychological problems. Evaluating the patients with repeated measurements at monthly intervals instead of a 6-month relapse interval would have better reflected the possible stress effects.

Conclusion

In conclusion, this study showed that depression and sleep quality were lower in RRMS patients who did not experience a 6-month relapse than in those who did. It was observed that MS patients who did not experience a relapse were better at coping with stress.

It could also indicated that depression may be associated with sleep quality and stress coping style in these patients regardless of whether they had a relapse or not. In the future, longitudinal studies are needed to investigate the relationship and effects of depression with sleep quality and coping with stress according to relapse status in different types of MS patients.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

This study was approved by SANKO University Non-Interventional Research Ethics Committee (March 2023, approval number: No: 2023/02-02).

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