THE JOURNAL OF ALTERNATIVE AND COMPLEMENTARY MEDICINE
Volume 18, Number 10, 2012, pp. 983–987

DOI: 10.1089/acm.2011.0390

Evaluation of the Effect of Progressive Relaxation Exercises on Fatigue and Sleep Quality in Patients with Multiple Sclerosis

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Abstract

Background and objectives: Fatigue and sleep problems are very commonly observed in patients with multiple sclerosis (MS). The Progressive Muscle Relaxation Technique (PMRT), used as one of the alternative methods in recent years, is reported to have benefits such as facilitating sleep and reducing sensitivity against fatigue. This research was conducted to investigate the effect of PMRT on fatigue and sleep quality in patients with MS.
Setting and design: This research was performed as a single-group pretest/post-test pretrial model. The research was conducted between March 2008 and December 2009 in the neurology polyclinic.
Materials and methods: The study was conducted with 32 patients who met the research criteria and agreed to participate in the study. A Personal Information Form was used as a data collection tool, Fatigue Severity Scale was used for measuring fatigue, and the Pittsburgh Sleep Quality Index was used for evaluating the sleep quality. PMRT was applied to the sample group once a day for 6 weeks.
Statistical analysis: Percentage, paired *t*-test, and Pearson's correlation analysis were used in the assessment of data.
Results: It was determined that PMRT decreased patients' fatigue level and improved their sleep quality, and this difference was observed to be statistically significant. Moreover, patients' fatigue level increased as their sleep quality decreased.
Conclusions: This study supports the effect of PMRT on fatigue and sleep quality in patients with MS, and it is recommended that further studies be conducted on this subject in the future.

Introduction

Fatigue is a common problem among individuals with multiple sclerosis (MS), and it is one of the most serious symptoms of the disease.[1] It was detected in previously conducted studies that 75%–87% of patients with MS complained of fatigue, and two thirds of these individuals designated fatigue as one of the worst three symptoms of their disease.[2–5]

When fatigue is not kept under control in MS patients, it negatively affects the individual's social activities, business and family life, as well as daily life activities, and therefore impairs his/her quality of life.[4–6] Pathological fatigue is one of the most common causes of unemployment among patients with MS. In addition, fatigue restricts a patient's ability to have social relationships and perform self-care activities, as well as his/her capabilities of doing things that generally require physical effort.[7]

There is no specific treatment method for keeping fatigue under control in patients with MS. For this purpose, several approaches are recommended, such as various medications, patient education, changes in lifestyle, appropriate physical exercise–fitness, relaxation and stress reduction techniques, ergonomic changes, balanced diet, increasing sleep quality, avoiding environmental challenges, improving the new identity, and encouragement.[8,9]

Sleep disorders are common in MS patients. Approximately half of all MS patients are reported to experience sleep problems.[10]

Impairment of night sleep duration and quality due to motor problems such as immobility, spasticity, and sphincter disorders is common among MS patients.[10] All physical and psychologic factors such as pain, depression, respiration-induced sleep problems, and disease severity may contribute to sleep disorders in patients with MS. Sleep disorders in

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patients with MS may cause sleepiness during the day, fatigue, depression and lower pain threshold.[11–13]

Studies on sleep have gradually gained significance not only because sleep disorders are very common among patients with MS, but also because they have the potential to have a negative effect on general health and quality of life.[14]

Application of the Progressive Muscle Relaxation Technique (PMRT) has recently become an integral part of the care of individuals with chronic disease due to its benefits such as reducing anxiety and effects of stress, distracting attention away from pain, relieving muscle strain and contractions, facilitating sleep, and reducing sensitivity to fatigue and pain.[15,21]

PMRT was developed in 1920s by Jacobson. PMRT is a type of exercise that includes voluntary stretching and relaxation of large muscle groups in the human body from hands to feet.[15,16] Previously conducted studies have revealed the positive effects of PMRT on fatigue and sleep.[17–20]

Patients need the recommendations of professional health team members to be able to cope with fatigue and sleep problems in an efficient way.[21] It is evident that nurses in this health team play a significant role in helping patients cope with fatigue and sleep disorders.

It is reported in the literature that fatigue and sleep problems are very commonly observed in patients with MS. There have been no studies in literature that investigate the direct effect of PMRT on fatigue and sleep quality in patients with MS.[8,9,14] This research was conducted to contribute to the nursing literature about PMRT for MS.

Materials and Methods

This study was designed as a single-group pretest/post-test pretrial model. The study was conducted with 35 patients among those who applied to and registered in the neurology polyclinic between March 2008 and December 2009 and who met the research criteria. However, since 3 patients did not complete the education program, the study was completed with a total of 32 patients.

The site of this research, Yakutiye Hospital, is the largest hospital in eastern Turkey, and almost all patients with MS in this region, particularly those living in the vicinity of Erzurum, receive MS treatment at this facility.
The inclusion criteria were as follows:

1. To be diagnosed with MS for at least 6 months,
2. To have Expanded Disability Status Scale (EDSS) score ≤ 5.0 (EDSS was evaluated by a neurologist),
3. To have Fatigue Severity Scale (FSS) ≥ 4 (FSS was evaluated by the researcher),
4. To not have had any attacks during the 3-month period preceding enrollment in the study,
5. To be residing in the city of Erzurum,
6. To be ≥ 18 years of age,
7. To be at least a primary school graduate,
8. To have a CD player at home, and
9. To have a good level of communication skills.

A three-part survey was used for data collection. The questionnaires included (1) a Personal Information Form, (2) FSS for measuring fatigue, and (3) Pittsburgh Sleep Quality Index (PSQI) for evaluating sleep quality.

In the pretest stage, data were collected by applying the Personal Information Form, FSS, and PSQI to patients who were admitted to the neurology polyclinic 3 days a week and who met the study criteria.

For patients with MS, education and initiatives were PMRT based. The PMRT was based on a classic muscle relaxation program devised by Jacobson. PMRT includes progressive relaxation (tense–release) of 11 groups of muscles (right arm, left arm, forehead, jaw and neck, back and shoulders, stomach, thighs, right calf, left calf, right foot, and left foot) and deep breathing.[15,16]

PMRT was given by using a handbook including relaxation exercises (including information about how to perform relaxation, respiration control, and progressive relaxation exercises) and a PMRT CD[22] (educational CD prepared by the Turkish Association of Psychologists). This CD contains instructions for relaxation exercises and music to relax patients.

Patients with MS were first given an education about PMRT in a quiet and special room in the neurology polyclinic and then allowed to listen to a CD on relaxation exercises. Later, the exercises in the CD were performed by the researcher and then the patients were asked to do these exercises. Patient education was given once for each patient to help them to learn and perform the exercises properly. Education was given to patients on a one-to-one basis and lasted for approximately 1 hour for each patient. After the education, each patient was given a handbook and CD containing PMRT and was asked to listen to and perform the exercises at home by following the instructions in the CD once a day for 6 weeks at hours when they felt themselves the least tired. Two (2) weeks after the first education, patients were again called to the neurology polyclinic and were asked to do the PMRT under the supervision of the researcher. In addition, telephone numbers of patients were received and they were followed in terms of performing the exercises they were assigned.

In the post-test stage, patients were asked to come to the neurology polyclinic 6 weeks after the completion of their education and they were again assessed with the FSS and PSQI by the researcher.

Data collection tools

Individual information questionnaire. The individual information questionnaire included age, sex, marital status, education, occupational status, income, and disease duration.

Fatigue Severity Scale. The presence and severity of fatigue were assessed by means of the FSS. The FSS was developed Krupp et al. (1989).[23] The FSS is composed of 9 items, each asserting the intrusion of fatigue in different aspects of living. Each item is rated from 1 = strongly disagree to 7 = strongly agree, and the test score is the average rating. Sample items from the FSS include items such as the following: "My motivation is lower when I am fatigued" and "Fatigue interferes with my physical functioning." FSS scores of ≥ 4 were suggested to be indicative of ''fatigue'' whereas FSS ≤ 4 characterized ''no fatigue''[23]

The questionnaire was validated on three groups: individuals diagnosed with either MS or systemic lupus erythematosus, and healthy adults. The FSS showed high internal consistency (Cronbach $\alpha = 0.88$), clearly differentiated patients from normals (by a score ratio exceeding 2:1), and exhibited excellent test–retest reliability.[23]

The validity of the Turkish version of the scale was demonstrated by Armutlu and colleagues[24] (2007). Cronbach α value was found to be 0.89.

Internal consistency (reliability) was examined by Cronbach α, and α of the scale was 0.91 in the study.

Pittsburgh Sleep Quality Index. The PSQI was developed Buysee et al. (1989).[25]

The PSQI measures subjective sleep quality that specifically assesses the preceding 1-month period. It consists of 19 self-rated questions and 5 questions rated by bedpartner or roommate (The last five questions are used for clinical information only and are not reported in this article). The 19 items are grouped into 7 component scores: sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. These component scores are added to a global PSQI score with a range of 0–21, with higher scores indicating worse sleep quality. A global PSQI of >5 has been suggested to distinguish poor (PSQI > 5) from good sleepers (PSQI ≤ 5).[26] Ağargün et al.[26] (1996) conducted the validity and reliability studies of the index in Turkey. In the original study, the Cronbach α value was calculated to be 0.80.

In this study, total Cronbach α parameter for PSQI was determined as 0.84; the α parameters of subdimensioned Cronbach were determined as 0.83 for sleep latency, 0.81 for sleep efficiency, 0.72 for sleep disturbances, and 0.67 for daytime dysfunction.

Statistical analysis. Coding and statistical analyses of data were done by using the SPSS 11.5 package program (LEAD Technologies, Inc.). In the evaluation of data, percentage, average, and standard deviation were used to assess the descriptive characteristics of patients, paired *t*-test was used to determine the difference between patients' mean scores obtained from fatigue and sleep quality scales before and after progressive relaxation exercises, and Pearson correlation analysis was used to detect the relationship between fatigues and sleep scales.

Ethical considerations. Official permission was received to conduct the research at Atatürk University, Faculty of Medicine, Yakutiye Research Hospital, Neurology Clinic. The research was also submitted to and approved by the ethics committee of the Institute of Medical Sciences of Atatürk University. Patients were verbally informed and their consent was received. The individuals who participated in the research were informed that they could withdraw from the study any time they wished. Individuals to be included in the research were assured about the confidentially of their personal information and the "confidentially principle" was observed.

Results

Average age of patients included in the research was found to be 38.15 ± 9.48 years. It was determined that 37.5% of patients were in the age group of 24–33 years, 62.5% were women, 84.4% were married, 40.6% were high school graduates, and 43.8% were employed. It was also determined that 43.8% of patients had a disease period of less than 2 years and mean income level of 1298 ± 827.98 Turkish Liras (Table 1).

FSS score average was found to be 5.75 ± 0.95 before PMRT and 3.81 ± 1.30 after PMRT. The difference between patients' score averages of FSS before and after PMRT was found to be statistically significant ($p < 0.001$) (Table 2). After PMRT, the patients felt less fatigue.

Table 1. Percentage Distribution of Patients' Characteristics

Characteristic (N = 32)	n	%
Age		
24–33	12	37.5
34–43	11	34.4
44–53	5	15.6
54 and above	4	12.5
Sex		
Female	20	62.5
Male	12	37.5
Marital status		
Married	27	84.4
Unmarried	5	15.6
Education		
Primary school	10	31.3
High school	13	40.6
Graduate school/faculty	9	28.1
Occupational status		
Employed	14	43.8
Housewife	13	40.6
Self-employment	5	15.
Duration of disease		
<2 years	14	43.8
3–5 years	6	18.8
6–8 years	5	15.5
>8 years	7	21.9
Mean income level	$\bar{x} \pm SD = 1298 \pm 827.98$ TL	

$\bar{x}$, mean; SD, standard deviation; TL, Turkish Liras.

The global sleep quality score average of patients was detected to be 10.81 ± 4.01 before PMRT and 6.25 ± 3.34 after PMRT. The difference between the global sleep quality ($p < 0.001$) score averages and the score averages the patients obtained from subjective sleep quality ($p < 0.001$), sleep latency ($p < 0.001$), sleep duration ($p < 0.05$), sleep efficiency ($p < 0.05$), sleep disorder ($p < 0.001$), and daytime dysfunction ($p < 0.001$) areas of sleep quality scale before and after PMRT was found to be statistically significant. When the patients practiced the PMRT, they slept more comfortably. Since none of the patients used sleeping pills, they were scored as "0" in the area of "use of sleep medication" and no statistical operation was performed (Table 3).

Table 4 demonstrates the relationship between patients' score averages obtained from sleep quality and FSS after PMRT. A positively significant relationship was detected between FSS score average and the score averages of subjective sleep quality, sleep disorder, daytime dysfunction, and global

Table 2. Comparison of Pretest/Post-Test Score Averages the Patients Obtained from Fatigue Severity Scale

	Pretest scores	*Post-test scores*		
Scale	$\bar{x} \pm SD$	$\bar{x} \pm SD$	t	p
FSS	5.75 ± 0.95	3.81 ± 1.30	8.164	$p < 0.001$

$\bar{x}$, mean; SD, standard deviation; FSS, Fatigue Severity Scale.

Table 3. Comparison of Pretest/Post-test Score Averages the Patients Obtained from Sleep Quality Scale

	Sleep quality score			
	Pretest	*Post-test*		
Sleep quality	$X \pm SD$	$X \pm SD$	t	p
Sleep quality	2.00 ± 0.67	1.09 ± 0.81	6.981	$p < 0.001$
Sleep latency	1.75 ± 1.10	1.18 ± 1.17	4.190	$p < 0.001$
Sleep duration	1.56 ± 1.16	0.81 ± 0.85	3.645	$p < 0.05$
Sleep efficiency	1.34 ± 1.28	0.71 ± 0.92	2.743	$p < 0.05$
Sleep disturbances	1.90 ± 0.77	1.21 ± 0.65	4.984	$p < 0.001$
Use of sleep medication	0.00 ± 0.00	0.00 ± 0.00	–	–
Daytime dysfunction	2.21 ± 0.94	1.28 ± 1.14	6.043	$p < 0.001$
Global PSQI	10.81 ± 4.01	6.25 ± 3.34	8.652	$p < 0.001$

PSQI, Pittsburgh Sleep Quality Index.

sleep quality after PMRT ($r = 0.742$, $p < 0.01$; $r = 0.499$, $p < 0.01$; $r = 0.642$, $p < 0.01$; $r = 0.617$, $p < 0.01$, respectively).

Discussion

When patients' pretest/post-test score averages obtained from FSS were compared, their fatigue score averages were observed to have decreased after PMRT ($p < 0.001$). This finding shows that PMRT applied is effective in reducing fatigue in patients with MS. Performing regular and mild exercises helps to strengthen bones and muscles and increases agility in patients with MS. It also decreases the possibility of patients living with any disabilities by preventing muscle loss and posture problems in the long term.[27]

Stuifberger has determined in his study on patients with MS that the group of patients who did regular exercise had better physical functions compared to the group of patients who did not do exercise.[28]

Oken et al. applied exercise to 69 patients with MS for 6 weeks in their study, which investigated the effect of yoga and exercise on cognitive functions, fatigue, psychologic state, and quality of life in patients with MS, and they detected a significant decrease on patients' fatigue levels.[29]

Kessel et al. determined that relaxation exercises and cognitive behavioral treatment reduced fatigue in patients with MS at the end of 8 weeks of treatment sessions.[18]

Table 4. Relation Between Score Averages the Patients Obtained from Sleep Quality Scale and Fatigue Severity Scale in the Post-test

	FSS	
PSQI	r	p
Sleep quality	0.742	$p < 0.01$
Sleep latency	0.234	$p > 0.05$
Sleep duration	0.111	$p > 0.05$
Sleep efficiency	0.035	$p > 0.05$
Sleep disturbances	0.499	$p < 0.01$
Use of sleep medication	–	–
Daytime dysfunction	0.642	$p < 0.01$
Global PSQI	0.617	$p < 0.01$

FSS, Fatigue Severity Scale; PSQI, Pittsburgh Sleep Quality Index.

Sutherland et al. also reported that relaxation education resulted in a decrease in fatigue levels in MS patients.[17]

It is reported in the literature that carefully and regularly applied exercise is one of the methods used in coping with fatigue [8,30]; PMRT used as one of the nonpharmacological approaches to control fatigue in patients with MS yielded positive results,[7,31] and 5–20-minute PMRT sessions were as effective as 1 hour of sleep in preserving individuals' physical energy.[32]

A statistically significant difference was found between the global sleep quality ($p < 0.001$) score averages and the score averages the patients obtained from subjective sleep quality ($p < 0.001$), sleep latency ($p < 0.001$), sleep duration ($p < 0.05$), sleep efficiency ($p < 0.05$), sleep disorder ($p < 0.001$), and daytime dysfunction ($p < 0.001$) areas of sleep quality scale after PMRT. Since none of the patients used sleeping pills, they were scored as "0" in the area of "use of sleep medication" and no statistical operation was performed. This finding demonstrates that PMRT applied in patients with MS is effective in improving patients' sleep quality.

Studies available in the literature report a high prevalence of sleep problems among patients with MS and the benefits of PMRT, such as facilitating sleep.[8,14]

Means et al. compared individuals who had sleep disorders and those who did versus those who did not apply PMRT, and determined that the duration of wakefulness decreased significantly and sleep quality was improved in the group applying PMRT.[19]

Esmonde and Andrew, Nayak et al., and Berkman et al. also reported an improvement of sleep quality in patients with MS who did PMRT in their studies.[33–35]

When the relationship between the patients' sleep quality and their mean scores from fatigue scales were evaluated after PMRT, a positively significant relationship was observed between the mean scores of fatigue severity scale and the mean scores of subjective sleep quality, sleep disorder, daytime dysfunction, and global sleep quality after PMRT. Patients' fatigue level increased as their sleep quality deteriorated. Similarly, Tachibana et al., Marrie, Attarian et al., and Stanton et al. also detected a positive relationship between sleep disorder and fatigue in patients with MS as a result of their studies.[10,36–38] This finding reveals a similarity with the results obtained from the present study.

Conclusions

At the end of the research, it was determined that PMRT reduced patients' fatigue levels and improved their sleep quality. It was also detected that patients' fatigue levels increased with the deterioration in their sleep quality.

In line with the results obtained from the research, it may be suggested that PMRT are included in routine patient care in nurses' clinical applications, patients are given materials such as handbooks, brochures, and CD that contain instructions about PMRT, patients are provided with suitable environments where they can do PMRT comfortably, and nurses provide consultancy to patients on this matter.

Acknowledgment

Financial support for this study was provided by Scientific Research Project (No. BAP- 2008 / 241). Dayapoğlu did some of the work for this study at the Research Institute of Health Sciences at Atatürk University as part of a PhD thesis.

Disclosure Statement

No competing financial interests exist.

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