

EFFECT OF ENERGY CONSERVATION INSTRUCTIONS ON FATIGUE AND SELF CARE PRACTICES AMONG PATIENTS WITH MULTIPLE SCLEROSIS

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Abstract

Multiple Sclerosis (MS) is a chronic progressive inflammatory disease of the Central Nervous System (CNS) and represents the major cause of non-traumatic disability in young adults. Fatigue is one of the most frequent complaints in patients with multiple sclerosis (MS), with a significant impact on the self-care. Energy conservation strategies are one of the key interventions for fatigue management in multiple sclerosis. **Aim:** This study aimed to evaluate the effect of energy conservation instructions on fatigue and self-care practices among patients with multiple sclerosis. **Design:** A quasi-experimental research design (pre/post-test control group design) was used to achieve the aim of the study. **Hypotheses:** **H₁:** Post total mean score of fatigue degree among patients who receive instructions about energy conservation strategies will be lower than the post total mean score of fatigue degree among patients who receive routine hospital care among patients with multiple sclerosis. **H₂:** Post total mean score of self-care practices among patients who receive instructions about energy conservation will be higher than the post total mean score of self-care practices among patients who receive routine hospital care among patients with multiple sclerosis. **Sample:** A convenient sample of female adult patients divided randomly into energy conservation and control groups for not less than 60 patients, 30 patients assigned for each group. **Data collection tools:** Three tools were used to collect data: (1) Personal and Medical Data Form (PMDF), (2) Global Fatigue Index (GFI), (3) Appraisal of Self-care Agency Revised (ASA-R). **Results:** There was a statistically significant difference in the mean score of fatigue as well as self-care agency among the study group that received energy conservation sessions when compared with the control group that received routine hospital care. **Conclusion:** Energy conservation strategies could be effective in decreasing fatigue level and increasing the capacity for self-care agency. **Recommendations:** The energy conservation instructions should be applied for the patients with MS in the early course of the disease to have a maximum benefit.

Keywords: Energy Conservation, Fatigue, Self-Care, Multiple Sclerosis.

INTRODUCTION

Multiple sclerosis (MS) is a chronic autoimmune, inflammatory, and neurodegenerative disease that affects the central nervous system (CNS). Multiple sclerosis is a long term,

unpredictable, incurable, demyelinating disease of the central nervous system, leading to significant impairment, health burden and disability (Wendebourg, et al., 2024). Fatigue is one of the most frequent complaints in patients with multiple sclerosis (MS). Fatigue is described as an unpleasant, troublesome, and burdensome symptom, contributing to irritability, poor motivation, attention, memory, and a decline in social and physical function (Tarasiuk et al., 2022). It has been reported that the prevalence of increased fatigue among MS patients affects daily tasks, mobility, and quality of life; especially, it has been expected that this chronic condition will live its whole lifespan.

Self-care deficit is another problem reported by MS patients. Self-care is defined by the World Health Organization (WHO) as “the capacity of individuals, families and communities to promote health, prevent disease, maintain health, and deal with diseases and disabilities with or without support from a health care provider” (Dehghani, Pourfarid, & Hojat, 2023). Studies confirm the high prevalence of self-care deficit in patients with multiple sclerosis. Thus, more attention should be paid to find the appropriate approach in care delivery across multiple disciplines to reduce fatigue to the furthest extent possible and improve self-care.

Although multiple sclerosis is an irreversible disease with unpredictable progression, therapeutic interventions are required to manage the symptoms and improve patients' quality of life. Medications are not fully effective in symptom control for patients with MS and thus complementary and alternative therapies may be recommended to be used for such patients to help control and treat their symptoms (Arji et al., 2022).

Non-pharmacological interventions for MS fatigue include a number of different interventions, such as mindfulness, yoga, tai chi, cognitive behavioral therapy, energy conservation and massage (Lotfi, Chigr, & Najimi, 2023). Energy conservation strategies refer to a set of daily behaviors individuals perform to manage a chronic illness and associated symptoms through conserving energy that might reduce fatigue and consequently improve self-care activities (Wang, Chang, & Plow, 2022).

Energy conservation involves implementing daily strategies by prioritizing tasks, adopting effective body positions, and arranging the household to minimize energy expenditures during daily activities. Energy conservation strategies are noninvasive, painless, and simple to learn, and free of adverse effects. Additionally, it is cost-effective and increases the quality of life and sense of control that patients have over their condition. Therefore, involving patients in their care plan is a forward-thinking approach that empowers them to recognize their strengths and reduce the severity of their symptoms (Mohamed Eldesoky, & Elesawy, 2025).

Significance of the Study

Multiple sclerosis (MS) is an immune-mediated disease of the central nervous system and one of the leading causes of neurological disability in young adults. The prevalence of MS has increased globally from 1960 to date with rising prevalence recorded in all regions of the world. Data from the twentieth century, from several geographical areas, show increased incidence of MS (Maunula, et al., 2025). The number of people with

multiple sclerosis has increased from 2.3 million in 2013 to 2.8 million in 2020 and 2.9 million in 2023 (Alhazmi, 2023). The increasing prevalence of MS has also been reported across the Middle East and North African region. In Egypt, there is 59,671 people are living with MS and this equates to 1 in every 1500 people (Yamout, Assaad, Tamim, Mrabet, & Goueider, 2020; Zeineddine, Al-Hajje, & Ismail, 2023).

In general, Multiple sclerosis tends to affect females more than males, with an estimated 3:1 female-to-male ratio globally (Dobson & Giovannoni, 2019). In Egypt, this ratio was estimated at approximately 3:1 woman to men ratio and it remains a leading cause of neurological disability in young adults in developed countries. Multiple sclerosis is one of the leading causes of non-traumatic disability in young adults in the age group between 20-40 years (Gaballah, Salah El-Deen, & Hebeshy, 2023).

Fatigue affects up to 80% patients with multiple sclerosis and is often considered as its most disabling symptom (Panagopoulou, Artemiadis, Chrousos, Darviri, & Anagnostouli, 2022). Fatigue that may lead to limitations of self-care activities is multidimensional and can be managed using multiple approaches, including pharmacological therapies and non-pharmacological therapies.

From the clinical experience, the researcher observed that MS patients suffered from fatigue as their disabling symptom, limited abilities to self-care independently; also, patients expressed verbally their needs to maintain self-care and return to normal activities. On the other hand, there are a scanty number of researches that either assesses fatigue and self-care or interventions to improve such symptoms among MS patients in Egypt. So, it is hoped that this study results will add to the nursing body of knowledge, improve nursing practice, open a new gate for other researches to be used for other patients to reduce fatigue, improve self-care that may lead to decrease length of hospital stay and clinical consequences on patient and health care system.

MATERIALS AND METHODS

Aim of the Study

The aim of this study is to evaluate the effect of energy conservation instructions on fatigue and self-care practices among patients with multiple sclerosis.

Research Hypotheses

To achieve the aim of this study the following research hypotheses are formulated:

- H₁:** Post total mean score of fatigue degree in patients who receive instructions about energy conservation strategies is lower than the post total mean score of fatigue degree in patients who receive routine hospital care among patients with multiple sclerosis.
- H₂:** Post total mean score of self-care practices in patients who receive instructions about energy conservation is higher than the post total mean score of self-care practices in patients who receive routine hospital care among patients with multiple sclerosis.

Research Design

A quasi-experimental design (pre/posttest control group) was used to achieve the aim of the current study.

Setting

This study was conducted at Neurology department, at Kasr EL-Aini Hospital-affiliated to Cairo University.

Sample

A convenient sample of female adult patients divided randomly into energy conservation and control groups for not less than 60 patients, 30 patients assigned for each group. The inclusion criteria were (a) patients who were diagnosed as having RRMS with disease duration 3-5 Years, (b) able to communicate, (c) have mild and moderate fatigue as measured by GFI, (d) not in the exacerbation phase. Exclusion criteria encompassed (a) patients with any musculoskeletal conditions such as osteoporosis, osteoarthritis, muscle spasticity and joint stiffness; (b) patients with vision problems, (c) patients with any psychiatric disorder and/or history of addiction.

Data Collection Tools

Data of the current study was collected using three tools. Both English and Arabic versions were validated for content by a panel of experts from the Medical-Surgical Nursing Department, Faculty of Nursing, Cairo University.

- 1) Personal and Medical Data Form (PMDF):** developed by the researcher and consists of two parts: **Part I:** Personal data which covers items related to age, gender, and marital status, level of education, occupation and residence. **Part II:** Medical data pertinent to Body Mass Index, Chronic Disease, .etc.
- 2) Global Fatigue Index (GFI):** it was adopted from Piper et al., (1989). It assesses the level of fatigue and the degree to which fatigue has interfered with activity of daily living. The GFI consists of 15 items with total score ranges from 4 to 50 with higher scores indicating greater impairment from fatigue. Scoring of the GFI involves: (a) the total sum of the first three items had score as (one) not at all to (ten) a great deal with the total score ranges from three to 30, (b) the mean of items from four to 14 rated on a Likert scale ranges from one (not at all) to ten (a great deal) with total score ranges from one to ten, (c) Item number 15 asks how often one has fatigue and it is rated from zero (no days) to ten (every day) with total score ranged from zero to ten. This tool has reported excellent reliability (Cronbach's alpha of .93) (Bormann, Shively, Smith & Gifford, 2001).
- 3) Appraisal of Self-care Agency Revised (ASA-R):** is adopted tool, based on Dorothea Orem's Self-Care Deficit Theory and evaluates a human being's ability to perform the practices in the care of oneself, in the relation between the individual and the environment; It is a Likert-type scale with 15 items with five different options as follows; one is I totally disagree, two is I disagree, three is I do not know, four is I agree and

five is I totally agree with three possible outcomes names as: "Having capacity for self-care (items 1, 2, 3, 5, 6 and 10); Developing capacity for self-care (items 7, 8, 9, 12 and 13), and Lacking capacity for self-care (items 4, 11, 14 and 15). The possible interval for the total measure ranges from 15 to 75 points and the higher the values the higher the self-care capacity (Oliveira- Kumakura et al., 2019). The reliability of ASA-R was documented using Cronbach's alpha, which showed 0.86 (Sousa et al., 2010).

Ethical Consideration

Primary approval to conduct the proposed study was obtained from the Research and Ethics Committee of Faculty of Nursing, Cairo University. Also, an official permission was obtained from hospital administrators to conduct the study. Each patient was informed about the nature, purpose of the study and the designed intervention. They were informed also that participation in the study is completely voluntary. Additionally, anonymity and confidentiality were assured through coding the data. Moreover, participants were informed that the data will not be reused in another research without their permission and they signed a consent form.

Procedure

Once official permission was granted from Research Ethics Committee at Faculty of Nursing Cairo University, an official permission was obtained from hospital administrators to proceed with the proposed study, the researchers started to collect the data through three phases: **Preparatory, implementation and evaluation phase.**

Preparatory Phase: During this phase, the study sample that met the inclusion criteria were interviewed individually in the neurology department to explain the nature and purpose of the current study, then the researcher obtained written consent from the patients who agreed to participate in the study; the researcher collected the baseline data using the Personal and Medical Data Form (tool I) followed by (tool II) Global Fatigue Index to assess the degree of fatigue, and the degree of self-care was assessed using (tool III) Appraisal of Self-care Agency Revised. Participants recruited were divided into two groups as the first 30 patients represented the control group who received routine hospital care only. The second 30 patients constituted the study group who received instructions regarding energy conservation strategies. This technique of groups is used in order to avoid contamination.

Implementation phase: In this phase the patient in control group received only routine hospital care. As regard study group, patients received energy conservation instructions through three teaching sessions over one week every other day as follows: the first session in the initial interview included (a) Balancing work and rest throughout the day; and (b) Life style modifications to reduce energy expenditures, the second session included (c) Proper body mechanics and using the body efficiently; and (d) Set priorities as do the most important thing first. While the third session was related to (e) Using assistive devices to conserve energy such as walker, wheel chair; and (f) Modification of the environment (Blikman et al., 2017; El Fadeel, & Salah El-Deen, 2020).

Each patient in the study group was followed up by telephone to ensure the compliance. Also, each patient was handed in an illustrative Arabic handout with figures that designed by the researcher after extensive literature/researches review. This Arabic handout included information related to the importance of energy conservation strategies and its technique for study group and those who didn't comply with the intervention dropped out from the study.

Evaluation phase: It was conducted after intervention for both groups three times at the end of the second, fourth & sixth week consecutively according to literature/ researches review (Blikman et al., 2017; Fateh, Askary-Kachooosangy, Shirzad, Akbarzadeh-Baghban, & Fatehi, 2022) using GFI and ASA-R (tool II, III).

Statistical Design:

The collected data were scored, tabulated and analyzed by personal computer using statistical package for the social science (SPSS) program version 25. Descriptive as well as inferential statistics were utilized to analyze data pertinent the study. Descriptive statistics including frequency, distribution, means, and standard deviation were utilized. Inferential statistics as independent t- test was used to compare means between results of the study and control groups, as well as chi square test was used to compare qualitative variables between the study and control groups. Level of significance was adopted at $p \leq 0.05$.

RESULT

Table 1: Frequency and Percentage Distribution of Personal Data among Study and Control Groups (N=60) (30/Each)

	Study group (n=30)		Control group (n=30)		Type of Test	P
	No.	%	No.	%		
Age					t .053	.958
18<30	8	26.7	9	30.0		
30<40	15	50.0	13	43.3		
40<50	7	23.3	8	26.7		
Mean + SD	34.5+7.71		34.6+6.8			
Marital status					X ² .067	0.795
Married	17	56.7	16	53.3		
Not married	13	43.3	14	46.7		
Level of education					X ² 2.286	0.683
Can` t read and write	2	6.7	1	3.3		
Read and write	3	10.0	4	13.3		
Primary school	6	20.0	6	20.0		
Secondary	5	16.7	9	30.0		
Bachelor	14	46.7	10	33.3		

*Result is significant at P-value ≤ 0.05 .

It's clear from table (1) that (50%) of the study groups and (43.3%) of the control group had age ranged from 30 to less than 40 years, with mean age of patients in the study group and control group was (34.5±7.71) and (34.6±6.8) years respectively. Regarding marital status, (56.7%) of the study group and (53.3%) of the control group were married. In relation to level of education (46.7%) of the study group and (33.3%) of the control group had bachelor degree. Additionally, there was no statistically significant difference between study group and control group in relation to mentioned demographic variables ($P>0.05$).

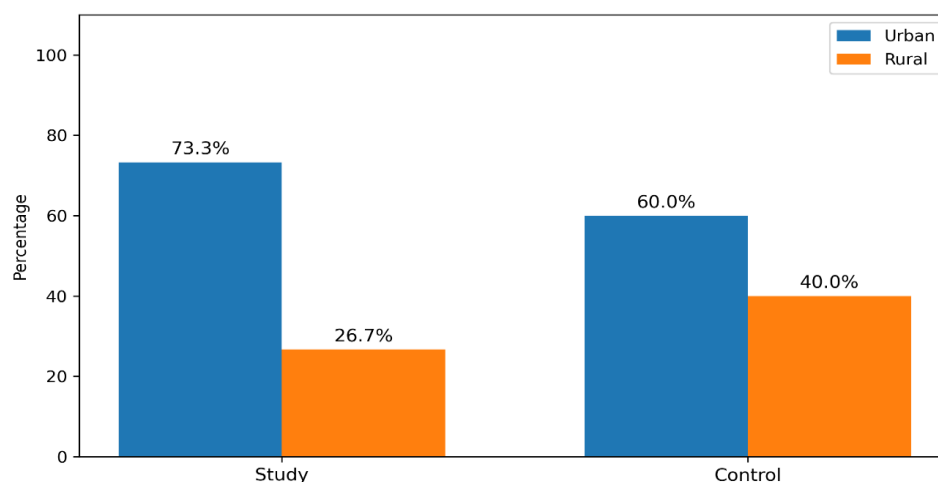


Figure 1: Percentage Distribution Regarding Place of Residence among Study and Control Groups (N=60) (30/Each)

In relation to place of residence, 73.3% and 60% of the study groups were from urban areas. Finally, there was no statistically significant difference between study and control groups in relation to place of residence ($X^2 = 1.2$, P - value=0.273)

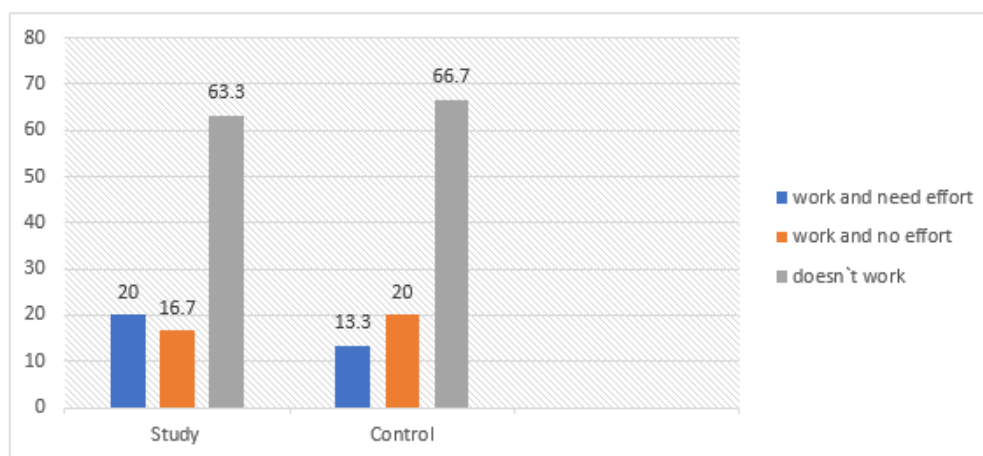


Figure 2: Percentage Distribution Regarding Work Status among Study and Control Groups (N=60) (30/Each)

In relation to work status, there was no statistically significant difference in relation to work status between study and control groups ($X^2 = 0.517$, P- value=0.772).

Frequency and Percentage Distribution of Medical Related Data among Study and Control Groups (N=60) (30/each).

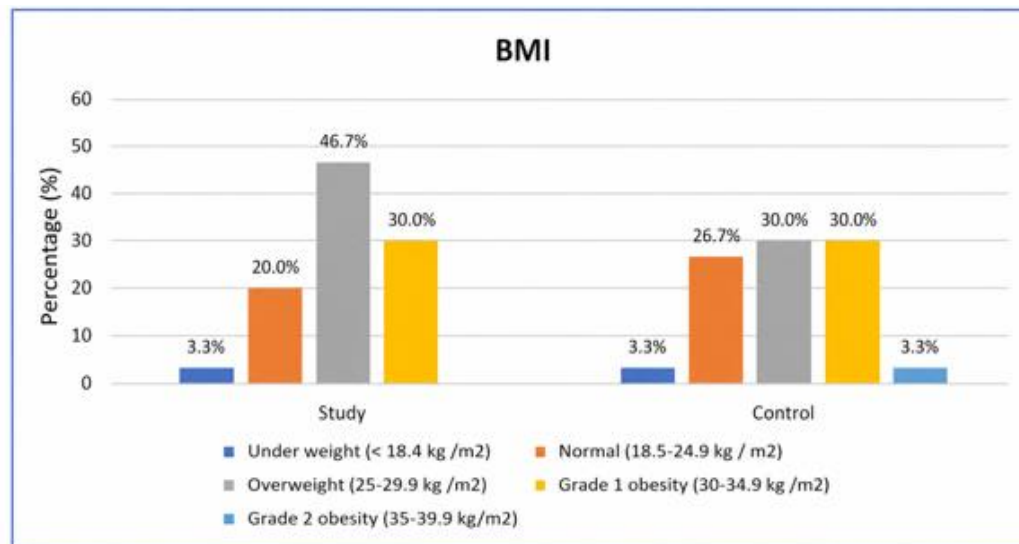


Figure 3: Frequency and Percentage Distribution of Body Mass Index (BMI) Among Study and Control Groups (N=60) (30/Each)

Figure (3) revealed that (46.7%) of the study group and (30%) of the control group were over-weight, while (20%) of the study group and (26.7%) of the control group were normal.

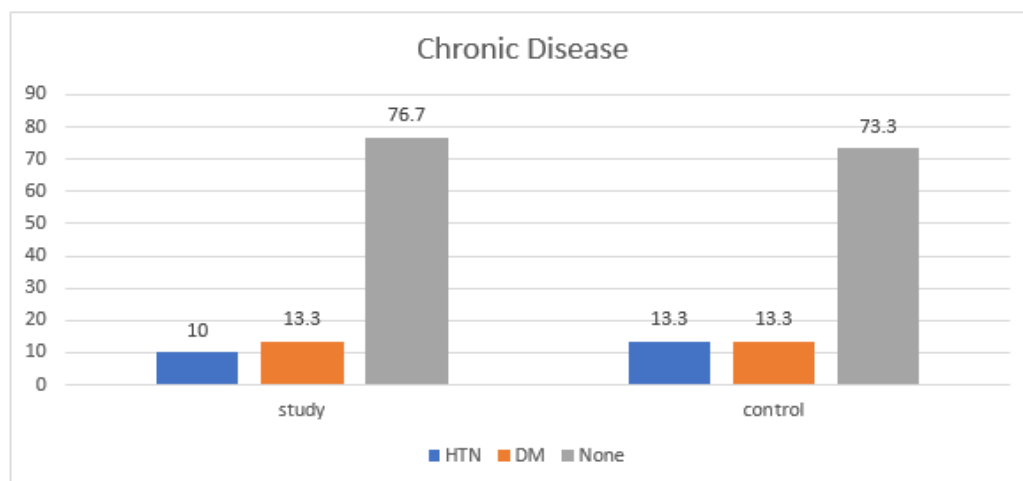


Figure 4: Frequency and Percentage Distribution of Chronic Disease among Study and Control Groups (N=60) (30/Each)

In relation to chronic illness, Figure (4) illustrated that (76, 7%) of the study group and (73.3%) of the control group had no chronic illness history. Moreover, there was no

statistically significant difference between study and control groups in relation to mentioned medical variables.

Section (II): Comparison between Study and Control Groups in relation to total mean scores of Fatigue and Self-care along the study period

Table 2: Comparison of Fatigue Total Mean Scores between Study Group and Control Group along the Study Period (N=60) (30/Each)

Study period	Mean $\pm$ SD	t-test	P-value
Base line			
Study group	31.85 $\pm$ 0.471	.505	.617
Control group	31.28 $\pm$ 1.019		
At the end of 2 nd week			
Study group	23.13 $\pm$ 4.84	4.828	.000*
Control group	30.31 $\pm$ 6.55		
At the end of 4 th week			
Study group	18.88 $\pm$ 6.99	6.522	.000*
Control group	29.83 $\pm$ 6.70		
At the end of 6 th week			
Study group	15.81 $\pm$ 7.40	7.138	.000*
Control group	29.16 $\pm$ 7.07		

*Result is significant at $p \leq 0.05$.

Table (2) revealed that at the base line reading, there was no statistically significant difference between study and control groups ($t=0.505$, $p=0.617$) in relation to total mean scores of fatigue. While, there was statistically significant difference between study and control groups after two weeks of energy conservation instructions sessions ($t=4.828$, $p=0.000$), after four weeks ($t=6.522$, $p=0.000$) and at six weeks ($t=7.738$, $p=0.000$).

Table 3: Comparison of Self-Care Agency Total Mean Scores between Study and Control Groups Along the Study Period (N=60) (30/Each)

Study period	Mean $\pm$ SD	t-test	P-value
Base line			
Study group	40.76 $\pm$ 3.60	1.570	.122
Control group	42.03 $\pm$ 2.55		
At the end of 2 nd week			
Study group	48.00 $\pm$ 4.06	4.44	.000*
Control group	43.36 $\pm$ 4.01		
At the end of 4 th week			
Study group	50.83 $\pm$ 4.93	5.69	.000*
Control group	43.80 $\pm$ 4.61		
At the end of 6 th week			
Study group	53.66 $\pm$ 5.41	6.99	.000*
Control group	44.03 $\pm$ 5.25		

*Result is significant at $p \leq 0.05$.

Table (3) revealed that at the base line reading, there was no statistically significant difference between study and control groups ($t=1.570$, $p=0.122$) in relation to total mean

scores of self-care agency. While, there was statistically significant difference between study and control groups after two weeks of energy conservation instructions sessions ($t=4.44$, $p=0.000$), after four weeks ($t=5.69$, $p=0.000$) and at six weeks ($t=6.99$, $p=0.000$).

DISCUSSION

A discussion on the current study findings is presented in the following sequences: (a) participants' demographic and medical related information and (b) the effectiveness of energy conservation instructions on fatigue level and self-care agency practices.

Regarding the sample characteristics of the study participants, the findings showed no statistically significant differences between the study and control groups in relation to demographic data as well as medical related information, so homogeneity along the current research was maintained. The current study revealed that most patients' age was between 18 and less than 40 years, with mean age of 34 ± 7.22 years for the study sample. The majority of the study participants were educated while more than half not working. Additionally, the findings indicated that more than two third of the study participants were from urban areas, half of the study participants were married. As well as more than two third of the study participants had no chronic illness. Whereas more than one third of the study participants were overweight.

These findings were congruent with Qomi, Rakhshan, Ebrahimi Monfared, & Khademian, (2023) who conducted a study entitled "The effect of distance nurse-led fatigue management on fatigue, sleep quality, and self-efficacy in patients with multiple sclerosis: a quasi-experimental study" and found that most of the study sample aged from 21 to 40 years, married, with no chronic disease. Furthermore, these findings is matched with the study of Yeni, Tulek, & Terzi, (2022), who conducted a study entitled "Effect of self-acupressure on fatigue in patients with multiple sclerosis", found that most of the study patients were not working, educated.

The effectiveness of energy conservation strategies on fatigue level and self-care practices

In relation to fatigue level, the current study revealed that the study and control groups had moderate fatigue at the baseline observation. Regarding the control group, the highest percentage reported moderate fatigue level along the study period. However, among the study group, the level of fatigue decreased after implementing energy conservation instructions. Additionally, the total mean score of fatigue among the study group, which received energy conservation sessions, showed a significant decrease compared to the control group that received routine hospital care by the end of the second week, fourth week and sixth week of intervention. Therefore, the study results support the first research hypothesis.

This finding supports the effectiveness of using energy conservation strategies to reduce level of fatigue among patients with MS. This result could be interpreted in the light of the fact that energy conservation strategies provide adequate time to rest and sleep that help to reduce fatigue, and also energy conservation strategies afford instructions regarding

avoiding unnecessary motions, as well as using proper body mechanics that may lead to performing self-care practices with minimal effort. Moreover, energy conservation strategies enhance usage of assistive devices that reduce wastage and losses of energy.

This study finding is similar to Yalçın, Tulek, & Kürtüncü, (2025), Who reported a significant reduction in the level of fatigue among MS patients who implemented energy conservation strategies in a study entitled “Effect of a nurse-led online patient support program on fatigue, sleep and quality of life in patients with multiple sclerosis”. Furthermore, a study conducted by Qomi, Rakhshan, Ebrahimi Monfared, & Khademian, (2023), entitled “The effect of distance nurse-led fatigue management on fatigue, sleep quality, and self-efficacy in patients with multiple sclerosis” and reported that energy management education among participants with MS is effective in reducing fatigue, and this supported the current study findings.

Additionally, Evidence from the randomized controlled trial “The effect of energy conservation strategies on fatigue, function, and quality of life in adults with motor neuron disease: Randomized controlled trial” Supports the effectiveness of energy conservation in reducing fatigue (Fateh, Askary-Kachoosangy, Shirzad, Akbarzadeh-Baghban, & Fatehi, 2022). Moreover, A systematic review and meta-analysis conducted by Wendebourg et al., (2024), entitled “Education for fatigue management in people with multiple sclerosis”, reported significant improvement in fatigue levels after implementing energy conservation strategies.

With reference to self-care practices, the current study evidenced that approximately the vast majority of both study and control groups reported moderate self-care agency at the base line reading. Interestingly, at the end of the sixth week after applying energy conservation strategies, most of the study group had high self-care agency, whereas most of the control group still had moderate self-care agency. Additionally, the total mean scores of self-care agency among the study group, which received energy conservation sessions, showed a significant increase compared to the control group that received routine hospital care by the end of the second, fourth week and sixth week of intervention. Therefore, the study results support the second research hypothesis.

This finding could be interpreted as that patients who applied energy conservation strategies were encouraged to learn how to schedule their tasks around their energy levels. Moreover, they learned to take short breaks; these short breaks allowed their mind to rest before focusing again. Moreover, energy conservation strategies reduce fatigue, which in turn encourage participation in self-care practices. The current study findings are congruent with the studies of Mohamed Eldesoky, & Elesawy, (2025) and El Fadeel, & Salah El-Deen, (2020), which reported significant improvement in practicing daily activities as well as self-care practices after implementing energy conservation instructions.

Overall, energy conservation strategies are easily applied, self-administered, cost-effective, safe, and effective in reducing fatigue as well as promoting the engagement in self-care practices. They help the patient to live independently and increase the level of

self-confidence, which in turn, encourages behavioral changes that can improve participation in self-care practices.

CONCLUSION

The results of the current study conclude that practicing energy conservation strategies could be effective in reducing the level of fatigue as well as improving the engagement in self-care practices among patients with MS. Moreover, the study results support the two research hypotheses.

Recommendation

As the energy conservation strategies had a significant effect on patient's fatigue as well as promoting self-care, so the following recommendations were concluded:

- 1) It is suggested to apply the energy conservation strategies for the patients with MS in the early course of the disease, so that the patients have a maximum benefit.
- 2) Replication of the study should be done on a larger probability sample selected from different geographical areas in Egypt to obtain more generalized result.
- 3) Further studies may be needed to determine the stability of the effect of the energy conservation strategies on the different medical diagnoses that are associated with fatigue and impairment in practicing self-care.

Nursing implication

The current study highlights the importance of applying energy conservation strategies for patients with MS, as the strategies reduce fatigue and promote self-care practices. Therefore, the nurses would have a pivotal role in implementing such strategies that might lead to decreased length of hospital stay, reduced risk of complications, and enhanced positive clinical consequences on patient and health care system. Moreover, this study might provide a practice framework for the future development of other nursing evidence-based practice in that regard.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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