Brief Report

Improvement in Activity of Daily Living and Fatigue in Multiple Sclerosis Patients: the Impact of Nutrition Education

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Abstract

Background: Fatigue is one of the most common complications of Multiple Sclerosis (MS). However, a few studies are available on the effect of nutrition education on fatigue and Activities of Daily Living (ADL) in patients with MS.
Objectives: This study aimed to assess the effect of nutrition education on fatigue and ability to perform ADL in patients with MS.
Methods: This quasi-experimental one group, pretest and posttest study was performed on 40 patients with MS, who were conveniently recruited among patients, registered at the Iranian MS Society. Data were collected through a demographic questionnaire, the Fatigue Severity Scale (FSS), a standard ADL scale, and a 24-hour food recall for two days. The instruments were completed at the start and two months after the intervention. Descriptive statistics and paired t test were used to analyze the data.
Results: Sixty percent of the patients had severe fatigue before the intervention while, 90% of them reported mild fatigue after the intervention. The mean posttest ADL was increased by 12.45 units after the intervention when compared with the pretest value (P<0.001). Moreover, the daily intake of vitamin D and E, calcium and omega3 were lower than 75% of the Dietary Reference Intake (DRI) in most of the patients.
Conclusions: The present study showed the beneficial effects of nutritional training on fatigue and ADL in patients with MS. Therefore, nurses and dietitians should regularly assess the patients' dietary pattern and train them and their families about appropriate diet.

Keywords: Quality of Life, Fatigue, Multiple Sclerosis, Nutrition Education

1. Background

Multiple Sclerosis (MS) is the most common disabling disease in young adults, which results from an inflammatory demyelinating process in the central nervous system. In Iran, its prevalence ranges from 5.3 to 74.28 per 100 000 people in different regions (1). Fatigue is one of the most common complications of MS that affect about one third of patients. About 20-60 percent of the patients refer to this problem as the most disturbing symptom of the disease (2, 3). Fatigue deeply affects other aspects of one's life. Decreased physical activity would influence the patients' mood, social interactions, and recreational activities (3). Nurses have a critical role in evaluation of fatigue and physical ability in patients with MS. Thus, they can design appropriate training strategies and non-pharmacological approaches to reduce fatigue and other side effects of the disease that consequently would not only improve the patients' quality of life, but also would enhance their independence in performing their Activities of Daily Living (ADL) (2, 4).

It has been shown that a diet containing omega 3 and 6 can decrease fatigue in patients with MS (5). Thus, a health promotion education program focusing on appropriate diet might be effective on decreasing fatigue and improving the patients' ability to perform their ADL (6).

Currently, a few studies are available about the effect of nutrition education on fatigue, and ability to perform ADL in patients with MS.

2. Objectives

This study aimed to assess the effect of nutrition education on fatigue and ability to perform ADL in patient with MS.

3. Methods

This quasi-experimental, one-group, pre-test and post-test study was performed on patients with MS, who were registered at the Iranian MS society. Inclusion criteria included having a definite diagnosis of MS for at least one year, being in the remission phase (i.e. relative stabilization of symptoms) so that they can follow the study, complaining of fatigue as the main symptom, and willingness to participate in the study. The exclusion criteria were: having other co-morbidities such as diabetes, hypertension and thyroid disorders, refusal to follow the diet, absence from one of the training sessions, and MS flare-up. Moreover, those who used opiates during the study and patients, who decided to leave the study, were excluded.

The sample size was calculated based on a previous study in which the effect of a training program on the ADL of patients with MS was investigated. The mean scores of fatigue were 6.25 ± 2.18 and 3.45 ± 1.70 in pre- and post-intervention, respectively ([4]). Then, through utilizing the respective formula, the sample size was estimated at 33 with $\alpha = 0.05$ and $\beta = 0.10$, ρ = the minimum correlation coefficient for the data before and after the constant 0.3, and effect size $= (\mu_1 - \mu_2) / \sigma = 0.66$.

$$n \geq 2 \frac{\left(Z_{\frac{\alpha}{2}} + Z_\beta \right)^2 \sigma^2}{(\mu_1 - \mu_2)^2} (1 - \rho) \qquad (1)$$

However, 46 samples were selected to compensate the possible dropout. Afterwards, 46 patients with the inclusion criteria were recruited through a non-randomized convenience sampling method. However, six patients left the study due to MS flare-up or withdrawal and the final analysis was performed on the 40 remaining patients.

The research instrument consisted of four parts including a demographic questionnaire, the Fatigue Severity Scale (FSS), a standard ADL scale, and a 24-hour food recall for two days. The FSS is a self-report instrument and contains nine items with seven-point Likert scale assessing the physical aspects of fatigue and their impact on the patient's daily function in a variety of medical and neurologic disorders. The minimum and maximum score of the scale were 9 and 63, which was categorized to: 9-27 as severe fatigue, 28-46 as moderate, and 47-63 as mild ([7]). The higher the score, the lower the fatigue severity. This instrument was translated to Farsi language by Azimian et al., and demonstrated appropriate validity and reliability (Cronbach's alpha = 0.96) ([7]).

The Barthel index of ADL ([8]), measures functional disability by quantifying patient's performance in 10 activities of daily life. A five-point increment is used in scoring, with a maximum of 100 indicating an absolute independence

and a minimum of 0 that represents a totally dependent and bedridden state. A score between 81 and 100 indicates that a patient is fully independent. However, scores of 61 - 80, 41 - 60, and 0 - 40 indicate relatively independent, relatively dependent, and fully dependent states, respectively. This instrument was translated to Farsi language by Oveisgharan et al., and demonstrated appropriate validity and reliability (Cronbach's alpha = 0.93) ([9]). Dietary intake was defined as the comparison of energy and nutrient intakes to Dietary Reference Intake (DRI) ([10]).

The intervention was performed in the forms of counseling and group education on healthy diet with six 2-hour sessions during 12 weeks. All sessions were facilitated by an expert nutritionist. Ten patients were in each group. The outline of the educational sessions was prepared based on the food-based dietary guidelines for Iran ([11]) and healthy eating habits (Table 1). At the end of the sixth session, all patients were provided a pamphlet on a healthy diet that summarized the contents of the training sessions. All questionnaires were completed before the first session and two months after the intervention.

3.1. Ethical Considerations

The study was approved by the institutional review board and the research ethics committee of Shahid Beheshti University of Medical Sciences (ethical code: 3643). The researcher explained the objectives to the patients and all participants signed a written informed consent before participation. The questionnaires were anonymous and all of the participants were assured about the confidentiality of their personal information and that they were free to leave the study at any time.

3.2. Data Analysis

The data distribution was checked using the Kolmogorov-Smirnov test. Descriptive statistics were calculated. Paired t test was used to compare the mean pretest and posttest scores of fatigue and ADL. The level of statistical significance was set at $P < 0.05$. All statistical analyses were performed using the statistical package for social sciences, version 13 (SPSS, Chicago, IL).

4. Results

The mean age of the participants was 35.8 ± 1.5 years, 52.5% of them were married and 65% were female. Most of the participants (62.5%) had university degrees and 82.5% were unemployed or housewives. The onset of MS symptoms was two to four years ago in 40% of the participants.

Before the intervention, the mean energy and protein intake were respectively 1682.63 ± 647.10 kcal and $67.21 \pm$

Table 1. Outline of the Education Sessions

Session	Content
Session 1	Greeting, introducing the sessions' facilitator, discussion about the nature of MS, routinely used medications, skills needed for using health resources, nutrition and diet in MS, physical activity and fatigue in MS.
Session 2	Discussions, questions, and answers on "food groups, exchange food lists, calculation foods calorie". Problem solving and decision making skills, keeping independence through the food sciences.
Session 3	Discussions on "food-based dietary guidelines", question and answers on emotions such as depression and fatigue and dependency in physical activity.
Session 4	Education, discussion and question and answers on "macro and micro nutrients: carbohydrate, protein, fat, vitamins and minerals".
Session 5	Education and discussion on: how to become prepared for daily hassles and daily living activities; education about body mass index calculation, overweightness and obesity.
Session 6	Education about the role of complementary treatment (i.e. healthy dietary pattern) in MS. discussion and question and answers on using the lessons learned in nutrition training sessions.

29.80 gr, and were lower than the DRI. The total daily carbohydrate and protein intake were 57% and 16%, respectively, that were lower than the recommended level. The mean fat intake was 50.15 ± 22.0 gr/day that included 27% of the total daily energy intake. Moreover, the daily intake of vitamin D and E, calcium and omega 3 were lower than 75% DRI in most of the patients.

Sixty percent of the patients had severe fatigue before the intervention while, and 90% of reported mild fatigue after the intervention. The mean posttest fatigue was increased by 10.70 units when compared with the pretest (P < 0.001). The mean posttest ADL was also increased by 12.45 units after the intervention when compared with the pretest value (P < 0.001) (Table 2).

5. Discussion

The present study showed that nutritional education could significantly decrease fatigue severity and increase the mean ADL scores in patients with MS.

Some of the previous studies implemented a number of non-pharmacological interventions to decrease the symptoms of patients with MS (5, 12, 13). However, the lack of dietary interventions is obvious in patients with MS. Among the few available studies, Leong et al., showed that an appropriate diet containing low fat with essential fatty acids, vitamin D, and free sugar can not only improve the general health and well-being, but also alleviated symptoms such as muscle weakness, fatigue, urinary problems, and mobility in patients with MS (5). Another study also reported that a diet containing vitamin B12 and iron supplements could decrease neurological and motor disorders as well as psychological symptoms such as depression and fatigue in patients with MS (14). According to Van Rensburg et al., conserving energy, and empowering the patients to participate in their care are the primary purpose of dietary programs in patients with MS (14). The present study also

showed that an appropriate dietary training would be effective in decreasing fatigue and improving the ability to perform ADLs in these patients. In this study, a majority of patients reported fatigue and sensory disorders as the most disabling symptoms of MS. Although MS has a variety of clinical manifestations, sensory disorders in the hands and feet are common due to neuronal demyelization (15). A previous study also reported that fatigue is the most disabling symptom affecting patient's ADLs and cognitive functions and disrupting their social and family life (16). At the start of this study, the patients neither followed a certain diet nor had appropriate food habits. This problem might be attributed to the patients' low nutrition knowledge. Therefore, nurses and dietitians should not only assess the patients' dietary pattern, but should also train them and their families about appropriate diet and its effect on their fatigue and functional abilities. As the fat intake of our patients was greater than the recommended DRI, patients with MS should be recommended to use limited fat and higher complex carbohydrates and protein with high biological value.

The present study showed the beneficial effects of nutritional training on fatigue and ADL in patients with MS. However, this study was a one-group non randomized trial with a relatively short follow up. Assessing the effects of long-term, randomized controlled nutritional interventions on the fatigue and ADLs of patients with MS is recommended.

Given the beneficial results of the intervention, nurses and dietitians should regularly assess the patients' dietary pattern and train them and their families about appropriate diet.

Acknowledgments

Table 2. Levels of Fatigue and Activities of Daily Living Score Before and After the Educational Program[a]

Time of Measurement	Fatigue				Ability to Do Activities of Daily Living				
	Mild	Moderate	Sever	Mean $\pm$ SD	Absolutely Independent	Relatively Independent	Absolutely Dependent	Relatively Dependent	Mean $\pm$ SD
Before the intervention	4 (10)	12 (30)	24 (60)	14.90 $\pm$ 0.77	5 (12.5)	9 (22.5)	23 (57.5)	3 (7.5)	48.0 $\pm$ 20.11
After the intervention	36 (90)	4 (10)	0	25.60 $\pm$ 0.44	12 (30)	22 (55)	5 (12.5)	1 (2.5)	60.91 $\pm$ 1.63
P value (paired t test)				< 0.001					< 0.001

[a] All of the data are presented as n (%) or Mean $\pm$ SD.

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