Effect of Benson Relaxation Technique on Sleep Quality and Fatigue for Multiple Sclerosis Patients

Nagla Hamdi Kamal Khalil[(1)], Fatma Mohmmed Abouelala [(2)], Amal Hemed Hamad[(3)], Fatma Mohamed Elesawy[(4)]

(1) Assistant professor of medical surgical nursing, Faculty of nursing, Alexandria University, Egypt.
(2) Lecturer of medical surgical nursing, Faculty of nursing, Kafrelsheikh University, Egypt.
(3) Lecturer of medical surgical nursing, Faculty of nursing, Zagazig University, Egypt.
(4) Lecturer of medical surgical nursing, Faculty of nursing, South Valley University, Egypt.
Fatma.abouelala@yahoo.com

Abstract

Background: Multiple sclerosis patients generally suffer from fatigue and sleep disturbances, which can impede their daily activities. The Benson relaxation technique is one of the complementary therapies that have been shown to provide benefits including improved sleep and decreasing fatigue level. **Aims:** To evaluate the effect of the Benson relaxation technique on sleep quality and fatigue for patients with multiple sclerosis. **Setting:** The study was carried out at the multiple sclerosis outpatient clinic in Zagazig University Hospital, Egypt. **Design:** A quiz experimental study was conducted. **Subject**: A purposive sample of 40 patients with multiple sclerosis, both sex with the patients' Expanded Disability Status Scale score ≤ 5.0. **Tools of data collection included:** Four tools were included Demographics and medical-related questionnaire, Fatigue Severity Scale was used to measure fatigue, Modified Fatigue Impact Scale was used to measure fatigue impact on daily activities, and the Pittsburgh Sleep Quality Index was used for measuring the sleep quality. **Results:** There was a significant statistically difference in sleep quality, fatigue total mean scores before and after the practice of Benson relaxation technique ($p<0.001$). Also, there was a significant statistically positive correlation between the fatigue severity scores and sleep quality scores before and after the practice of Benson relaxation technique. **Conclusion:** The practice of Benson relaxation technique is effective in decreasing fatigue and improving sleep quality for patients with multiple sclerosis. **Recommendation:** Applying Benson relaxation technique to therapeutic routine management of multiple sclerosis patients.

Keywords: Benson relaxation technique, fatigue, multiple sclerosis, sleep quality.

Introduction

Multiple sclerosis (MS) is a demyelinating and neurodegenerative inflammatory condition of central nervous system (CNS) characterized by a broad variety of manifestation that impair physical, mental, cognitive, and social function **(Sakkas et al., 2019).** It is common in young adults between the ages of 20 and 50 years, with a peak onset at 30 years. It begins with localized neural damage of the CNS followed by episodes of relapse and recurrence of symptoms **(Kaminska et al., 2017).**

Multiple sclerosis caused by a multifaceted interaction of genetic, environmental, and life style risk factors **(Serafini et al., 2018).** According to the MS International Federation, approximately 2.8 million individuals are affected worldwide (35.9 per 100,000 populations). Females are twice affected with MS than males. **(Walton et al., 2020).** The prevalence of all neurological disorders in Egypt was estimated to be 3.4 percent and the prevalence of MS was found to be 14.1/100,000 **(El Tallawy et al., 2016)**.

Patients with MS report a variety of symptoms, which commonly are fatigue, sleep disturbances, and cognitive impairment **(Gilmour et al., 2018).** The most prevalent MS symptoms are fatigue which interferes with their daily life, reducing the physical, mental, and social quality of life **(Cehelyk et al., 2019).** Over that, Fatigue is frequently accompanied by depression and anxiety symptoms, as well as sleep disturbances **(Labuz-Roszak et al., 2012).**

Also, **Langeskov-Christensen, et al., (2017); Labuz-Roszak et al., (2012)** added that fatigue affects up to 80% of MS patients during the early stages of the disease. Fatigue is most likely caused by a combination of primary and secondary causes. The primary fatigue results

from the dysfunction of central nervous system neuronal circuits. While anemia, sleep disturbance, and immunosuppressive drug are the main cause of secondary fatigue.

Approximately 60% of MS patients suffer from sleep disorders that are multifactorial in nature and have uncertain pathophysiology **(Cehelyk et al., 2019).** Numerous forms of sleep abnormalities are common in patients with MS such as insomnia, obstructive sleep apnea caused by respiratory problems, restless leg syndrome, periodic limb movement disorder, and daily excessive sleeping **(Hughes, et al., 2018).** Sleep disturbance specifically insomnia leads to significant limitations in physical and cognitive abilities, as well as increased suffering from fatigue **(Archer et al., 2014).**

Sleep abnormalities are four times higher in MS than in healthy people **(Garland et al., 2017; Boe Lunde et al., 2012).** Over that, sleep deprivation has a negative effect on patients' health and life quality that adding to the overall disease burden **(Amtmann, et al., 2018).** Therefore, ineffective sleep quality has a significant symptom that contributes to greater impairment and difficulties in managing ordinary activities in MS patients **(Vitkova et al., 2018; Newland et al., 2019).**

Non-pharmacological and complementary therapy are often correlated with fewer risks and complications which can be used single or in conjunction with other therapies. The most common non-pharmacological therapies involve music therapy, relaxation, mind-distraction strategies, biofeedback, yoga, behavioral changes, guided imagery, and cognitive restructuring. Relaxation is important nursing practice; it has been implemented as a valuable non-pharmacological approach for reducing stress and its effects on emotional, physical, and psychological conditions, as well as self-steams, anxiety depression, and improving patient quality of life **(Mahdavi, et al., (2013)**.

Relaxation is a mental calming method for decreasing physical discomfort, anxiety, stress, mood disorders, and autonomic nervous system dysfunction of which affects sleep quality **(Rambod et al., 2013).** It works by regulating the hypothalamus, reducing sympathetic activity, and increasing catecholamine secretion which decreases unpleasant physiological effects of stress such as tachycardia, hypertension, and muscle spasm **(Kiani, et al., 2017).**

Benson relaxation technique (BRT) is a light-emitting method that results in relaxation of all body muscles, it was considered as a one type of subjective stress management **(Masry, et al., 2017).** Benson relaxation technique is the most effective and easy-to-use nursing procedure. It includes mindfulness techniques that are influenced by a wide range of physical and psychological signs and Symptoms such as anxiety, pain, depression, mood and self-esteem, reduce stress and improve sleep quality **(Rambod, et al 2013).** So, it was necessary to apply the Benson relaxation technique for patients with multiple sclerosis to reduce it their fatigue level and improve their sleep quality.

Significance of the study:

The high prevalence of fatigue and sleep disorders in patients with multiple sclerosis and their negative effects on physical and psychological wellbeing necessarily requires the use of simple, suitable, and inexpensive methods to improve sleep quality and reduce fatigue among these patients, BRT resulted in whole muscles relaxation and is considered a straightforward strategy for the treatment of sleep disturbance.

Aim of the study:

Evaluate the effect of Benson relaxation technique on sleep quality and fatigue level for multiple sclerosis patients.

Research Hypotheses:

H1: The Sleep quality means scores will improve among multiple sclerosis patients after practice the Benson relaxation technique

H2: The fatigue severity means scores will improve among multiple sclerosis patients after practice the Benson relaxation technique.

Subjects and Method

Study design:

A quasi- experimental, (pre and post) study design was used.

Setting:

The study was carried out at the multiple sclerosis outpatient clinic in Zagazig University Hospital, Zagazig, Egypt.

Subjects:

A purposive sample of 40 patients with multiple sclerosis who had the following inclusion criteria:

- Agree to participate in the study.
- Ages range from 18 -60 years old of both sexes.
- Diagnosed with MS by a neurologist for at least 6 months.
- Regularly follow up in multiple sclerosis outpatient clinics
- The patients' Expanded Disability Status Scale (EDSS) score ≤ 5.0.
- Able to read and write.
- Both males and female.

Exclusion criteria

- Having comorbid diseases as cerebral or heart attacks in the past three months.
- Patients with intellectual and psychological disabilities
- Patients who are involved in any other regular programs, such as exercise, physical activities, or cognitive-behavioral approaches

Sample size

- The sample size was estimated to be 40 patients using the epidemiology information "EPI info." software version 6.02 with alpha error 5% coefficient interval 95%, and power of study of 80%.

Data collection tools:

Tool I: Demographic and medical-related data questionnaire sheet: The researchers developed this tool. It was divided into 2 parts, as follows:

- Part one: the demographic data as age, sex, marital status, level of educational, place of residence, and occupation.
- Part two: Medical data as age at disease onset, duration of disease, and type of MS.

Tool II: "The Pittsburgh Sleep Quality Index (PSQI)": **Buysse et al., (1989)** developed this scale. It is an effective tool for assessing sleep quality and patterns in last month. This tool was translated into Arabic language and approved to be valid and reliable by **Asaad, & Kahla, (2009)**. This tool consisted of seven domains: quality of sleep, sleep latency, sleep efficiency, sleep duration, use of sleep medication, sleep disturbances, and daytime dysfunction. The items are graded in a scale from 0 (no difficulty) to 3 (severe difficulty), with a total score ranged from 0 to 21 with lower scores indicating better sleep quality and larger scores indicating poor sleep quality.

Tool III: Fatigue Severity Scale (FSS): It was created by **Krupp et al., (1989).** This scale consists of nine statements that are used to assess subjective fatigue over the previous seven days. Each statement was graded on a scale from 1 to 7, with (1) that indicate strongly disagree and (7) indicating strong agreement. To get the total score divide the sum of the scores by nine. FSS scores of ≤ 4 were supposed to indicate fatigue, while FSS ≥ 4 were supposed to indicate no fatigue.

Tool IV: Modified fatigue impact scale (MIFS): it used to evaluate the effects of fatigue on a variety of daily activities. It was made up of 21 items, it designed by **(Fisk et al., 1994).** It's a 5-point Likert-type grade ranging with zero meaning never and 4 meaning almost always. It is divided into three subscales: cognitive (ten items), psychosocial functioning (two items), and physical (nine items). By summing the scores of three subscales, a total score ranges from 0-84 is calculated. High scores indicate that fatigue has a stronger effect on a patient's activity.

Content validity and reliability:

It was established by a jury of 5 experts in of Medical-Surgical Nursing field who reviewed tools for clarity, relevance, comprehension, understanding, and applicability. Then, some modifications were applied accordingly.

Reliability of tools II, III, and IV (The Pittsburgh Sleep Quality, Fatigue Severity Scale and Modified fatigue impact scale Index was ensured by the r coefficient (r= 0.83, 0.79, and 0.81 correspondingly).

Pilot study:

A pilot study on five patients (10%) was carried out to test the clarity, applicability, and feasibility of the tools used. It was also carried

out to detect any difficulties with tools administration and to note the time taken for gathering data; modifications were made based on finding. Pilot study sample was separated from the final sample of the study.

The study's implementation was divided into four stages (assessment, planning phase, implementation phase, and evaluation phase).

Data Collection Procedure:

- The study implementation was divided into three phases (assessment, implementation, and evaluation phase). The study was performed over a period of six months, from July 2020 to February 2021.

Assessment phase:

- The official permission for carrying out the study was taken from the responsible authorities of Zagazig University Hospital.
- Before data collection, the study's intent was explained to studied patients, and then written consent was obtained from them.

Implementation phase:

- All the studied subjects who fulfilled the eligibility criteria were interviewed individually to fill out the demographic and medical-related data questionnaire as well as PSQI, FSS, and MIFS to assess sleep quality and fatigue severity and the effect of fatigue on patients' life. This took approximately thirty minutes.
- The conduction of BRT for the studied subjects was done in two sessions, in the first session the researcher gave information about fatigue and sleep disturbance in MS patients, as well as the definition, mechanism, and advantages of the BRT and how to perform it. This took about 20 minutes.
- In the second session, the studied subjects were given instructions for practice of the BRT in a calm and separate room at the MS outpatient clinic to help them understand and practice the technique properly.
- The researcher used videos, demonstration, and remonstration to teach the patients. Then the researcher reviewed and reinforced content based on the participants' needs.
- Each patient received instruction about BRT that lasted for approximately 20 minutes, each patient received a handbook in simple Arabic language.
- Each patient was instructed to conduct the technique at home two times a day, morning and evening for fifteen to twenty minutes for eight weeks.
- Telephone contacts were used every week to confirm study participants' adherence to the BRT. They were also instructed to document daily relaxation using a checklist provided after the instructions to ensure that the relaxation technique was correctly performed.
- The participants were told to do the BRT in the following steps
  - Sit comfort in a relaxed position.
  - Keep eyes closed.
  - Maintain muscles relaxed, starting from the soles of their feet and move forward.
  - Breathe in and out through nostril, keep attention to breathing. Inhale, and exhale with comfort and confidence as exhale, silently say the word "one".
  - Repeat the technique for twenty minutes. Keep your body and muscles relaxed while mentally repeating the wanted word. Then gradually open the eyes and remain motionless for little minutes.

Evaluation Phase:

- Evaluate the effectiveness of relaxation technique after 8 weeks using the study tools, through a comparison between before and after practice BRT.

Ethical considerations:

Ethical approval was taken from Zagazig University Faculty of Nursing Ethic Committee. A formal agreement was taken for the study from all subjects after clarifying the purpose of the study. Also, they were told that information gathered would be kept confidential and utilized only for the research purpose, and the techniques of study would have no harmful effect on them. The researchers stressed that involvement in the study is completely voluntary and that the patients' privacy was ensured by data coding. Subjects were also told that refusing to take part in the study would have no effect on their treatment.

Statistical analysis:

The data obtained from questionnaires were analyzed by using SPSS software version 23. Number, percent, mean, and standard deviation were used to evaluate qualitative data. Kolmogorov-Smirnov test was used to analyze whether quantitative variables had a normal distribution. Covariance was analyzed using "one-way ANOVA", Paired sample t-test pre-post comparison. The association between fatigue severity and sleep quality measures was discovered using the Spearman correlation. The significance threshold was set at <0.05.

Limitation of the study

- The study was done with a limited sample size, which limits generalization of the result.
- The study was conducted in only one out patient hospital setting.

Result

Table 1: shows that the demographic and disease-related characteristics of MS patients. The mean age was 32.57±8.04 years, there were 85.0 % females, 72.5 % were married, 45.0% were graduates of secondary school, 72.5% were not working and housewives, and 55.0 % were urban patients. Regarding to type of MS 60.0% had relapsing- remitting multiple sclerosis. In relation to the mean of MS duration was 5.15 ± 3.08 and mean age at onset of MS was 28.12±7.74.

Table 2: shows that the mean scores for the fatigue severity scale was decreased after practice of BRT compared with before the practice of BRT with a highly statistically significant decreased ($p < 0.001$).

Table 3: Shows there was a statistically significant differences between the mean scores of all subscales of MFIS before and after practice of BRT namely, physiological, cognitive, and psychosocial subscales. P value at 0.006, 0.009, and 0.008 respectively. The total mean scores of MS subjects were highly statistically significant p value at (<0.001**) after practice of BRT.

Table 4: illustrates the effect of the BRT on mean score of PSQI. This table shows a significant difference was found before and after practice the technique of all subscales except sleep medication used scale with no statistically significant difference p value at 0.323. Concerning the total mean score PSQI, there was a highly significant improvement of overall sleep quality mean score at $p < 0.001$.

Table 5: demonstrates that there was a positive significant correlation between the FSS score and PSQI score before and after the application of BRT.

Table 6: clarified that, a statistically significant relation between the demographic characteristics of the MS patients, and the mean score of fatigue severity scale among their age, sex, occupation, and duration of illness before and after practice of BRT. Additionally, the table reflected a significant statistically relationship between demographic characteristics of the studied patients, and mean score of the sleep quality index among their age, marital status, occupation, and duration of illness before and after application of BRT ($p \leq 0.01$)

Table (1): The distribution of MS patients according to their demographic and disease-related characteristics (No= 40).

	No	%
Age (Years):		
<30	14	35.0
30- < 40	18	45.0
40 <50	6	15.0
50 - 60	2	5.0
Mean ± SD	32.57±8.04	
Sex:		
Male	6	15.0
Female	34	85.0
Marital status:		
Single	11	27.5
Married	29	72.5
Educational level		
basic education	1	2.5
Secondary education	18	45.0
High education	17	42.0
Postgraduate	4	10.0
Residence:		
Urban	22	55.0
Rural	18	45.0
Occupation:		
Working	11	27.5
Not working/ Housewife	29	72.5
Type of Multiple Sclerosis:		
Relapsing- remitting	24	60.0
Primary progression	5	12.5
Secondary progression	9	22.5
Progressives relapsing	2	5.0
Duration of illness		
1 to 3 years	14	35.0
4 to 6years	15	37.5
7 to 9 years	7	17.5
> 9years	4	10.0
Mean±SD	5.15±3.02	
Mean age at onset	28.12±7.74	

Table (2): The Comparison between the mean scores for FSS among MS patients before and after practice of BRT

Fatigue severity scale	Before	After	t test	P
	Mean ± SD	Mean± SD		Value
FSS	4.92±1.30	3.15±1.25	8.83	< 0.001**

SD: Standard deviation t: Paired sample t-test **Highly statistically significant at p ≤ 0.001

Table (3): The Comparison between the mean scores for MFIS among MS patients before and after practice of BRT

MFIS subscale	Before	After	t test	P
	Mean ± SD	Mean ± SD		Value
Physical	22.50±4.00	20.20±3.31	2.89	0.006*
Cognitive	21.45±6.10	18.02±3.64	2.74	0.009*
Psychosocial	4.55±1.01	3.97±1.025	2.80	0.008*
Total	48.50±8.63	42.20±4.21	4.17	< 0.001**

SD: Standard deviation t: Paired sample t-test *: Statistically significant at p ≤ 0.05
****Highly statistically significant at p ≤ 0.001**

Table (4): Comparison between mean score of PSQI subscales among MS patients before and after practice of BRT.

PSQI	Before	After	t test	P
	Mean ± SD	Mean ± SD		Value
Quality of sleep	2.22±0.47	1.90±0.30	3.59	< 0.001**
Sleep latency	2.32±0.91	1.65±0.75	4.80	< 0.001**
Sleep duration	1.85±0.42	1.50±0.50	3.34	0.002*
Sleep efficiency	1.95±0.74	1.62±0.49	2.31	0.0.26*
Sleep disturbances	2.17±0.84	1.47±0.55	6.827	< 0.001**
Sleep medication used	0.10±0.30	0.75±0.26	1.00	0.323
Daytime dysfunction	2.27±0.45	1.22±0.42	13.18	< 0.001**
Overall PSQI	12.90±2.09	9.45±1.37	10.98	< 0.001**

SD: Standard deviation **t: paired sample t-test** ***: Statistically significant at p ≤ 0.05**
****Highly statistically significant at p ≤ 0.001**

Table (5): The Correlation between FSS and PSQI before and after practice of BRT

	FSS scores before		FSS scores after	
	R	P	R	P
PSQI **Pre**	0.517	0.001*	---	----
PSQI **Post**	---	----	0.363	0.02*

Table (6): The association between the demographic characteristics of the MS patients and mean score for FSS, and PSQI before and after practice of BRT.

Variables	Mean score of FSS Mean ± SD				Mean score of PSQI Mean ± SD			
	Before	Test of significance	After	Test of significance	Before	Test of significance	After	Test of significance
Age (years):								
Less than 30	3.92±1.14		2.92±1.38		11.64±1.64		9.07±1.14	
30 to less than 40	5.33±1.08	F:6.66	3.00±1.02	F:3.03	12.77±1.43	F:10.14	9.27±1.01	F:3.68
40 to less than 50	5.50±1.04	P:0.001*	3.33±1.03	P:0.04*	14.83±2.13	P:< 0.001*	10.00±1.67	P:0.02*
50 and more	6.50±0.70		5.50±0.70		17.00±0.00		12.00±2.80	
Sex:								
Male	3.66±1.03	t:7.63	2.83±1.60	T:0.44	11.83±2.78	t:1.86	9.16±1.32	T:0.29
Female	5.14±1.23	P:0.009*	3.20±1.20	P:0.50	13.08±1.94	P:0.18	9.50±1.39	P:0.59
Marital status:								
Single	4.27±1.27	T:4.06	2.54±1.12	T:3.79	12.27±1.48	T:1.37	8.63±0.80	T:5.97
Married	5.17±1.25	P:0.051	3.37±1.23	P:0.054	13.13±2.26	P:0.24	9.75±1.43	P:0.01*
Level of education	5.0±0.0				14.0±0.0		10.0±0.0	
Prima education	5.05±1.51	F:0.11	4.0±0.0	F:0.29	13.27±1.93	F:0.49	9.50±1.04	F:0.08
Secondary education	4.82±1.13	P:0.95	3.22±1.16	P:0.82	12.52±2.15	P:0.69	9.41±1.66	P:0.96
University	4.75±1.50		3.11±1.49		12.50±3.00		9.25±1.89	
Postgraduate			2.75±0.50					
Occupation:								
Working	4.09±0.70	F:7.13	2.54±1.03	F:3.79	11.72±0.78	F:5.26	8.72±0.90	F:4.96
Non-working /housewife	5.24±1.35	P:0.01*	3.37±1.26	P:0.06	13.34±2.27	P:0.02*	9.72±1.43	P:0.03*
Residence:								
Urban	5.18±1.29	t:1.02	3.31±1.24	t:0.88	13.31±2.25	t:1.99	9.68±1.58	T:1.40
Rural	4.61±1.28	P:0.17	2.94±1.25	P:0.35	12.38±1.81	P:0.16	9.16±1.04	P:0.24
Duration of illness:			2.78±0.80		11.92±1.20		9.07±0.91	
1to 3 years	4.28±0.82	F: 2.97	2.86±1.24	F:4.73	12.53±1.88	F:5.37	9.26±1.03	F:4.24
4 to 6years	4.93±1.57	P:0.04*	3.42±1.13	P:0.007*	14.14±1.95	P:0.004*	9.42±1.71	P:0.01*
7 to 9 years	5.57±1.13		5.00±1.41		15.5±3.00		11.50±1.91	
> 9 years	6.00±.081							

SD: Standard deviation **t: Student t-test** **F: "One-Way ANOVA test"**
: Statistically significant at p ≤ 0.05** *: Highly statistically significant at p ≤ 0.001**

Discussion

Sleep disturbance and fatigue are widespread in MS patients. Complementary treatments are commonly used to treat people with MS and BRT is a form of them. So, the aim of the study was to evaluate the effect of BRT on sleep quality and fatigue for patients with MS.

In respect of demographic aspects, the present study displayed that the mean of the patients' age was 32.57±8.04 and the majority of them were females. In this regard a study conducted by **Walton et al., (2020**) they stated that the mean age of patient who diagnosed with MS is 32 years. The incidence of females was twice than males.

According to the current study's findings, nearly three-quarters 72.5% of the patients were married and nearly half of them was graduates from secondary school and one- third had high levels of education. Nearly three-quarters of them were not working and housewives. The findings matched with **Ibrahim et al., (2020**), who found that half of the sample was married and had either secondary or higher education, with the majority of the sample being housewives.

Regarding type of MS, more than half of the studied patients had relapsing- remitting multiple sclerosis (RRMS) with an average mean of MS duration was 5.15 ± 3.08 years and mean age at onset of MS was 28.12±7.74 years. This finding was corresponded with **Zakaria et al., (2016)** who showed that the average disease duration in the MS population were 5.7±5.3 years with three- quarters of study patients having RRMS.

The present study findings demonstrated that a statistically significant decrease in fatigue means scores after practice of BRT when compared to before practice of BRT by the end of the 8th week, indicating that practice of BRT may contribute to decreasing the severity of fatigue. These findings are in line with a study by **Mirhosseini et al., (2019**) who concluded that BRT significantly lowered the mean of fatigue value and its influence on general activity, moods, usual work, interacting with others, walking ability, and satisfaction of life in MS patients.

This result was also congruent with **Nazari et al., (2016)** who claimed that the relaxation technique in eight sessions in 40 minutes two times a week caused a significant difference in fatigue for MS patients. some researchers believe that muscles relaxation produces hormones and substances inside the body, which causes physiological effects, such as enhanced circulation in the feet and hands and reduction in fatigue severity **Seifi, et al., (2018); Solehati, & Rustina, (2015).**

Many studies had found that the BRT effectively reduces fatigue caused by many chronic conditions, including cardiovascular diseases **(Seifi, et al., 2018)** and renal failure **Mahdavi, et al., (2013).** In the same direction, a study done by **Dayapoglu, & Tan, (2012)** they found that slow progression muscle relaxation techniques are effective in decreasing fatigue in MS patients.

The current study showed that after practice of BRT, the mean of all subscales of MFIS which included physiological, cognitive, and psychosocial subscales decreased significantly after the practice of BRT. This implies that the negative influence of fatigue on global aspect of the human that statistically significant reduced after the practice of BRT. This is in the same with a previous study by **Mirhosseini, et al., (2019)**, who reported that BRT significantly reduced the average of fatigue severity for patients with MS and added that the BRT was shown to be a cost-effective, safe, and common alternative therapy for reducing fatigue in MS patients.

The present study demonstrated that a significant difference between the overall sleep quality and all sleep subscales after practice of BRT was found when compared to before practice of BRT by the end of the 8th week. This indicates that the practice of BRT may contribute to improving sleep quality. The results were similar to the findings of (**Masry, et al., 2017)** they found that improvement of sleep quality in the study group after implementation of BRT. Also, **Elsayed et al., (2019)** who revealed a significant improvement of sleep quality with the end-stage renal disease after using the Benson relaxation approach. From the point of researchers view, this positive effect of BRT on improving patients

sleep quality may be explained as the relaxation technique mechanism works in physical and psychological manner revealing that both the mind and body are involved in the process of calming down, which leads to improving sleep quality.

The current study revealed that a statistically significant correlation between mean fatigue score and mean sleep index score. This could be explained by the fact that patients with increase fatigue have more naps and disturbed sleep, that could be linked to a cytokine-related etiology, as confirmed in pervious study by **Liu, et al., (2012).** These results were in agreement with **Dayapoglu, & Tan, (2012)** who reported positively significant correlation between mean score of the severity of fatigue and the mean score of quality of sleep after the implementation of progressive relaxation technique in patients with MS. This finding was supported also by **Stanton, et al., (2006),** who detected a positive relation between sleep disturbance and fatigue in MS patients.

The present study added that a significant relation between age, sex, occupation, illness duration, and fatigue severity. This result is in agreement with **Kamkar & Maghsoudlou, (2018)** who found a significant relation between age, marital status, working and fatigue severity.

Moreover, the current study found a significant association between age, marital status, occupation and duration of illness and the average mean of the sleep quality index before and after practice of BRT. These findings are corresponding with **Elsayed et al., (2019**) who found a statistically significant relation between socio-demographic variables and sleep quality index. Finally, following data analysis and discussion, the study hypotheses were proven.

Conclusion

This study concluded that practicing of BRT by MS patients was effective in improving their fatigue and sleep quality. Additionally, there was a statistically significant positive correlation between the fatigue severity scores and sleep quality scores before and after the practice of Benson relaxation technique

Recommendations

Based on the results of this study the next recommendations are suggested:

- Further studies should be done to evaluate the long-term effect of this technique in large sample of MS patients from various geographic regions to help in greater generalization of the findings.
- Applying BRT to therapeutic routine management of MS patients. This technique is a useful and cost-effective complementary therapy to improve sleep quality and fatigue.

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References

Amtmann, D., Bamer, A. M., Kim, J., Chung, H., & Salem, R. (2018). People with multiple sclerosis report significantly worse symptoms and health related quality of life than the US general population as measured by PROMIS and NeuroQoL outcome measures. *Disability and health journal*, *11*(1), 99-107.

Archer, S. N., Laing, E. E., Moller-Levet, C. S., van der Veen, D. R., Bucca, G., Lazar, A. S., ... & Dijk, D. J. (2014). Mistimed sleep disrupts circadian regulation of the human transcriptome. *Proceedings of the National Academy of Sciences*, *111*(6), E682-E691.

Archer, S. N., Laing, E. E., Möller-Levet, C. S., van der Veen, D. R., Bucca, G., Lazar, A. S., ... & Dijk, D. J. (2014). Mistimed sleep disrupts circadian regulation of the human transcriptome. Proceedings of the National Academy of Sciences, 111(6), E682-E691.

Asaad, T., Kahla, A. (2009). Sleep problems and diagnosis. Egypt: Dar Eirtak for Printing, Publishing and Distribution Co., 169-383-977, p 22-25.

Boe Lunde, H. M., Aae, T. F., Indrevåg, W., Aarseth, J., Bjorvatn, B., Myhr, K. M., & Bo, L. (2012). Poor sleep in patients

with multiple sclerosis. *PloS one*, *7*(11), e49996.

Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry research*, *28*(2), 193-213.

Cehelyk, E. K., Harvey, D. Y., Grubb, M. L., Jalel, R., El-Sibai, M. S., Markowitz, C. E., ... & Chahin, S. (2019). Uncovering the association between fatigue and fatigability in multiple sclerosis using cognitive control. *Multiple sclerosis and related disorders*, *27*, 269-275.

Dayapoglu, N., & Tan, M. (2012). Evaluation of the effect of progressive relaxation exercises on fatigue and sleep quality in patients with multiple sclerosis. *The Journal of Alternative and Complementary Medicine*, *18*(10), 983-987.

Elsayed, E. B. M., Radwan, E. H. M., Elashri, N. I. E. A., & El-Gilany, A. H. (2019). The effect of Benson's relaxation technique on anxiety, depression and sleep quality of elderly patients undergoing hemodialysis. *International Journal of Nursing Didactics*, *9*(02), 23-31.

El-Tallawy, H. N., Farghaly, W. M., Badry, R., Metwally, N. A., Shehata, G. A., Rageh, T. A., ... & Kandil, M. R. (2016). Prevalence of multiple sclerosis in Al Quseir city, Red Sea governorate, Egypt. *Neuropsychiatric disease and treatment*, *12*, 155.

Fisk, J. D., Pontefract, A., Ritvo, P. G., Archibald, C. J., & Murray, T. J. (1994). The impact of fatigue on patients with multiple sclerosis. *Canadian Journal of Neurological Sciences*, *21*(1), 9-14.

Garland, S. N., Scurrey, S. R., & Ploughman, M. (2017). Factors associated with poor sleep in older adults with multiple sclerosis. *International journal of behavioral medicine*, *24*(6), 937-945.

Gilmour, H., Ramage-Morin, P. L., & Wong, S. L. (2018). Multiple sclerosis: Prevalence and impact. *Health reports*, *29*(1), 3-8.

Hughes, A. J., Dunn, K. M., & Chaffee, T. (2018). Sleep disturbance and cognitive dysfunction in multiple sclerosis: a systematic review. *Current neurology and neuroscience reports*, *18*(1), 1-9.

Ibrahim, F. A., Sebaee, A., Ahmed, H., El Deen, D. S., & Shalaby, N. M. (2020). Effect of Acupressure Pain and Fatigue among Patients with Multiple Sclerosis. *Indian Journal of Public Health Research & Development*, *11*(3).

Kaminska, J., Koper, O. M., Piechal, K., & Kemona, H. (2017). Multiple sclerosis-etiology and diagnostic potential. *Postepy higieny i medycyny doswiadczalnej (Online)*, *71*, 551-563.

Kamkar, M. Z., & Maghsoudlou, A. (2018). The effect of progressive muscle relaxation technique on the quality of sleep and fatigue in patients with multiple sclerosis. *Nursing And Midwifery Journal*, *15*(12), 911-920.

Kiani, F., Zadeh, M. A. H., & Shahrakipour, M. (2017). The effect of Benson's relaxation method on hemodialysis patients' anxiety. *Biomedical Research (India)*, *28*(3), 1075-1080.

Krupp, L. B., LaRocca, N. G., Muir-Nash, J., & Steinberg, A. D. (1989). The fatigue severity scale: application to patients with multiple sclerosis and systemic lupus erythematosus. *Archives of neurology*, *46*(10), 1121-1123.

Łabuz-Roszak, B., Kubicka-Bączyk, K., Pierzchała, K., Machowska-Majchrzak, A., & Skrzypek, M. (2012). Fatigue and its association with sleep disorders, depressive symptoms and anxiety in patients with multiple sclerosis. *Neurologia i neurochirurgia polska*, *46*(4), 309-317.

Langeskov-Christensen, M., Bisson, E. J., Finlayson, M. L., & Dalgas, U. (2017). Potential pathophysiological pathways that can explain the positive effects of exercise on fatigue in multiple sclerosis: a scoping review. *Journal of the neurological sciences*, *373*, 307-320.

Liu, L., Rissling, M., Natarajan, L., Fiorentino, L., Mills, P. J., Dimsdale, J. E., ... & Ancoli-Israel, S. (2012). The longitudinal relationship between fatigue and sleep in breast cancer patients undergoing chemotherapy. *Sleep*, *35*(2), 237-245.

Mahdavi, A., Gorji, M. A. H., Gorji, A. M. H., Yazdani, J., & Ardebil, M. D. (2013). Implementing benson's relaxation training in hemodialysis patients: Changes in perceived stress, anxiety, and depression. *North American journal of medical sciences*, *5*(9), 536.

Masry, S. E., Aldoushy, E. E., & Ahmed, N. A. E. M. (2017). Effect of Benson's Relaxation Technique on Night Pain and Sleep Quality among Adults and Elderly Patients Undergoing Joints Replacement Surgery. *Int J Nurs Didactics*, *7*(4), 1-8.

Mirhosseini, S., Mohammadi, A., Rezaei, M., & Mirbagher Ajorpaz, N. (2019). The effect of Benson relaxation technique on the fatigue severity of patients with MS. *Journal of Client-Centered Nursing Care*, *5*(3), 175-182.

Nazari, F., Soheili, M., Hosseini, S., & Shaygannejad, V. (2016). A comparison of the effects of reflexology and relaxation on pain in women with multiple sclerosis. *Journal of Complementary and Integrative Medicine*, *13*(1), 65-71.

Newland, P., Lorenz, R. A., Smith, J. M., Dean, E., Newland, J., & Cavazos, P. (2019). The relationship among multiple sclerosis–related symptoms, sleep quality, and sleep hygiene behaviors. *Journal of Neuroscience Nursing*, *51*(1), 37-42.

Rambod, M., Pourali-Mohammadi, N., Pasyar, N., Rafii, F., & Sharif, F. (2013). The effect of Benson's relaxation technique on the quality of sleep of Iranian hemodialysis patients: a randomized trial. *Complementary therapies in medicine*, *21*(6), 577-584.

Sakkas, G. K., Giannaki, C. D., Karatzaferi, C., & Manconi, M. (2019). Sleep abnormalities in multiple sclerosis. *Current treatment options in neurology*, *21*(1), 1-12.

Seifi, L., Najafi Ghezeljeh, T., & Haghani, H. (2018). Comparison of the effects of Benson muscle relaxation and nature sounds on the fatigue in patients with heart failure. *Holistic Nursing Practice*, *32*(1), 27-34.

Serafini, B., Zandee, S., Rosicarelli, B., Scorsi, E., Veroni, C., Larochelle, C., ... & Aloisi, F. (2018). Epstein-Barr virus-associated immune reconstitution inflammatory syndrome as possible cause of fulminant multiple sclerosis relapse after natalizumab interruption. *Journal of neuroimmunology*, *319*, 9-12.

Solehati, T., & Rustina, Y. (2015). Benson relaxation technique in reducing pain intensity in women after cesarean section. *Anesthesiology and pain medicine*, *5*(3).

Stanton, B. R., Barnes, F., & Silber, E. (2006). Sleep and fatigue in multiple sclerosis. *Multiple Sclerosis Journal*, *12*(4), 481-486.

Vitkova, M., Gdovinova, Z., Rosenberger, J., Szilasiova, J., Mikula, P., Stewart, R. E., ... & van Dijk, J. P. (2018). Is poor sleep quality associated with greater disability in patients with multiple sclerosis? *Behavioral sleep medicine*, *16*(2), 106-116.

Walton, C., King, R., Rechtman, L., Kaye, W., Leray, E., Marrie, R. A., ... & Baneke, P. (2020). Rising prevalence of multiple sclerosis worldwide: Insights from the Atlas of MS. *Multiple Sclerosis Journal*, *26*(14), 1816-1821.

Zakaria, M., Zamzam, D. A., Hafeez, M. A. A., Swelam, M. S., Khater, S. S., Fahmy, M. F., ... & Gadallah, M. (2016). Clinical characteristics of patients with multiple sclerosis enrolled in a new registry in Egypt. *Multiple Sclerosis and Related Disorders*, *10*, 30-35.