Effect of Nursing Intervention on Fatigue for Multiple Sclerosis Patients

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Abstract

Background Fatigue is one of the more frequent symptoms of multiple sclerosis and could adversely effect on patients general health status. **Aim:** Evaluate the effect of nursing intervention on fatigue for multiple sclerosis patients. **Design** A quasi-experimental design was utilized. **Setting** The study was carried out in the neurological department) at El Demerdash hospital. **Subjects** A convenience sample of available patients within 6 months of about 144 patients involved. **Tools Three** tools were used for data collection; first tool: patients' socio-demographic and health status characteristics; knowledge questionnaire and patient-reported fatigue self-care practices questionnaire second tool: Fatigue Severity Scale. 3rd tool: Modified Fatigue Impact Scale. **Results:** The multiple sclerosis patients' means ± SD scores in all knowledge items were improved after fatigue nursing intervention. Also, a highly statistically significant improvement in all items of reported pre and post fatigue intervention practices (p-value < 0.001). There was a statistically significant strong direct correlation between total scores of pre and post knowledge and reported self-care practices of fatigue nursing interventions (p <0.001). Significant improvement in the reported multiple sclerosis patients' fatigue severity scores means level in the post-test than that of the pre-test, P < 0.001. **Conclusion** Implementation of nursing intervention could improve fatigue and decrease its severity with improved the patients' knowledge and fatigue nursing intervention reported practices. Also, there was noticed statistically significant strong positive correlation between total scores of pre-and post-knowledge and with total scores of pre- and post-reported practices of fatigue nursing intervention. **Recommendations** Implementation of fatigue nursing intervention for every patient with Multiple sclerosis to equip them with the knowledge essential to undertake fatigue intervention and achieve long-lasting control of fatigue. Conducting health educational programs and campaigns to raise the multiple sclerosis patients' awareness about the disease and fatigue intervention practices.

Keywords Multiple sclerosis, Fatigue & Nursing intervention

Introduction

Multiple sclerosis, a chronic progressive inflammatory degenerative disease of the central nervous system (CNS), where the immune system fights itself (an autoimmune disorder), leading to the destruction of myelin sheaths (demyelination) and axonal damage of the (CNS) causing long-term disability especially among young adult [(1)]. Recently, the prevalence of MS has been changing dramatically worldwide. Based on the scientific epidemiological studies the global prevalence of MS is estimated to be more than 2.3 million; as well as more than 400,000 patients in the United State of America (USA) are affected [(2)]. As well as requires considerable time and enormous financial resources to achieve the rehabilitation targets. Some studies have reported that the causes of the disease are not exactly known, but there are genetic and environmental factors such as vitamin D deficiency, Epstein-Barr virus, and Herpes virus infections that activate T cells and lead to myelin sheaths [(3)]. There are many types of MS, differing based on the advancement and deterioration of the disease. They include the Relapsing-remitting form multiple sclerosis (RRMS), primary progressive MS (PPMS), secondary progressive MS (SPMS), clinically isolated syndrome, and radiological isolated syndrome. The McDonald diagnostic criteria state that the diagnosis of MS depends on clinical presentation, imaging, and presence of dissemination in space, as well as time, by either clinical or imaging features to rule out other diagnoses [(4)].

Multiple Sclerosis is mostly diagnosed among patients in their twenty and thirty years old, although it can develop at any age. Also, studies have concluded that the MS symptoms include physical disability, and commonly experience fatigue (75–90%), gait imbalance and weakness (30.8%), bowel and bladder dysfunction, visual disturbances and optic neuritis symptoms (20.1%), cognitive dysfunction, sexual dysfunction, pain, and depression; and these symptoms result in a substantial negative impact on health status, limitations in daily activities, restrictions in participation in work life and leisure activities as well as causing different health related problems [(5)]. Additionally, fatigue is the greatest usually recounted symptom amongst peoples with MS, upsetting 75–95% of patients. The original mechanisms are unidentified and maybe several: more than 30 primary and secondary pathological fatigue pathways were recognized [(6,7)].

The absolute cause of fatigue in MS is still unidentified, nevertheless, it is hypothesized that MS-related fatigue may result from centrally mediated processes characterized by MS itself, such as demyelination and axonal loss in the CNS or immune actions (Primary fatigue) or from MS-related complications (trigeminal neuralgia, spasms, psychological issues, etc.), musculoskeletal problems (pain, posture, gait anomalies), sleep problems, and medications (Secondary fatigue) that ultimately associated with limited workability and with worse of general health status [(8)]..Fatigue is often harshly restricting a patient's work, family, and social life. Clinically, patients with MS report fatigue as exhaustion, lack of energy, increased sleepiness or worsening of symptoms, and weakness exacerbated by activity and heat [(9,10)].

Fatigue affects MS general health status in multidimensional spheres (10). Fatigue may affect physical and cognitive function, psychosocial state. Several studies have illustrated that the health status is worse in patients with MS as contrasted with healthy controls with a higher prevalence of depression and fatigue. Fatigue is primary the main contributing factor of poor health status of MS patients [(11,12)]. Hence, the crucial role of nurse includes the nursing interventions that aim to both modify and control the patient's illness by supporting patient self-care practices through helping the patient to cope with fatigue symptom ; promoting safe, best function; and supporting a wellness- and modify health related problems. Nurses can suggest behavioral changes such as conditioning programs, exercise, and improved nutrition. Patients can be referred to an occupational therapist, which can teach them about and help them implement energy-conservation techniques [(4)].

So, nurses can play a valuable role in fatigue nursing intervention by taking the time to assess patients' fatigue and its effects on general health of MS patients, and developing nursing interventions, . Although a variety of nursing intervention options are available for MS-related fatigue, no single option has emerged as the best. Therefore, further research on the treatment and nursing interventions of this symptom in the MS population is needed [(5)].

Significance of the study

The Multiple sclerosis is a silent disease that begins and affects hearing and speech, 59.671 the number of MS patients in Egypt in addition to, 59 patients to every 100,000 citizens the disease incidence rate, 75% from the total number of patients females and 26 years the mean age of incidence rate in Egypt [(13)]. From

the actual clinical observation the fatigue problem affecting about 80% of patients with Multiple sclerosis and is considered as one of the most recurrent problems of (MS), and it can affects their general health status. As it can interfere whether the physical state as well psychosocial and cognitive health of MS patients [14]. Therefore, nurses must regularly assess fatigue in their patients with MS. A variety of nursing intervention are available for MS-related fatigue, and patients and their support systems must be made aware that fatigue can be managed [15,16].

Aim of the stud

This study aim to evaluate the effect of nursing intervention on fatigue for multiple sclerosis patients through the following objectives:

1- Assess the patients' knowledge about MS and fatigue reported intervention practices.
2- Assess the fatigue severity and its related health problems (physical, cognitive, and psycho-social health status).
3- Plan and implement MS nursing intervention about fatigue based on patients' needs.
4- Evaluate the effectiveness of nursing intervention on fatigue for MS patients.

Research hypothesis

H1: Fatigue nursing intervention has a positive effect on (MS) patient's knowledge and fatigue reported intervention practices.

H2: Fatigue severity will be modified after implementing fatigue nursing intervention.

H3: Fatigue nursing intervention will improve general health status (physical, cognitive, and psychological status) of MS patients.

Subjects and methods

Research design

A quasi-experimental research design was utilized to meet the aim of the study.

The setting of the study

This study was conducted at the neurological department (MS Day Care Unit) at El Demerdash hospital affiliated with Ain Shams University. The MS unit is located on the second floor of the neurology department in the internal medicine building which consists of one room with 8 chairs capacity they work every day from Saturday to Wednesday except on Thursday and Friday of every week from 9 am to 5 pm daily.

Sample

A convenience sample of available patients within 6 months. Based on the flow rate obtained from the MS Day Care Unit

information system within the period of data collection time the total population =225 and according to Solvin's formula for sample size calculation the required sample was 144 members [17].

$$n = \frac{N}{1 + N(e)^2} = 144\ patients$$

Where:

- n= Corrected sample size.
- N = Population size.
- e = Margin of error, and e = 0.05 based on the research condition.

Tools for data collection

Three tools were used for data collection. **First tool**: Developed by the researchers after strength review of the relevant literature **National Center for Biotechnology Information (NCBI)** & **European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS)** [18,19]. It designed In the Arabic language based on related literature, it was divided into three parts; **Part I** patients' socio-demographic characteristics and health status; asked about as age, gender, education level, marital status, present job, family member no., rooms no., Residence & Monthly family income, duration of MS and the types of MS.

Part II knowledge questionnaire sheet to assess patients' knowledge regarding MS and fatigue it includes 10 questions about the definition of MS, signs & symptoms of MS, MS diagnosed, the causes, risky age group, MS complications, meaning of fatigue associated with MS, and types and how the MS patient deal with the feeling of fatigue and exhaustion associated with multiple sclerosis.

Scoring system

Knowledge obtained from studied patients was checked with a model answer and scored as the following: Complete correct answer takes "three", while the incomplete answer takes "two" And a wrong answer or don't know takes "one". The Patients' knowledge total score 30 grads & converted into percentage and construed as follows:

- Good >70% with scores ranged from 21-30 marks.
- Fair 60 - 70% with scores ranged from 18-21 marks.
- Poor < 60% with score ranged from 1-17 marks.

Part III Patient-reported fatigue intervention practice questionnaire developed by the researchers after reviewing the relevant literature **National Center for**

Biotechnology Information (NCBI) & **Karatepea etal** [18,20]. Used to assess patients' reported practices regarding fatigue nursing intervention. It is composed of 25 items that are divided into four domains; healthy diet, regular resting &sleeping, physical exercises, and things avoided for MS patients.

Scoring system

This part was rated on a three-point rating scale of performance "always" grade three, "sometimes" grade two, "rarely" grade one. The total score of this part was 75 grades. The higher scores indicated higher practice levels. They were categorized as: scores equal to or more than 60 % were considered as satisfactory practice level and scores lower than 60 % were considered as unsatisfactory practice level.

Second tool Fatigue Severity Scale (FSS): standardized scale adopted from **Amtmann, etal** [21] It is a self-reported scale & consists of a 9-item scale that measures the severity of fatigue and how much it affects the person's activities and lifestyle in patients with a variety of disorders especially among MS patients. Administration time is less than 5 mints.

Scoring system Answers are scored on a seven-point scale where 1 = strongly disagree and 7 = strongly agree. This means the minimum score possible is nine and the highest is 63. Higher the score=greater fatigue severity. The more common way of scoring: mean of all the scores with minimum score being 1 and the maximum score being 7. Mean (SD) FSS scores for healthy individuals; 2.3 (0.7). A cut-off score of 4 or more is considered indicative of problematic fatigue.

Third tool Modified Fatigue Impact Scale (MFIS) Adopted from **D'Souza,** [22], developed by The Consortium of Multiple Sclerosis Research Centers. It is a short version of the 21-items. The MFIS 5 measures fatigue effect on general health status through its effect on cognitive, physical, and psychosocial function considered by some authors to be three important sub-scales in patients with MS. It is a self-administered questionnaire and begins with introductory statements about how fatigue can affect a person's health status. Patients were asked to circle the one number (from a 5-point Liker scoring system) that best indicates how often fatigue has affected them during the past 4 weeks. The scale ascends from 'never', 'rarely', 'sometimes', 'often' and 'almost always' each scored 0–4, respectively.

Scoring system Items on the MFIS can be aggregated into three sub scales (physical, cognitive, and psycho-social), as well as into a total MFIS score. All items are scaled so that higher scores indicate a greater effect of fatigue on a person's health status. **Physical Sub scale** This scale can range from 0 to 36. It is computed by adding raw scores on the following items: 4+6+7+10+13+14+17+20+21. **Cognitive Sub scale** This scale can range from 0 to 40. It is computed by adding raw scores on the following in items 1+2+3+5+11+12+15+16+18+19. **Psycho-social Sub scale** This scale can range from 0 to 8. It is computed by adding raw scores on the following items: 8+9. **Total MFIS Score:** The total MFIS score can range from 0 to 84. It is computed by adding scores on the physical, cognitive, and psycho-social sub-scales

II. Operational Design

a- Preparatory phase

This phase comprised reviewing past and currently available literature and the different studies related to fatigue nursing intervention for MS Patients using text, articles, magazines, and the internet to get a clear picture of the research problem and develop the study tools for data collection.

Validity of tools

The study tools were tested for validity through the judgments of 5 experts in Community Health Nursing and Adult Health Nursing (two professors in Community Health Nursing & three professors in Adult Care Health Nursing).

Reliability of the tools

The reliability test for the present study tools was established by using Cronbach's alpha which showed good internal consistency and good reliability as follows: Knowledge part (Cronbach's alpha = 0.980) and practice part =0.948). Cronbach's alpha scores for the FSS were ranged between 0.8899 and 0.940. MFIS questionnaires the 21 and 5-item have a (Cronbach's alpha coefficient of 0.81 and 0.80), respectively.

Ethical considerations

Ethical approval was obtained from the Scientific, Ethical Committee of Nursing Faculty at Helwan University. Additionally, oral consent form regarding agreement from the participant in the study was taken after explaining the objective of the study to them. As well, they were assured that anonymity and confidentiality guaranteed and the right to withdraw from the study at any time.

b- Pilot study

A pilot study was done on 10% of the study sample about 14 patients to evaluate tools' clarity, applicability, and feasibility and to estimate the time needed for filling in the tools. The pilot study data were analyzed, and no modifications were done to the study tools. So, those who participated in the pilot study were included in the main study sample.

c- Fieldwork

The study was conducted within 6 months from the beginning of January to the end of June 2021. The researchers started by introducing themselves to the study members through personal and group interviews. The participants were informed about the aim of the study. Each participant was interviewed separately, and the answers were marked by the researchers, about 20-30 minutes was needed to complete the questionnaire.

After that, fatigue nursing intervention was implemented. Then, the initial data were collected from the studied patients. The results were analyzed statistically and manually prepared, and the package was implemented for them based on educational needs. After completion of the fatigue nursing intervention implementation, the evaluation of the studied members was carried out by using the same research tools. The researchers were presented in MS daycare unit room 2 days/week, Saturday & Monday from 9:00 Am to 2:00pm.

The application of the fatigue nursing intervention was carried out in four phases

Phase I Assessment phase The researchers first introduced themselves and explained the purpose of the study briefly to the MS patients. Every patient was met individually. The MS patients assured that the obtained information will be treated confidentially and used only for the study. The searchers read and explained each item of the study scales in front of the patient and recorded his/her responses to each item.

Phase II Planning phase It involved designing the topics, which were arranged according to the needs of the study participants and the general objective to increase knowledge and practices regarding fatigue with MS; this achieved through the implementing fatigue nursing intervention, this based on analysis of the actual needs in pre assessment by using the pre-test tools. The fatigue nursing intervention booklet was prepared by the researchers, in simple Arabic language. The content of the booklet

included data about: the definition, signs & symptoms of MS, diagnosis, the causes, risky age group, types, complications of MS. Additionally, the definition of fatigue associated with MS, types of fatigue as well as intervention reported practices that includes the following parts; healthy food, regular periods of rest, regular exercises and avoidant all these nursing intervention included to improve fatigue health-related problems among multiple sclerosis patients.

Phase III Implementation phase The fatigue nursing intervention designed by the researchers in simple Arabic language and sessions began with an orientation about the program and its objectives. The researchers arranged a suitable free time for the participants as the researchers were presented in MS day care unit room 2 days/week, Saturday & Monday from 9:00 Am to 2:00pm. Firstly, they introduced themselves to the participant and gave them a brief idea about the intervention topics. Every session took about 30-45 minutes. The total number of members was 144 the researchers divided them into 3 groups every group from 45-50 members. Fatigue nursing intervention was applied in one session for every group, covers the theoretical part, and another one session for every group for practical part. The teaching methods are designed and developed based on their assessment of educational needs and include lectures, group discussions, and role-play to perform healthy protective practices. The media was a booklet, pictures, PowerPoint presentation also, videos on the laptop screen.

Phase IV Evaluation phase It includes a post-test done after 3 months of the fatigue nursing intervention by using the same formats of the pre-test tools to assess the effect of nursing intervention on fatigue.

III. Administrative Design

The present study was carried out after taking official permission from the faculty of Nursing Dean to the administrator of the neurological department (MS Day Care Unit) at El Demerdash hospital affiliated to Ain Shams University to collect the data. As well, the aim and expected outcomes of the study were explained clearly.

Statistical Design

Data entry and statistical analysis were performed using personal computer software, the statistical package for social sciences (SPSS), version 20. Suitable descriptive statistics were used such as;

frequency, percentage, mean and standard deviation. A Chi-square test was used to detect the relation between the variables. Also, the correlation coefficient (r) test was used to estimate the closeness association between variables. A paired (t) test was used to compare the mean score between both studied variables. The p-value is the probability that an observed difference is due to chance and not a true difference. A significant level value was considered when the p-value ≤ 0.05 and a highly significant level value was considered when p-value ≤ 0.001, while p-value > 0.05 indicates non-significant results.

Results

Table (1) indicates that 50.1% of the MS patients age ranges from 31-40 years with the mean age 30.83 ± 7.039 and 65.9 % were females. Regarding their marital status, 58.3% were married, 23.6% single, and 12.5 were divorced. As well as 34.0% had secondary and university educated. Also, 18.1% were housewife, 16.7% were an employee and only 5.6% were retired. As well as 54.9% of them their place of residence was the urban. Concerning the crowding index, 68.8% of MS patients had one to two members per room, 50.0% of their family income was enough for only necessities. Relating the disease duration 49.3% had MS for 2-5 years with mean years ± SD 2.8 ± 2.0 and 63.2% of the studied patients had Relapsing-Remitting MS type.

According to the study hypothesis which confirmed MS patient's knowledge, fatigue intervention reported practices will be improved after implementation of nursing intervention; it will be discussed through the following parts of study results; tables (2,3,4,5,6) and figures (1&2).

Table (2) Illuminates that in the pre-test the huge margin of the MS patients' means ± SD in all knowledge items was very low which shown that they did not have any knowledge about MS and fatigue nursing intervention. After implementing nursing intervention, there were highly statistically significant improvements were observed in the MS patients' mean scores in all tested items of knowledge (P <0.000)

Figure (1) Presents that there was a marked improvement among MS patients' total score of knowledge pre and post fatigue nursing intervention. As well as the figure shows that 74.3% of the MS patients had poor knowledge pre- fatigue nursing intervention,

while 81.9% of them had good knowledge after the fatigue nursing intervention.

Table (3) Refines that there were a highly statistically significant improvement in all items of pre and post-reported intervention reported practices of fatigue nursing intervention (p-value = 0.000).

Figure (2) Describes that there was an obvious improvement among MS patients' total score of reported practices pre and post fatigue nursing intervention. As well as the figure shows that 91.7 % of the MS patients had unsatisfactory reported practices pre-fatigue nursing intervention , while 93.0% of them had satisfactorily reported practices post fatigue nursing intervention.

Table (4) Discloses that there were noticed statistically significant strong positive correlation between total scores of knowledge and total scores of reported pre and post fatigue nursing intervention($p < 0.001$).

Table (5) shows statistically significant improvement in the reported MS patients' FSS means scores in the post-test than that of the pre-test, $P < 0.001$.

Table (6) Confirms statistically significant improvement in the reported MS patients' MFIS means scores in all items in the post-test than that of the pre-fatigue nursing intervention, $P < 0.001$.

Table (1) Frequency Distribution of Multiple Sclerosis patients' Socio-demographic Characteristics & Health Status (No. =144)

Characteristics	No. (%)	Characteristics	No. (%)
Age		**Place of residence**	
- **≤ 20**	**10(6.9)**	- Rural	**65(45.1)**
- **21-30**	**52(36.1)**	- Urban	**79(54.9)**
- **31-40**	**72(50.1)**	**Crowding index**	
- **≥ 41**	**10 (6.9)**	- < 1	**15(10.4)**
Mean ± SD	**30.83 ± 7.039**	- 1-2	**99(68.8)**
Sex		- ≥ 3	**30(20.8)**
- **Male**	**62(43.1)**	**Family income**	
- **Female**	**82(65.9)**	- Not enough	**60(41.7)**
Marital status		- Enough only necessities	**72(50.0)**
- **Single**	**34(23.6)**	- Enough and saved	**12(8.3)**
- **Married**	**84(58.3)**	**Disease duration**	
- **Divorced**	**18(12.5)**	- ≤ 1 Year	**60(41.7)**
- **Widow**	**8(5.6)**	- 2-5 Years	**71(49.3)**
Educational level		- 6-10Years	**13(9.0)**
- **Primary**	**44(30.6)**	**Mean ± SD**	**2.8 ± 2.0**
- **Preparatory**	**32(22.2)**	**Multiple Sclerosis type**	
- **Secondary**	**34(34.0)**	- Relapsing Remitting MS	**91(63.2)**
- **University**	**34(34.0)**	- Primary Progressive MS	**41(28.5)**
Occupation		- Secondary Progressive MS	**12(8.3)**
- **Not worked**	**18(12.5)**		
- **Student**	**20(13.9)**		
- **Housewife**	**26(18.1)**		
- **Worker**	**10(6.9)**		
- **Free work**	**23(16.0)**		
- **Handwork**	**15(10.4)**		
- **Employee**	**24(16.7)**		
- **Retired (early)**	**8(5.6)**		

Table (2) Mean Scores and Standard Deviation for MS Patients' Knowledge about MS and Fatigue Pre, and Post- Nursing intervention (No. = 144).

Knowledge Items	Pre - nursing intervention Mean ± SD	Post -nursing intervention Mean ± SD	Paired t. test	P-value
Meaning of Multiple sclerosis	1.23±0.31	2.75±0.58	23.273	**0.000****
Causes of Multiple sclerosis	1.27± 0.56	2.36±0.76	13.569	**0.000****
Types of Multiple sclerosis	1.22±0.56	2.76±0.57	23.237	**0.000****
Age of MS onset	1.17±0.50	2.73±0.61	22.498	**0.000****
MS manifestation	1.18±0.51	2.74±0.60	16.970	**0.000****
MS diagnosis	1.20±0.54	2.74±0.59	23.329	**0.000****
Most common recurrent symptoms	1.22±0.55	2.47±0.72	17.291	**0.000****
Complication of MS	1.21±0.54	2.43±0.65	19.066	**0.000****
Concept of fatigue	1.21±0.54	2.51±0.66	20.160	**0.000****
Nursing intervention of fatigue	1.18±0.51	2/63±0.71	23.329	**0.000****
Total Scores= 30 degree	**12.11±4.92**	**26.13±5.59**	**22.73**	**0.000****

**Highly statistically significant at p≤0.001

Figure (1) Distribution of Total Scores of MS Patients' Knowledge Pre, and Post- Nursing intervention (No. = 144).

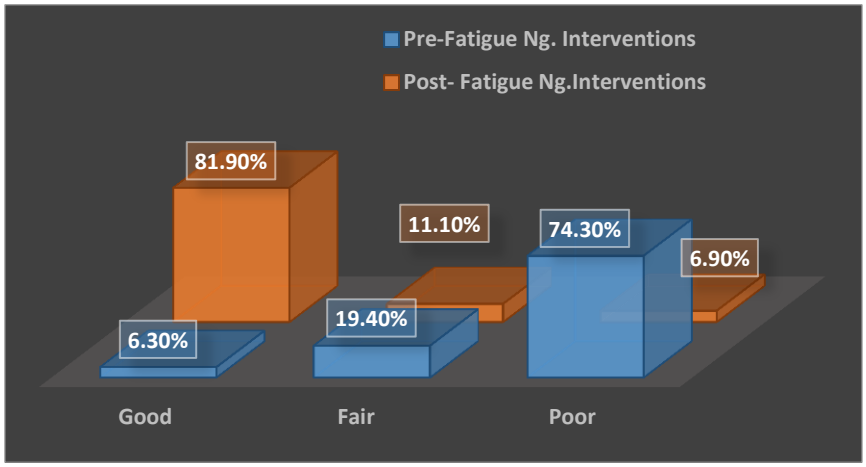

Table (3) Mean Scores and Standard Deviations of MS Patients' Reported Fatigue Practice Items Pre & Post -Fatigue Nursing intervention (No. = 144).

Fatigue Reported Practices	Pre-Intervention Mean ± SD	Post-Intervention Mean ± SD	Paired t. test	P-value
a-Healthy food				
- Drink adequate amount of water 2 liters	1.41±0.71	2.38±0.78	9.975	**0.000****
- Use oil obtained from plants and fish	1.36±0.68	2.09±0.83	8.015	**0.000****
- Drink cinnamon tea, ginger every day	1.36±0.70	2.23±0.81	9.263	**0.000****
- Drink fresh juices	1.31±0.67	2.31±0.77	11.563	**0.000****
- Avoids cola, Alcohol, cafe	1.46±0.67	2.30±0.79	9.307	**0.000****
- Eats 6 meals instead of 3	1.56±0.84	2.17±0.76	6.034	**0.000****
- Eat healthy food free from fats	1.55±0.83	2.35±0.84	7.548	**0.000****
- Eats a lot of vegetables and fruits	1.28±0.62	2.35±0.84	11.461	**0.000****
- Eats foods rich in vit. B	1.31±0.65	2.38±0.76	12.269	**0.000****
Eats foods rich in omega 3	1.27±0.59	2.32±0.78	12.386	**0.000****
b- Regular periods of rest and sleeping				
- Take adequate rest period during the day	1.28±0.62	2.48±0.73	16.014	**0.000****
- Sleep and get up early at a fixed time every day	1.33±0.66	2.49±0.63	15.061	**0.000****
- Sleep 8 hrs. daily	1.35±0.67	2.48±0.65	15.271	**0.000****
- Go to sleep and rest when feeling tired	1.27±0.59	2.68±0.70	19.045	**0.000****
- Take a warm shower before going to sleep	1.25±0.95	2.56±0.67	12.854	**0.000****
- Distribute activities throughout the day	1.36±0.71	2.38±0.84	10.831	**0.000****
- Go away from anything that triggers angry	1.27±0.62	2.26±0.70	12.509	**0.000****
- Plan activities and ask for help when need	1.31±0.66	2.63±0.63	18.344	**0.000****
c- Regular exercises				
- Perform simple exercises as walking 30 min daily	1.33±0.67	2.65±0.64	15.096	**0.000****
- perform exercises to strengthen the muscles	1.31±0.68	2.58±0.66	15.499	**0.000****
d- Avoidant				
- Avoids sugar and fats, chocolates	1.26±0.62	2.48±0.69	15.694	**0.000****
- Avoids milk products	1.29±0.64	2.29±0.94	11.345	**0.000****
- Avoids smoking	1.29±0.65	2.49±0.68	15.793	**0.000****
- Avoids salts	1.34±0.71	2.56±0.68	13.948	**0.000****
- Avoids sun exposure	1.31±0.68	2.78±0.66	18.111	**0.000****
Total score of reported practice	30.83±10.51	60.52±9.63	23.710	**0.000****

** Highly statistically significant at p-value <0.001

Figure (2) Distribution of Total Scores of MS Patients' Self-care Reported practices Pre, and Post-Fatigue Nursing intervention (No. = 144).

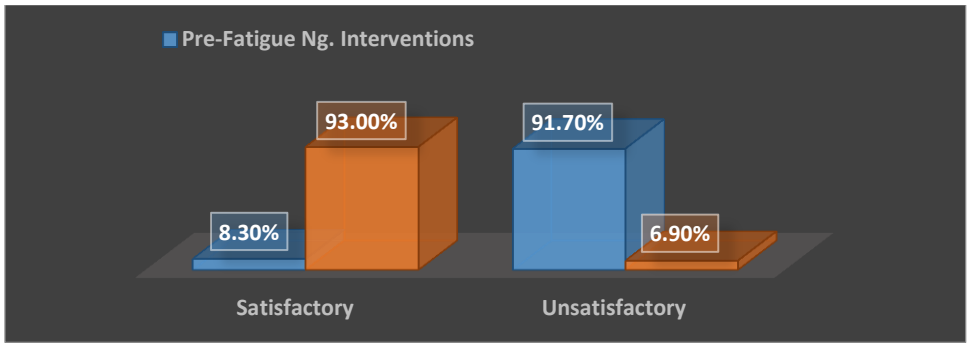

Table (4) Correlation between MS Patients' Total Scores of Knowledge and Reported Practice Items Pre and Post Fatigue Nursing intervention (No. = 144).

Items	Total scores of knowledge			
	Pre- Ng. Intervention		**Post-** Ng. Intervention	
	r	**P-value**	**r**	**P-value**
Reported Practices	**0.667**	**0.000****	**0.708**	**0.000****

*Correlation is significant at 0.001

Table (5) Mean Scores of Fatigue Severity Scale (FSS) of MS Patients Pre- and Post-Fatigue Nursing intervention (No. = 144)

Total FSS	Mean ± SD	Minimum / Maximum	Paired t. test	P-Value
Pre- Ng. intervention	47.17±11.14	22-63	22.348	**0.000****
Post- Ng. intervention	22.83±9.23	10-45		

** Highly statistically significant at p-value <0.001

Table (6) Mean Scores and Standard Deviations of Modified Fatigue Impact Scale on MS Patients Health Status Pre and Post Fatigue Nursing intervention (No. =144)

MFIS items	Pre- Ng. intervention Mean ± SD	Post- Ng. intervention Mean ± SD	Minimum/ Maximum	Paired t. test	P-Value
-Physical Subscales 0-36 *9Q Questions (4+6+7+10+13+14+17+20+21)	28.38±5.19	15.23±6.1	9-36* 3-35**	19.291	**0.000****
-Cognitive Subscale 0-40 *10Q Questions (1+2+3+11+12+15+16+18+19	32.04±6.27	16.76±7.01	10-40* 3-39**	18.619	**0.000****
-Psychosocial subscale 0-8*2Q Questions 8+9	6.27±1.17	3.98±1.56	2-8* 2-8**	12-469	**0.000****
Total MFIS = 84*21Q	66.69±12.31	36.28±13.71	21-84* 9-81**	18.990	**0.000****

*pre- Ng. intervention, ** post- Ng. intervention ** highly statistically significant at p value <0.001

Discussion

Fatigue-related to Multiple Sclerosis (MS) is believed as a multidimensional symptom, manifesting in several aspects such as physical, cognitive, and psychosocial fatigue [23]. So, the present study aims to assess the effect of nursing intervention on fatigue for multiple sclerosis (MS) patients.

Part I Socio-demographic characteristics and health status of MS patients:

The finding of the present studied patients showed that the mean age was 30.83 ± 7.039 and more than two-thirds of the studied patients was female. Regarding their educational level, more than one-third of the studied patients were secondary and university educated. As well as more than half of the study sample were married and nearly one-quarter of them were divorced. Around one-quarter of the patients were housewives. More than half their place of residence was urban and more than two-thirds there had one to two family members in one room. Half reported that their income was enough only necessities. As well as about half of the study sample with MS disease duration from 2-5 years & more than one-third of them had Relapsing Remitting (RRMS) type.

This finding was supported by,***Beckerman, Eijssen & Ierhulsdonck(2020)*** [23] ,whose title about "Fatigue Profiles in Patients with Multiple Sclerosis" their study was based on the severity of fatigue and not on dimensions of fatigue. Reported that the age range 19–68 yrs. of participants with primary MS-related fatigue and 75% were women. Another agreement with ***Hussein, etal (2019)*** [24], whose title about "Demographic, clinical and Para-clinical characteristics of a sample of Egyptian MS patients attending MS clinic in Al-Azhar University Hospitals". Reported that the same results as the mean age of onset in men were 29.13±8.99 and in females was 28.13±8.27. As regards the mean age of patients in the current study, it was 32.59±9.41years old and the mean age of onset of disease was 28.42±8.48 years old with the peak age of onset between 18-40 years old (84.3%). As well as the study results agreed with ***Schiess, etal(2019)*** [25], whose title about "Characteristics of a cohort of MS patients in Abu Dhabi: how like the west? Multiple Sclerosis and Related Disorders". Reported that the study included 105 multiple sclerosis patients showed that male: female ratio was 1: 2.75.

Regarding marital status the finding was supported by ***D'hooghea(2018)*** [6] Whose title about "Improving fatigue in multiple sclerosis by smartphone-supported energy nursing intervention: The MS Tele Coach feasibility study". Reported that by study Seventy-five were RRMS patients were recruited from 16 centers in Belgium, found

that about one-third of participants were married or living with a partner & about 10 of the other half were divorced.

On the same way the study by ***Kapucu,AKKUŞ,&AKDEMİR(2019)*** [26] whose title about "Knowledge of Patients with Multiple Sclerosis About Their Disease and Prevention of Complications" were done on 115 Turkish MS patients revealed that, female more than male in the study, more than half of the sample were married, graduated from high school/university currently unemployed and had a disorder duration of 1-5 years. As well as this result supported by ***Zakaria,etal(2016)*** [27]. whose title about "Clinical characteristics of patients with multiple sclerosis enrolled in a new registry in Egypt, reported that MS was more common among females in Egypt, with RRMS being the most common presentation. These similarities between the research from the researchers' points of view confirm the same MS disease-related characteristic features although different settings and countries. As well confirms the literature review that MS is about two to three times more common in women than men.

Part II Effect of Fatigue Nursing Interventions in Modification of MS patients' knowledge:

As regarding the MS patient's knowledge pre, and post- fatigue nursing intervention, the current study indicated that in the pre-test the huge margin of the MS patients' mean scores in all knowledge items were very low which shown that they did not have any knowledge about MS and fatigue nursing intervention. After implementing nursing intervention, there were highly statistically significant improvements were observed in the MS patients' mean scores in all tested items of knowledge. This result contradicted with ***Kapucu,AKKUŞ & AKDEMİR(2019)*** [26], the study which reported that nearly most of the study sample had adequate information about the disease, and more than three-quarters of them identified disease progression and prognosis.

Also, the results came in agreement with ***Abolfazli(2014)*** [28]**,** who conducted a study about "Knowledge and attitude assessment of Iranian multiple sclerosis patients receiving interferon beta" in Tehran and found that the mean calculated knowledge score was 35.9 ± 17.5. These similarities and differences from the researchers' point of view postulate the success of the fatigue nursing interventions. Therefore, extensive educational nursing intervention and programs should be implemented to raise awareness of these diseases, thus contributing to the efficient nursing intervention of MS and reducing the associated fatigue.

Part III Effect of nursing intervention on Fatigue for MS patients' Practices:

As regarding the MS patient's nursing intervention reported practices pre, and post-fatigue nursing intervention, the current study indicates that there was a highly statistically significant improvement in all items of reported pre and post fatigue nursing intervention practices. This result contradicted [3],whose title about "Effects of multidisciplinary rehabilitation on chronic fatigue in MS: A Randomized Controlled Trial", revealed that Multidisciplinary fatigue rehabilitation was not more effective in terms of reducing nursing intervention reported fatigue practices in MS patients. This contradiction from the researchers' clinical experiences may have arisen from the difference in cultural conditions, field of education, and level of education of the patients. As well as this could ensure the success of the nursing intervention on the improvement of MS patients' reported practices about fatigue. Since most MS patients are in the age of adolescence and youth, habituation of adequate nursing intervention practices would be more convenient than in the case of other chronic diseases that emerge later in life.

On the same way the study by ***khan,et al.,(2014)*** [29] who reported that the amount of organized fatigue nursing intervention programs for patients with MS looked effective in reducing fatigue and its related problems.

This part verified the research hypothesis $\mathbf{H_1}$ which stated that Fatigue nursing intervention have a positive effect on (MS) patient's knowledge and reported practices regarding fatigue nursing intervention.

As regarding FSS of MS Patients Pre- and Post-Fatigue Nursing intervention the current study shows that statistically significant improvement in the reported MS patients' FSS scores means level in the post-test than that of the pretest. This finding was supported by, ***Mirhosseini et al.,(2019)*** [30]**,** whose title about "The Effect of Benson Relaxation Technique on the Fatigue Severity of Patients with MS in Iran", The study findings suggested that Benson relaxation technique significantly reduced the mean FSS of fatigue and its effect on overall activity using MFIS improved, mood, walking ability, normal work, communicating with others, and life enjoyment in patients with MS.

While the results contradicted by ***Rietberg et al.,(2020)*** [3]***,who*** revealed that the primary outcome measure overall score showed no significant differences between groups at 12 weeks and 24 weeks follow-up, nor for sub-scales. This could postulate the vital role of nursing intervention that could improve MS

patient knowledge, as well as a self-care practice about fatigue, and confirmed its effectiveness in reducing fatigue severity among patients with MS.

As regarding mean scores and standard deviations of modified fatigue impact scale on MS patient's related health problem pre and post fatigue nursing intervention the present study revealed that statistically significant improvement in the reported MS patients' MFIS scores means level in its all items in the post-test than that of the pre-fatigue nursing intervention. This finding was fixed by, ***Rooney et al.,(2019)*** [31], whose title about "Minimally important difference of the Fatigue Severity Scale and Modified Fatigue Impact Scale in people with Multiple Sclerosis", who concluded that, a difference of the FSS & on the MFIS pre and post the fatigue rehabilitation program establishes a clinically significant difference in fatigue. Therefore, these appraisals represent a threshold value that can be used to interpret changes in the FSS and MFIS over time or in response to an intervention. On the opposite side, these results contradicted with ***Rietberg et al.,(2020)*** [3]**.** Study which reported that fatigue was quite invariant from baseline onwards, irrespective of the type of therapy applied. No differences were found not only on the primary outcome but also on two other nursing intervention fatigue questionnaires, the FSS, and the MFIS.

This part confirmed the research hypothesis **H_2 & H_3** which listed that Fatigue severity modified after nursing interventions as well as fatigue nursing intervention improved the physical, cognitive, and psychological status of MS patients.

Conclusion

Based on the results of the present study, it was concluded that implementation of fatigue nursing intervention could improve health-related problems associated with fatigue and decrease fatigue severity with improved the MS patients' knowledge and nursing intervention reported practices. Also, there were noticed statistically significant strong positive correlation between total scores of pre-and post-knowledge and with total scores of pre-and post-reported nursing intervention practices of fatigue nursing intervention. So, the research hypotheses were supported.

The study recommended that

- Implementation of fatigue nursing intervention for every patient with Multiple sclerosis to equip them with the knowledge essential to enable them to undertake fatigue nursing intervention and achieve long-lasting remission of the disease.
- Conducting health educational programs to raise the multiple

sclerosis patients' awareness about the disease and fatigue nursing intervention practices.

- Replication of this study on a large probability sample to achieve more generalization.

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