Physical and Psychosocial Adaptation Strategies for Patients with MultipleSclerosis

Hamda Ahmed Eldesoky [1], Nagia I. Hassan[2], Mona Abdelmoksoud Amer[3] Heba Mahmoud Mahmoud[4]

(1, 3, 4) Lecturer, Medical-Surgical Nursing, Faculty of Nursing, Alexandria University, Egypt

(2) Assistant Professor, Psychiatric Nursing and Mental Health, Faculty of Nursing, Damanhour University,Egypt

Corresponding Author: Hamda Ahmed Eldesoky

Author Email: Hamda.ahmed@alexu.edu.eg

Abstract

Background: Multiple sclerosis (MS) is one of the most serious autoimmune neurological diseases. It can restrict the patient's functional abilities, social relationship, life pattern, occupational maintenance and wellbeing. **Aim:** This study aims to determine the physical and psychosocial adaptation strategies used by patients with multiple sclerosis. **Research design:** A cross sectional descriptive design was adopted to carry out this study. **Settings:** The study was conducted at neuropsychiatric outpatient clinic of Al Hadara Alexandria University Hospital. **Subjects:** A purposive sample of 110 patients admitted to the above mentioned setting and diagnosed with multiple sclerosis was recruited in this study. **Tools:** Four tools were used for data collection namely: Patients' demographic characteristics and clinical data sheet, Multiple Sclerosis Patients' Physical and Psychosocial Assessment Structured Interview Schedule, Physical Adaptation Strategies Structured Interview Schedule of Patients with Multiple Sclerosis and Psychosocial Adjustment to Illness Scale–Self- Report (PAIS- SR). **Results:** The study results revealed that sensory and motor symptoms scores was the highest mean of all physical disturbances parameters. More than half of the patients had high psychological and social disturbance. Physical, psychological, social disturbance score was negatively correlated with the total physical, psychosocial adaptation strategies score. **Conclusion:** MS has a negative impact not only on the physical activities, but also on the psychological, social and financial aspects of life. **Recommendations:** The developed booklet with its simple instructions and illustrations should be utilized in hospitals as a teaching aid for patient with MS. Periodic training program should be carried out for nurses working in the MS unit about health education and rehabilitation programs.

Keywords: Multiple Sclerosis, Physical Adaptation Strategies, Psychosocial Adaptation Strategies.

Introduction

Multiple sclerosis (MS) is a chronic demyelinating autoimmune disorder affecting the central nervous system. It is characterized by patchy loss of myeline sheath that surrounds nerve fibers, visualized on imaging scans as plaques or lesions in the brain and spinal cord **(Duncan et al., 2018)**. MS affects individuals during the most productive time of their lives, and directly limits their work capacity, leading to major social and economic consequences **(Corallo et al ., 2019).**

Roughly, Multiple Sclerosis affects more than 2.5 million people worldwide. According to National Statistical Records, there is no clear statistical data regarding the incidence of MS in Egypt. According to Al Hadara University Hospital Statistical Medical Annual Records, it was found that 700 patients were diagnosed with MS in year 2019 **(Statistical Records of Al Hadara University Hospital, 2019)**. In most patients, MS is initially characterized by episodes of reversible neurological deficits, which is often followed by progressive neurological deterioration over time **(Shamaa et al., 2020)**. Based on the course of disease, patients are grouped into four major categories: Relapsing-remitting MS (RRMS), Primary progressive MS (PRMS), Secondary progressive MS (SPRMS) and Progressive relapsing MS (RMS) **(Sand , 2015 & Anas al., 2018)**.

Relapsing-remitting MS is the most common form, affecting about 85.0% of patients; it is marked by flare-ups elapses or exacerbations of symptoms followed by periods of remission. Till now the main etiology of MS still remains unclear. But it is thought that a combination of environmental and genetic factors leads to autoimmune reactions against CNS structures resulting tissue damage and neurological impairment

(**Baecher et al., 2018**). As a result of these problems, different symptoms and signs may occur depend on the lotion of demyelination and extent of the lesion, such as visual impairment, dysarthria, dysphagia, numbness or tingling, weakness, dizziness and vertigo. In addition, sexual problems, cognitive problems, bowel and bladder problems, walking difficulties, spasticity, coordination and balance impairment, pain, fatigue, as well as sensory impairment (**Ghasemi et al., 2017**).

Over time, these symptoms with repeated episodes of disease activity often in combination with a lack of patients confidence and abilities to manage these symptoms, lead to further loss of mental functions, such as higher rates of depression and anxiety which can affect outcomes such as quality life, activities of daily living and levels of recreation, leisure and work (**Berzins et al, 2017& Karimi et al., 2020**). Therefore, Multiple sclerosis is diagnosed on the basis of clinical findings and supporting evidence from ancillary tests, such as Magnetic Resonance Imaging (MRI) of the brain and examination of Cerebrospinal Fluid (CSF) (**Thompson et al., 2018**).

To date, no definitive treatment method has been introduced to patients with MS, drug therapies including steroids, cyclosporine and interferons are used to control symptoms and reduce demyelination process. So, because of the complexity of the disease, the difficulty in determining treatment and a wide range of symptoms and effects on most aspect of life of both patients and their families necessitate adaptation with the disease (**Hauser, Cree, 2020**). Living with chronic illness requires the ability to adapt to living with the stressors of unremitting symptoms such as pain, fatigue, depression and anxiety. While recovery is the desired outcome of illness, for those with chronic illnesses, the more attainable two outcomes may be that of maintained psychological and physiological well-being in the face of these chronic demands on fitness (**Singh et al., 2014**).

Adaptation is a constant, ongoing process that requires a change in structure, function or behavior so that the person is better suited to the environment; it involves an interaction between the person and the environment. The desired goals of adaptation for any system are survival, growth and reproduction (**Jennings, 2017**). Since MS has no cure, adaptation and lifestyle changes should accompany medical treatment. They help patients feel better, stay more active and slow the progress of the disease, relieve symptoms, improve exercise tolerance, improve health status, prevent and treat exacerbations, prevent complications and reduce mortality (**Livneh , 2021**).

Consequently, it is important to know how well MS patients get along physically, socially and psychologically, how they respond and adapt to their physical disturbances imposed by their disease and the factors that either contribute to or inhibit their adaptation. This knowledge can help health care providers to understand the patients better, and to implement individualized health education and rehabilitation measures which possibly slow the progress of the disease (**Dymecka and Bidzan , 2018**). Nurses can have a major impact onpatients' symptoms and QOL through appropriate patient assessment, communication with the clinical team, and implementation of proper management. The role of nurse-led consultations with patients has become more important in the management of MS, and nurse-led education and intervention programs have been reported to improve patient knowledge, and reduce the frequency of exacerbations (**Dineen-Griffinet et al ., 2019**).

Physical and psychosocial adaptation in MS includes a lot more than just treating the disease and its symptoms (**Dymecka and Bidzan, 2018**). Today, it is known that physical adaptation does not lead to relapse or a faster progression of the disease, but decreases fatigue and improves functional capacity and subsequently increase physical and sporting activity. It mainly includes cares, reeducation, rehabilitation, prevention, therapeutic education and support for social rehabilitation (**Rocca et al., 2016**).

MS has a major psycho-emotional and cognitive impact. Therefore, the acquisition of adaptation abilities, based on the previous history and experience of the patient, is also essential and must be part of a wider set of psychosocial abilities (**Seyedoshohadaee et al., 2016 & Hyarat et al., 2019**).

Whatever, the nursing staff and other clinicians who work with people with MS and their families have long observed that disability is determined not only by inflammatory disease activity but also by psycho-social functioning. Psycho-Social support has been shown to buffer the effects of stress and has been linked to improved medical outcomes. One of the most important responsibilities of nursing is the education of society and patients regarding the disease and the interventions that help them to adapt to the disease and to cope with the restrictions imposed on their daily lives **(Nikolaev et al, 2019 & Donisi, et al, 2021)**.

Significance of the study

Multiple sclerosis is associated with adverse sequelae, high costs, and negative impact on quality of life, including loss of mobility, affects patients' ability to perform simple, everyday tasks and to participate in leisure activities. Specific therapeutic and psychosocial strategies are needed to improve the negative impact of the disease on the general health **(Cifu, 2020)**. As, the literature review revealed limited studies determine the physical and psychosocial adaptation strategies used by patients with multiple sclerosis in Egypt, lack of data necessitates the design of this study.

Aim of the study:

Determine the physical and psychosocial adaptation strategies used by patients with multiple sclerosis.

Research questions:

What are the types and levels of physical and psychosocial adaptation strategies used by patients with multiple sclerosis?

Subjects and Methods

Research design:

A cross sectional descriptive design was adopted to carry out this study.

Setting:

The present study was conducted at the neuropsychiatric outpatient clinic of Al Hadara Alexandria University Hospital, Alexandria governorate which contain three physicians' rooms used for MS patient examination and counseling.

Subjects:

Patients diagnosed with multiple sclerosis and admitted to the above mentioned setting. The patient was selected according to the following inclusion criteria:

- Age: 18- 60 years old.
- Confirmed diagnosis with multiple sclerosis.
- Able to communicate verbally.
- Patients with relapsing remitting multiple sclerosis not in either secondary or primary multiple sclerosis.
- Have no ongoing exacerbation of multiple sclerosis.
- Willing to participate in the study.

Sampling technique:

Purposive sample was utilized to select (110 patients).

Sample size calculation: **Epi info-7programs** (version 21) was used to estimate the sample size usingthe following parameters:

- Population size: 155 patients over 6 month
- Expected frequency:50%
- Margin error: 5%
- Confidence Coefficient: 95%
- Minimum sample size: 110 patients

Tools: Four tools were used to collect the necessary data.

Tool I: Patients' demographic characteristics and clinical data sheet: It was used to assess the patient's demographic and clinical data. It was developed by the researchers based on relevant literature **(Zahmatkeshan & Delaviz, 2017, Elshrnoby, 2019&Mostafa, 2020)**. It included two parts:

- **Part I: Demographic characteristics**: as age, gender, level of education, marital status, occupationand area of residence.
- **Part II: Clinical data**: Clinical data was collected from patients' medical records, and covered the following: past and present medical history, such as disease, duration, number of hospitalization during last year, number of attacks exacerbations in year, the presence of cardiovascular disease, diabetes mellitus, low back pain and family history.

Tool II: Multiple Sclerosis Patients' Physical and Psychosocial Assessment Structured Interview Schedule: This tool was developed by the researchers after review of relevant literatures (**Soundy et al.,N 2016, Eladham, 2018, Vijayasingham et al., 2018 Elshrnoby., 2019 & Jankovic et al., 2021**) to assess severity of physical symptoms and the effect of the disease on psychosocial health status. It consisted of three parts:

- **Part I: Multiple Sclerosis Patients' Physical Assessment:** This part used by the researchers to assess severity of physical symptoms among patients with MS. It consisted of 29 items: sensory symptoms which consisted of (2 items), visual disturbances (3 items), pain (3 items), motor symptoms (5 items), speech and swallowing problems (3 items), bladder/bowel symptoms, (5 items), cognitive symptoms (4 items), sexual Symptoms (4 items) and fatigue.

- **Part II: Multiple Sclerosis Patients' Psychological Assessment:** This part used by the researchers to assess the effect of the disease on psychological health status. It consisted of fourteen items: seven items to assess presence of negative feelings, including fear or panic when attack, relapse, frail or invalid because of loss of interest, depression, hopelessness, worthlessness and nervousness. Another seven items were structured to assess presence of positive feelings which included happiness, enjoyment, and ability to laugh and see the funny side of things, forward with enjoyment to things, feel very cheerful, full of pep, calm and peaceful.

- **Part III: Multiple Sclerosis Patients' Social Assessment**: This part used by the researchers to assess the extent to which physical health interferes with normal social activities with family, friends and neighbors. It was composed of ten items related to: housework, self-care as bathing and dressing, attendance and performance of work, socialization, sexual activities life, recreational activities, shopping, lifting or carrying groceries and playing sports or games, degree of independence and embarrassment in public.

Scoring system: the presence of each physical and psychosocial disturbance and its severity was assessed through rating scale as follows (0) Not at all, (1) Mild, (2) Moderate and (3) Severe. Positive symptoms were given reversed scores, the total score was summed and percent score was calculated by dividing on the total score and multiplying by 100.The total scores of disturbance were categorized into three levels as follows:

- Low level of disturbance less than <50%,
- Moderate level of disturbance was 50<75%
- High level of disturbance was 75 %≤.

Tool III: Physical Adaptation Strategies Structured Interview Schedule of Patients with MS:

This tool was developed by the researchers after reviewing relevant literatures (Zahmatkeshan et al, 2017, Hernandez, et al., 2018, Corallo, et al., 2019) in order to identify the physical adaptation strategies of patients with MS. It was composed of 115 items to identify detailed descriptions of the physical adaptation strategies performed by MS patients in their daily living activities of the following areas: manage vision problems (9 items), methods to manage pain (7 items) ,maintain balance and coordination (11 items) , managing eating and swallowing problems (8 items) , manage flare up(10 items), exercising (6 items) ,energy conservation (25items), strategies to improve sleep(8 items), keeping bladder and bowel healthy(8 items), dealing with cognitive problems(7 items) and regular follow-up visit(2 items).

Scoring system: each item of the performed adaptive strategies in this tool was checked and scored on a two point rating scale as follows: Not done= 0 and done =1. The items of the performed adaptive strategies were summed and percent score was calculated by dividing on the total score and multiplying by 100.

- Percent score which was <50% = low level of adaptation.
- Percent score which was (50<75%) = Mild level of adaptation.
- Percent score which was (75 %≤) = High level of adaptation

Tool IV: Psychosocial Adjustment to Illness Scale–Self- Report (PAIS-SR): This scale was adopted from (Derogatis, 1986). It was used by the researchers to assess the quality of patients' psychosocial adjustment to illness. The PAIS-SR is an assessment scale designed for persons with chronic illnesses to assess the quality of their psychosocial adjustment to illness. The interactions of patients with individual around them as well as with other factors that determine their psychosocial environment are measured by the scale. The scale is a 46-item scale with 7subscales. The items are in the form of questions such "How much has your disease interfered with your work and responsibilities?" with a 4-point Likert-type scale and responses varying from 0 = not at all to 3= severe. Subscales of the PAIS-SR are as follows: Health care orientation (8 items), vocational environment (6 items), domestic environment (8 items), sexual relationships (6 items), extended family relationships (5 items), social environment (6 items), and psychological distress (7 items). The highest score that can be obtained is 138, and the lowest score is 0. High PAIS-SR scores indicate a "low psychosocial adjustment." Scores below 50, between 50 and 75, and over 75 are considered to be indicators of "moderate psychosocial adjustment," and "high psychosocial adjustment".

Methods

The study was accomplished according to the following steps:

1. Approval:

- An approval from the Ethics Research Committee, Faculty of Nursing, and AlexandriaUniversity was obtained.

- An official letter clarifying the purpose of the study was obtained from the Faculty of Nursing, Alexandria University forwarded to the concerned personnel at Al Hadara, Alexandria University Hospital to take their permission to collect data.

2. Development of study tools:

- Tool I, II and III were developed by the researchers after extensive review of recent and relevant literature and tool four was

adopted and translated into Arabic language by the researchers. The tool was further reviewed and validated by the supervisors.

- Arabic version of tools I, II, III, and IV were used. The tools were revised by a jury composed of five experts in the field of in the medical surgical nursing and psychiatric Health Nursing for content validity. Recommended modifications were done accordingly.

- **Validity testing:** Data collection tools were presented to five experts in the medical surgical nursing and psychiatric nursing sectors at the Faculty of Nursing to evaluate the validity of the content. The modifications were made according to the experts' judgment on the clarity of the sentences, the adequacy of the content and the sequence of the elements. Experts agree with the content, but recommend minor changes in the language that would make the information clearer and more accurate. Suggested modifications were done.

Reliability testing: The reliability of tools was tested by means of Cronbach's Alpha. Reliability Coefficient for tool II was (0.905), tool III was (0.827) and tool IV was (0.910) which means all tools were reliable.

3. Pilot study:

A pilot study was conducted on randomly selected 10 patients with MS not included in the actual study to assess the clarity and applicability of the tools and to identify any difficulties that may be faced during the actual study. In addition, the time needed to answer the tools was also estimated. The tools modifications were done.

4. Data Collection:

Each patient who attended the previously selected settings and followed the inclusion criteria, was recruited and written consent was taken after informing him /her with the aims of the study and ensuring confidentiality of the data. They were interviewed individually in neuropsychiatric outpatient "Clinic examination and counseling room". Every patient took about 30-45 min to complete the interview.

Data collection lasted about nine months (from the beginning of May 2020 to the end of Januray2021).

5. Ethical Considerations:

- Written informed patients' consent obtained before collection of data, and after explanation of aim of the study.

- Confidentiality of the collected data was assured.

- Privacy of the study participants was maintained.

- Participation in the voluntary, with patient right to withdrawal at any time.

6. Statistical Analysis:

After the collection of data, the data were fed to the computer and analyzed using IBM Statistical Package for Social Sciences (SPSS) version 23. (Armonk, NY: IBM Corp). Qualitative data were described using number and percent. The Kolmogorov-Smirnovtest was used to verify the normality of distribution. Quantitative data were described using range (minimum and maximum. Significance of the obtained results was judged at the 5% level. Linear correlation was conducted using Spearman Rho coefficient to show correlation between different studied parameters among the studied patients with MS.

Results

Table 1: Shows frequency distribution of the studied patients according to their demographic and clinical data Regarding age, it was noticed that around half the studied patients (50.9%) were within the age group 30 to less than 40 years. Concerning gender, it was found that more than two thirds of the studied patients (68.2%) were female. As regards to marital status, it was found that about two thirds (64.5%) of them were married. In relation to the level of education, it was found that that two thirds (60.0%) of the studied patients had high education, while only (7.3%) of them were illiterate. Concerning the area of residence, it was found that more than three-quarters (78.2%) of the studied patients were living in urban areas. In relation to occupation, the table shows that more than two thirds

(67.3%) of the studied patients were housewives.

Regarding disease duration, it was noticed that more than half (54.5%) of the studied patients had MS disease between the period from 10 to less than 20 years. Concerning Number of hospitalization during last year, the table showed that more than half (52.7%) of the studied patients were hospitalized 5-10 times. Concerning the number of attacks of exacerbations in a year, the study revealed that the nearly half of (45.5%) of the studied patients had 5-10 times of attack in the year. In relation to family history of MS, the table showed that around one third (33.6%) of the studied patients had family history of MS. Regarding the presence of other health problems, the table showed that more than two thirds (70.0 %) of the studied patients had no medical history for other health problems.

Table (2) Describes total scores and levels of physical disturbances among the studied patients. *Concerning sensory motor symptoms,* the table showed that the majority (82.7%) of the studied patients had high disturbance while (12.7%) of them had moderate disturbance and only (4.5%) of them had low disturbance. *Concerning visual and cognitive disturbances,* it was found that around half (50.9%) of the studied patients had high disturbance, while less than one third (26.4%) of them had low disturbance. *Regarding Speech and swallowing problems*; the table revealed that less than half(44.5%) of the studied patients had low disturbance while more than one third (37.3%) of them had high disturbance. *Concerning bladder and bowel problems,* it was found that around three - quarters of the studied patients (73.6%) had high disturbance, and only (6.4%) had low disturbance. *Regarding sexual problems,* it was found that around half (50.9%) of the studied patients had high disturbance. Also, it was noticed that around one third (31.8%) of them had low disturbance. *Concerning pain and fatigue*, it was found that around three - quarters of the studied patients (73.6%) had high disturbance ,while only (3.6%) of them had low disturbance. *Concerning overall physical disturbance*, the table, showed that the studied patients had a total means score of (2.25±0.37) and total mean percent score of

(75.04±12.32) as regards to the overall physical disturbance

Table (3) Description total scores and levels of psychological and social disturbances among the studied patients. *Concerning Overall Psychological Disturbance*, the table showed that the studied patients had a total mean score of (2.22±0.40) and total mean percent score of (74.05±13.46), also, the table revealed that more than two third (60.9%) of the studied patients had high disturbance. Also, it was noticed that more than one third (39.1%) of them had moderate disturbance, while none of them had low disturbance. *Concerning positive feeling,* the table showed that more than two third (67.3%) of the studied patients had high disturbance while only (19.1%) had low disturbance, total mean percent score of (79.31±32.08). *Regarding the negative feelings,* the table showed that (45.5%) had high disturbance, while (17.3%) had low disturbance ,total mean percent score of (68.79±30.11), *Concerning Overall social disturbance*, the table showed that the studied patients had a total mean score of (2.30±0.58)and total mean percent score of (76.56±19.27), also the table revealed that more than two third (65.5%) of the studied patients had high level of social disturbance, while only (7.3%) of them had low level of social disturbance.

Table (4): Description and Levels of physical and psychosocial adaptation strategies used by the studied patients. *Concerning the overall physical adaptation*, the table illustrated that the studied patients had a total mean score of (1.31±0.72) and total

mean percent score of (43.78±24.0), also the table revealed that two third (57.3%) of the studied patients had low adaptation while only (4.5%) had high adaptation.

Concerning overall psychosocial adaptation, the table showed that the studied patients had a total mean score of (1.34±0.51) and total mean percent score of (44.52±17.08), also the table revealed that more than two third (68.2%) of the studied patients had low adaptation while none of them had high adaptation.

Table (5): Delineates correlation between scores of physical and psychosocial disturbances and scores of adaptation strategies used by the studied patients, the table showed that the physical disturbance score was negatively correlated with the total physical adaptation strategies score (r=-0.210*, p=0.028*). Similarly, the physical disturbance score was negatively correlated with of the psychosocial adaptation strategies score (r= -0.396*, p=<0.001*). On the other hand, the psychological disturbance score was negatively correlated with the total physical adaptation strategies score (r= -0.349*, p=<0.001*). Similarly, Psychological disturbance score was negatively correlated with of the psychosocial adaptation strategies score (r= -0.734*, p=0.019*). Moreover, social disturbance score was negatively correlated with the total physical adaptation strategies score (r= -0.330*, p= <0.001*). Similarly, social disturbance score was negatively correlated with of the psychosocial adaptation strategies score (r= -0.671*, p=<0.001*).

Table (1): Frequency distribution of the studied patients according to demographic and clinical data (n = 110).

Demographic and clinical data	(n = 110)	
	No.	%
Age (years)		
• 20< 30	21	19.1
• 30< 40	56	50.9
• 40< 50	28	25.5
• ≥ 50	5	4.5
Min. – Max.	20.0 – 52.0	
Mean ± SD.	36.79 ± 7.87	
Median	36.50	
Gender		
• Male	35	31.8
• Female	75	68.2
Marital status		
• Married	71	64.5
• Widow	12	10.9
• Divorce	7	6.4
• Single	20	18.2
Education		
• Illiterate	8	7.3
• Primary + Prepatory	22	20.0
• Secondary	14	12.7
• High education	66	60.0
Occupation		
• Not working	74	67.3
• Work	36	32.7
Residence		
• Rural	24	21.8
• Urban	86	78.2
Disease duration (years)		
• Less than 5 years	4	3.6
• 5- 10 years	36	32.7
• 10 less than 20	60	54.5
• 20-30 years	10	9.1
Number of hospitalization during last year		
• less than 5 times	15	13.6
• 5-10 times	58	52.7
• More than10 times	37	33.6
Number of attacks of exacerbations in a year		
• less than 5 times	15	13.6
• 5-10 times	50	45.5
• More than10 times	45	40.9
Family history of MS		
• No	73	66.4
• Yes	37	33.6
Presence of other health problems rather than MS		
• No	77	70.0
• DM	12	10.9
• HTN	9	8.2
• Heart disease	4	3.6
• low back problem	8	7.3

Table (2): Describes total scores and levels of physical disturbances among the studied patients (n = 110).

Physical level disturbance items	Levels of Disturbances									
	Disturbance score (%)									
	Total score		Mean score	% score	Low (<50%)		Moderate (50%-<75%)		High (75%≤)	
	Min. – Max.	Mean ± SD.	Mean ± SD.	Mean ± SD.	No.	%	No.	%	No.	%
Sensory ,motor symptoms	7.0–21.0	18.52±3.14	2.65±0.45	88.18±14.96	5	4.5	14	12.7	91	82.7
Visual and cognitive disturbances	2.0–19.0	13.39±4.38	1.91±0.63	63.77±20.87	29	26.4	25	22.7	56	50.9
Speech and swallowingproblems	0.0–9.0	5.25±3.08	1.75±1.03	58.38±34.17	49	44.5	20	18.2	41	37.3
Bladder and bowel problems	0.0–9.0	7.89±1.92	2.63±0.64	87.68±21.36	7	6.4	22	20.0	81	73.6
Sexual symptoms	0.0–12.0	7.13±4.69	1.78±1.17	59.39±39.07	35	31.8	19	17.3	56	50.9
Pain and fatigue	3.0–15.0	13.10±2.63	2.62±0.53	87.33±17.56	4	3.6	25	22.7	81	73.6
Overall physical disturbance scores	**42.0–81.0**	**65.28±10.72**	**2.25±0.37**	**75.04±12.32**	**1**	**0.9**	**32**	**29.1**	**77**	**70.0**

Table (3): Description of total scores and levels of psychological and social disturbances among the studied patients (n = 110).

Psychological and Social level disturbance items	Levels of Disturbances									
	Disturbance score (%)									
	Total score		Mean score	% score	Low (<50%)		Moderate (50 %-< 75%)		High (75%≤)	
	Min. – Max.	Mean ± SD.	Mean ± SD.	Mean ± SD.	No.	%	No.	%	No.	%
Overall Psychological disturbance score	21.0–38.0	31.10±5.65	2.22±0.40	74.05±13.46	0	0.0	43	39.1	67	60.9
Positive feeling	0.0–21.0	16.65±6.74	2.38±0.96	79.31±32.08	21	19.1	15	13.6	74	67.3
Negative feeling	0.0–21.0	14.45±6.32	2.06±0.90	68.79±30.11	19	17.3	41	37.3	50	45.5
Overall Social disturbance score	6.0–35.0	26.01±6.52	2.30±0.58	76.56±19.27	8	7.3	30	27.3	72	65.5

Table (4): Description and Levels of physical and psychosocial adaptation strategies used by the studied patients (n= 110)

Physical and psychosocial adaptation strategies	Total score		Mean score	% score	Levels of Adaptation					
					Adaptation scores (%)					
					Low (<50%)		Moderate (50%-<75%)		High (75%≤)	
	Min. – Max.	Mean ± SD.	Mean ± SD.	Mean ± SD.	No.	%	No.	%	No.	%
Physical adaptation strategies	**44.0–336.0**	**151.1±82.80**	**1.31±0.72**	**43.78±24.0**	**63**	**57.3**	**42**	**38.2**	**5**	**4.5**
Physical adaptation strategies, manage vision problems	0.0–27.0	12.60±8.32	1.40±0.92	46.67±30.81	66	60.0	25	22.7	19	17.3
Methods to manage pain	0.0–21.0	8.04±7.10	1.15±1.01	38.27±33.79	76	69.1	18	16.4	16	14.5
Maintain balance, coordination	0.0–33.0	15.54±13.48	1.41±1.23	47.08±40.85	56	50.9	15	13.6	39	35.5
Managing eating and swallowing problems	0.0–54.0	27.12±13.58	1.51±0.75	50.22±25.15	57	51.8	35	31.8	18	16.4
Energy conservation	0.0–75.0	31.77±25.18	1.27±1.01	42.36±33.58	57	51.8	32	29.1	21	19.1

Physical and psychosocial adaptation strategies	Total score		Mean score	% score	Levels of Adaptation					
					Adaptation scores (%)					
					Low (<50%)		Moderate (50%-<75%)		High (75%≤)	
	Min. – Max.	Mean ± SD.	Mean ± SD.	Mean ± SD.	No.	%	No.	%	No.	%
Keeping bladder and bowelhealthy	2.0–24.0	12.83±7.15	1.60±0.89	53.45±29.81	56	50.9	32	29.1	22	20.0
Dealing with cognitive problems	0.0–33.0	6.75±8.87	0.61±0.81	20.43±26.88	90	81.8	18	16.4	2	1.8
Practice exercise	0.0–18.0	8.38±6.40	1.40±1.07	46.57±35.56	56	50.9	25	22.7	29	26.4
Manage flare up	0.0–30.0	13.51±8.39	1.35±0.84	45.03±27.97	68	61.8	29	26.4	13	11.8
Strategies to improve sleep	0.0–24.0	11.73±8.30	1.46±1.04	48.87±34.62	52	47.3	39	35.5	19	17.3
Follow-up	0.0–6.0	2.79±1.95	1.40±0.98	46.52±32.57	51	46.4	34	30.9	25	22.7
Psychosocial adaptationstrategies	**28.0–102.0**	**54.15±21.15**	**1.34±0.51**	**44.52±17.08**	**75**	**68.2**	**35**	**31.8**	**0**	**0.0**
Health care orientation	3.0–22.0	10.96±4.14	1.37±0.52	45.68±17.27	76	69.1	22	20.0	12	10.9
Vocational environment	1.0–15.0	8.28±3.0	1.38±0.50	45.99±16.67	20	55.6	14	38.9	2	5.6
Domestic environment	4.0–22.0	10.11±4.33	1.32±0.62	44.0±20.58	71	64.5	27	24.5	12	10.9
Sexual relationship	3.0–18.0	8.77±4.11	1.46±0.69	48.74±22.83	66	60.0	24	21.8	20	18.2
Extended family relationships	0.0–15.0	6.43±2.91	1.29±0.58	42.85±19.38	73	66.4	31	28.2	6	5.5
Social environment	1.0–18.0	7.77±4.11	1.30±0.68	43.19±22.81	55	77.5	10	14.1	6	8.5
Psychosocial distress	2.0–21.0	10.15±5.11	1.45±0.73	48.31±24.36	68	61.8	16	14.5	26	23.6

Table (5): Correlation between Scores of physical and psychosocial disturbances and scores of adaptation strategies used by the studied patients (n=110)

Adaptation strategies		Physical and Psychosocial Disturbances		
		Physical disturbances	Psychological disturbances	Social disturbances
Physical adaptation strategies	r	-0.210[*]	-0.349[*]	-0.330[*]
	p	0.028[*]	<0.001[*]	<0.001[*]
Psychosocial adaptation strategies	r	-0.396[*]	-0.734[*]	-0.671[*]
	p	<0.001[*]	<0.001[*]	<0.001[*]

r: Spearman Rho correlation coefficient   *significant at P≤0.05

Discussion

Multiple Sclerosis (MS) is the most prevalent central nervous system (CNS) chronic demyelinating, neuroinflammatory and neurodegenerative disorder, affecting individuals in their early adult life with marked functional, financial and quality life impact, therefore it is necessary to improve their quality of life by all means, includingthe most appropriate way of adaptation (**Soundy et al, 2016**), so the present study was conducted to determine the physical and psychosocial adaptation strategies used by patients with multiple sclerosis. The result of the present study revealed that approximately half of the patients studied (50.9%) were in the age group 30 to less than 40 years, and three-quarters of the patients (75.0%) were female. This result is in harmony with (**Xu et al, 2021**) who found that MS is more common in women than in men, with a peak onset between the ages of 30 and 40 years.

In this context (**Ahn et al ,2015 and Rejali et al, 2016),** mentioned that the fact that

the female hormonal changes during menstruation, pregnancy and early menopause, has specific effects on the development of CNS and affects function of the immune system, long exposure to this hormone increases the risk of developing an autoimmune disease such as MS. Regarding the number of attacks of exacerbations in a year, result of the present study showed that the nearly half of (45.5%) of the studied patients had 5-10 times of attack in the year. The results of the present study go on the same line with **(Ziemssen and Thomas, 2017)**, who mentioned that the majority of patients have a relapsing-remitting form of the disease. Also, during the MS relapse, the patient experiences an episode of new or worsening signs or symptoms of a demyelinating event for at least 24 hours, in the absence of infection or fever.

Accordingly, the result of the present study showed that the majority of the study sample had high physical disturbance such as sensory, motor symptoms, visual, cognitive disturbances, speech, swallowing problems, bladder, bowel problems, pain and fatigue. These findings were in line with **(Gustavsen, 2021)**, who showed that that the MS patients exposes to a variety of symptoms including muscle weakness in the extremities, vertigo, ataxia, spasticity, and visual impairment. Moreover, **(Braley et al, 2016)**, stated that to serious physical symptoms, patients may experience cognitive problems, gait problems, persistent pain, tiredness, sleep disorders, and bowel and bladder dysfunction are all common symptoms among MS patients. In addition, **(Marck et al, 2017)** concluded that the pain, which includes headaches, lower back pain, neuropathic pain, and painful spasms, is a common symptom in people with MS, with a prevalence range of (30.0% to 85.0%). Also, they noted that disturbance to the central or peripheral nervous system, inflammatory, and musculoskeletal mechanisms, such as immobilization of parts of the body, may all contribute to pain in MS patients.

Regarding to fatigue, The results of the current study are in agreement with **(Tenager; 2019)**, who reported that fatigue is one of the most common symptoms of MS patients and has a substantial impact on their quality of life. Sometimes it is accompanied by symptoms of depression and anxiety, as well as sleep disturbances. According to **Carotenuto et al, 2021** who reported that bladder dysfunction occurs in at least 80.0% of people with MS, it occurs as a result of delayed transmission of nerve signals in areas of the Central Nervous System (CNS) that control the bladder and the urinary sphincters, a spastic (overactive) bladder unable to hold a normal amount of urine, or a bladder that does not empty properly. Additionally cognitive disturbances, the result of the present study is in the line with the study conducted by **(Yazgan et al ,2021)**, who stated that, the cognitive impairment occurs in 40-65% of multiple sclerosis patients and can be a major source of disability, social impairment, and poor quality of life. This may be attributed to that; cognitive disturbance has an impact on working memory, conceptual reasoning, linguistic fluency, information processing speed, attention, and executive function.

Concerning the overall psychosocial disturbance, the results of this study revealed that more than two third (60.9% & 65.5%) of the studied patients had high psychosocial disturbance, these findings come in accordance with studies conducted by **(Grech etal, 2017)**, who reported that MS patients experience psychological effects as anxiety, depression, low self-confidence, difficulties in sleeping and concentration and all of these symptoms affect a person's ability to function normally, leading to a subsequent disruption in their education, family life, employment opportunities and activities of daily living. Hence, a reduction of the patient ability to adapt to the disease.

Moreover, this finding was in agreement with **(Hartley et al, 2014)**, stated that the patients with MS experience periods of anxiety, fear and uncertainty, which can lead to hopelessness, depression and feelings of abandonment. It negatively affects the patient's meaningful activities (work and social activities) and interactions, ability to continue life roles, ability to work and do recreational activities. Also the results of this study are in accordance with **(Elder, Collett, 2016 and Donisi et al , 2021),** who stated that MS is a stressful condition as a result of its psychological, social, and physical consequences. They also stated that if a chronic

illness is an even a series of stressful events, it follows that how patients deal with these events has an adaptive effect.

Concerning physical adaptation, the present study finding revealed that about two third (57.3%) of the studied patients had low level of adaptation. These come in agreement with **(Ozpulat, 2017),** who reported that this patient visits the doctor frequently and stays in the hospital due to the different symptoms that that emerge with the disease progression. He also added that one out of every ten infected individuals returns to the hospital due to poor adaptation to treatment, and which results in the inefficient use of health services and may disrupt the patient's long-term adaptation to the condition. Also, **(Wilski etal , 2021)** concluded that the adaptation strategies should be carefully considered in patients with MS since the time of diagnosis to encourage their active adjustment to disease and promote better clinical outcomes.

Regarding to overall psychosocial adaptation, the current study findings revealed that more than two third (68.2%) of the studied patients had low level of adaptation since patients express that they were unable to manage their psychosocial problems because they feel frustration and loss of interest in life as a result of their functional impairment, socioeconomic problems, loss of their family role and inability to provide family. This finding is supported by **(Benedict et al, 2020)** who stated the physical disability and cognitive impairment as a result of illness lead to psychological distress, which may appear as substantial limitations to activities of daily living and reduced adaptive capacity.

Furthermore, **Malcomson et al, 2017,** reported that to cope with the disease, patients are required to find ways to modify and/or help them in their psychosocial adjustment to their illness. Various psychosocial therapies, including as cognitive-behavioral therapy, group psychotherapy, and stress management, may be beneficial to these patients. In addition, there is a need to move services provided to patients diagnosed with MS from secondary care to primary care, where the nurses can address their complex psychosocial needs within a multidisciplinary team. In the light of

this, it was noticed that physical disturbance was negatively correlated with physical, psychosocial adaptation strategies.

The results of the current study are in agreement with **(Ben-Zacharia et al, 2021)** who stated that the poor adaptation strategies could influence a patient's ability to manage MS- related pain, adherence to treatments, and promotion of self-care activities.

Adaptive coping strategies may be helpful for patients' synergy with medical approaches to MS regarding early acute phase management and delay of disability progression. In this context, **(Abdel Sayed et al., 2019)** mentioned that depression and anxiety are highly prevalent among patients with MS, and this leads to a decrease in the quality of life. It was also clear that there is significant positive correlation between depression and disability. This means that the more the degree of disability the more sever degree of depression. Also, **(Seyedoshohadaee, etal., 2016)** reported that lack of knowledge with regard to adaptation to the disease and problems in these patients caused various problems and finally led to various complications and their low quality of life. Thus, due to the chronic nature of the disease, type of problems in these patients, inefficiency of drug treatment in solving these problems, and the need to acquire adaptation for continuous care, training can provide active and informed participation of the patients to solve some of their problems.

Finally, we conclude there were difficulties of adaptation among MS patients and the physical and psychosocial aspects of MS are far-reaching and may have devastating effects on individuals and caregivers so, the nurses and families should help patients in increasing their abilities to adapt to new life changes and restrictions. The individualized nature of this chronic illness experience makes comprehensive and ongoing assessment crucial. **(Ghafari et al., 2015)**.

Conclusion:

Based on the results of the current study, it has been concluded that MS is a disabling disease which affects the adaptation and coping ability of the patients. It has a negative impact not only on the physical activities, but also on

the psychological, social and financial aspects of life which enter MS patients in dilemma and affect their ability to adapt with the disturbances caused by the disease. Also, it can be concluded that rehabilitation program must be tailored and added to the care plan of MS patients in order to enhance their adaptation ability.

Recommendations:

- A colored illustrated educational booklet should be available and distributed to all patients with MS.

- Development of structured health education and rehabilitation programs using different educational media for MS patients.

- In service training program should be carried out for nurses working in the MS unit about health education and rehabilitation programs.

- Periodic multidisciplinary scientific meeting should be carried out for physicians, nurses, psycho social consultant about MS, advanced treatment, and rehabilitation program needed.

- Healthcare providers, especially medical surgical, psychiatric nursing staff and social worker should support the patient in developing the ability to adapt in these challenging situations.

- It also appears that psychosocial support should concern the patient and include guidance to the medical staff that directly cares for the MS patient.

References

Abdel Sayed, M. M., Ibrahim, A. F., & Mohamed, A. E. S. H. (2019). Neuropsychiatric Manifestations of Multiple Sclerosis in Egyptian Patients. The Egyptian Journal of Hospital Medicine, 76(2), 3407-3413.

Ahn J, O'Mahony J, Moshkova M, Hanwell H, Singh H, Zhang M, et al (2015). Puberty in females enhances the risk of an outcome of multiple sclerosis in children and the development of central nervous system autoimmunity in mice. Mult Scler.;21:735–48

Anas, E., Mohamed, K., Shurouq, A., & Osama, A. (2018). Approach in diagnosis and management and common mistakes in diagnosis of multiple sclerosis.

Baecher-Allan, C., Kaskow, B. ., & Weiner, H. (2018). Multiple sclerosis: mechanisms and immunotherapy. Neuron, 97(4), 742-768.

Benedict, R.., Amato, M.., DeLuca, J., & Geurts,. J. (2020). Cognitive impairment in multiple sclerosis: clinical management, MRI, and therapeutic avenues. The Lancet Neurology, 19(10), 860-871.

Ben-Zacharia, A. B., Janal, M. N., Brody, A. A., Wolinsky, J., Lublin, F., & Cutter, G. (2021). The Effect of Body Mass Index on Brain Volume and Cognitive Function in Relapsing–Remitting Multiple sclerosis: A CombiRx Secondary Analysis. Journal of Central Nervous System Disease, 13, 11795735211042173.

Berzins, S. A., Bulloch, A. G., Burton, J. M., Dobson, K. S., Fick, G. H., & Patten, S. B. (2017). Determinants and incidence of depression in multiple sclerosis: a prospective cohort study. Journal of Psychosomatic Research, 99, 169-176.

Braley, T. J., Kratz, A. L., Kaplish, N., & Chervin, R. D. (2016). Sleep and cognitive function in multiple sclerosis. Sleep, 39(8), 1525-1533.

Burke, T., Dishon, S., McEwan, L., & Smrtka, J. (2016). The evolving role of the multiple sclerosis nurse: an international perspective. International journal of MS care, 13(3), 105–112. https://doi.org/10.7224/1537-2073-13.3.105.

Carotenuto, A., Costabile, T., Moccia, M., Falco, F., Petracca, M., Satelliti, B., & Lanzillo, R. (2021). Interplay Between Cognitive and Bowel/Bladder Function in Multiple Sclerosis. International Neurourology Journal.

Cifu, D. X. (2020). Braddom's physical medicine and rehabilitation E-book. Elsevier Health Sciences.

Corallo, F., Bonanno, L., Di Cara, M., Rifici, C., Sessa, E., D'Aleo, G., ... & Marino, S. (2019). Therapeutic adherence and coping strategies in patients with multiple sclerosis: an observational study. Medicine, 98(29).

Derogatis, L. R. (1986). The psychosocial adjustment to illness scale (PAIS). Journal of psychosomatic research, 30(1), 77-91.

Dineen-Griffin, S., Garcia-Cardenas, V., Williams, K., & Benrimoj, S. I. (2019). Helping patients help themselves: A systematic review of self-management support strategies in primary health care practice. PloS one, 14(8), e0220116. https:// doi. org/ 10.1371/journal.pone.0220116

Donisi, V., Gajofatto, A., Mazzi, M. A., Gobbin, F., Busch, I. M., Ghellere, A., & Rimondini, M. (2021). A Bio-Psycho-Social Co-created Intervention for Young Adults With Multiple Sclerosis (ESPRIMO): Rationale and Study Protocol for a Feasibility Study. Frontiers in psychology, 12, 215.

Duncan, I. D., Radcliff, A. B., Heidari, M., Kidd, G., August, B. K., & Wierenga, L. A. (2018). The adult oligodendrocyte can participate in remyelination. Proceedings of the National Academy of Sciences, 115(50), E11807-E11816.

Dymecka, J., & Bidzan, M. (2018). Biomedical variables and adaptation to disease and health-related quality of life in Polish patients with MS. International journal of environmental research and public health, 15(12), 2678.

Eladham.M. (2018). Physical and Psychosocial Adaptation Strategies of Patients with Chronic Obstructive Pulmonary Disease. IOSR Journal of Nursing and Health Science (IOSR-JNHS) e- ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 7, Issue 4 Ver. VII (Jul.-Aug. 2018), PP 76-89. www.iosrjournals.org.

Elder t Collett J, . (2016). the Psychological Processes of Adaptation and Hope in Patients with Multiple Sclerosis: A Thematic Synthesis January Open Journal of Therapy and Rehabilitation 4(01).

Elshrnoby O, (2019). Neurological status and Functional Abilities of patients multiple sclerosis,Master thesIis,Faculty of nursing,Alexandria University.

Ghafari S, Fallahi-Khoshknab M, Nourozi K, Mohammadi E (2015). Patients' experiences of adapting to multiple sclerosis: a qualitative study. Contemp Nurse.;50 (1).

Ghasemi, N., Razavi, S., & Nikzad, E. (2017). Multiple sclerosis: pathogenesis, symptoms, diagnoses and cell-based therapy. Cell Journal (Yakhteh), 19(1), 1.

Grech, L. B., Kiropoulos, L., Kirby, K., Butler, E., Paine, M., & Hester, R. (2017). Adaptive coping interventions should be a priority for people with multiple sclerosis and cognitive impairment. Multiple Sclerosis Journal, 23(S3), 82.

Gustavsen, S., Olsson, A., Søndergaard, H.., Andresen, S.., Sørensen, P. S., Sellebjerg, F., & Oturai, A. (2021). The association of selected multiple sclerosis symptoms with disability and quality of life: a large Danish self-report survey. BMC neurology, 21(1), 1-12.

Hartley, S., McArthur, M., Coenen, M., Cabello, M., Covelli, V., Roszczynska-Michta, J.,. (2014). Narratives Re-flecting the Lived Experiences of People with Brain Disorders: Common Psychosocial Difficulties and Determinants 23(3), 1027–1037.

Hauser, S. L., & Cree, B. A. (2020). Treatment of multiple sclerosis: a review. The American Journal of Medicine.

Hernández-Ledesma, A. L., Rodríguez-Méndez, A. J., Gallardo-Vidal, L. S., (2018). Coping strategies and quality of life in Mexican multiple sclerosis patients: Physical, psychological and social factors relationship. Multiple sclerosis and related disorders, 25, 122-

127. https:// doi. org/ 10. 3390/ ijms 160715761.

Hyarat, S. Y., Subih, M., Rayan, A., Salami, I., & Harb, A. (2019). Health related quality of life among patients with multiple sclerosis: the role of psychosocial adjustment to illness. Archives of psychiatric nursing, 33(1), 11-16.

Jankovic, J., Mazziotta, J. C., Pomeroy, S. L., & Newman, N. J. (Eds.). (2021). Bradley's Neurology in Clinical Practice E-Book. Elsevier Health Sciences.

Jennings, K. M. (2017). The Roy adaptation model: a theoretical framework for nurses providing care to individuals with anorexia nervosa. ANS. Advances in nursing science, 40(4), 370.

Karimi, S., Andayeshgar, B., & Khatony, A. (2020). Prevalence of anxiety, depression, and stress in patients with multiple sclerosis in Kermanshah-Iran: a cross- sectional study. BMC psychiatry, 20(1), 1-8.

Livneh, H. (2021). Psychosocial adaptation to chronic illness and disability: An updated and expanded conceptual framework. Rehabilitation Counseling Bulletin, 00343552211034819.

Malcomson, K. S., Dunwoody, L., & Lowe-Strong, A. S. (2017). Psychosocial interventionsin people with multiple sclerosis. Journal of Neurology, 254(1), 1–13.

Marck, C. H., De Livera, A. M., Weiland, T. J., Jelinek, P. L., Neate, S. L., Brown, C. R., Taylor, K. L., Khan, F., & Jelinek, G. A. (2017). Pain in People with Multiple Sclerosis: Associations with Modifiable Lifestyle Factors, Fatigue, Depression, Anxiety, and Mental Health Quality of Life. Frontiers in neurology, 8, 461. https:// doi. org/ 10. 3389/ fneur. 2017.00461.

Mostafa,Z, (2020). Effect of rehabilitation exercise program on health status outcomes of patients multiple sclerosis, PHD, Faculty of nursing, Alexandria University.

Nikolaev, E. L., Karavaeva, T. A., Vasilieva, N. V., Vasilieva, A. V., & Chekhlaty, E. I. (2019). Medico-psychological supporting program of the multiple sclerosis patients: organization stages and tasks. Vm Bekhterev Review Of Psychiatry and Medical Psychology, (2), 95-101.

Ozpulat F. (2017). The role of public health nurses regarding the patient and family centered care provided for chronic illnesses. Turkiye Klinikleri JPublic Health Nurs- special topics; 3(2): 77–82.

Rejali, M., Hosseini, S. , Kazemi Tabaee, M. , & Etemadifar, M. (2016). Assessing the Risk Factors for Multiple Sclerosis in Women of Reproductive Age Suffering the Disease in Isfahan Province. International journal of preventive medicine, 7,58. https:// doi.org/10.4103/2008-7802.178532.

Rocca, M. A., Meani, A., Riccitelli, G. C., Colombo, B., Rodegher, M., Falini, A., & Filippi, M. (2016). Abnormal adaptation over time of motor network recruitment in multiple sclerosis patients with fatigue. Multiple Sclerosis Journal, 22(9), 1144-1153.

Sand, I. K. (2015). Classification, diagnosis, and differential diagnosis of multiple sclerosis. Current opinion in neurology, 28(3), 193-205.

Seyedoshohadaee, M., Parnian, S., Mardani, M., & Haghani, H. (2016). The effects of life skills training on patients' adaptation with multiple sclerosis., 2(4), 215-222.

Shamaa, A., Abdallah, A. N., Bahr, M. M., & El-Tookhy, O. S. (2020). A review: Multiple Sclerosis Treatment: Current Strategies and Future Hopes. Alexandria Journal for Veterinary Sciences, 66(2).

Singh, S., Deshmukh, P., Ungratwar, A., Subramanyam, A. A., & Kamath, R. (2014). Does resilience affect illness perception and well-being in the elderly?. Journal of Geriatric Mental Health, 1(2), 94.

Soundy, A., Roskell, C., Elder, T., Collett, J., & Dawes, H. (2016). The psychological processes of adaptation and hope in patients with multiple sclerosis: a thematic synthesis. Open Journal of Therapy and Rehabilitation, 4(1), 22-47.

Tenager E. A global perspective on the burden of multiple sclerosis. The Lancet Neurology. 2019;18 (3):227-8. doi: 10.1016/S1474-4422(18)30498-8.

The statistical records of the Outpatient Clinc of Hadara Orthopedic and Traumatology University Hospital; Alexandria. 2019.

Thompson, A. J., Banwell, B. L., Barkhof, F., Carroll, W. M., Coetzee, T., Comi, G., & Cohen, J. A. (2018). Diagnosis of multiple sclerosis: 2017 revisions of the McDonald criteria. The Lancet Neurology, 17(2), 162-173.

Vijayasingham, L., & Mairami, F. F. (2018). Employment of patients with multiple sclerosis: the influence of psychosocial–structural coping and context. Degenerative neurological and neuromuscular disease, 8, 15.

Wilski, M., Brola, W., Łuniewska, M., & Tomczak, M. (2021). The perceived impact of multiple sclerosis and self-management: The mediating role of coping strategies. PloS one, 16(3), e0248135.

Yazgan, Y. Z., Tarakcı, E., Gungor, F., & Kurtuncu, M. (2021). Understanding the impact of cognitive impairment and disease severity on activities of daily living in MS patients with different disability levels. Clinical Neurology and Neurosurgery, 200, 106398.

Zahmatkeshan, N., & Delaviz, H. (2017). Effect of isometric exercises on ability and balance of patients with multiple sclerosis. Iranian Rehabilitation Journal, 15(4), 415- 420.

Ziemssen, T., & Thomas, K. (2017). Alemtuzumab in the long-term treatment of relapsing-remitting multiple sclerosis: an update on the clinical trial evidence and data from the real world. Therapeutic advances in neurological disorders, 10 (10), 343.