

## COHESIVE MODEL OF NURSING CARE: IMPLEMENTATION AND EVALUATION FOR PATIENTS WITH MULTIPLE SCLEROSIS

Marwa Abdelhamid Mohammed Mahmoud<sup>1</sup>, Amora Omar Ibrahim Elmowafy<sup>1</sup>, Shima  
Mohamed Abdou Rizk<sup>2</sup>

<sup>1</sup>Lecturer of Medical Surgical Nursing, Faculty of Nursing, Mansoura University, Egypt.

<sup>2</sup>Assistant Professor of Medical Surgical Nursing, Faculty of Nursing, Mansoura University,  
Egypt.

\*Corresponding author: [marwaabdo@mans.edu.eg](mailto:marwaabdo@mans.edu.eg)

### Abstract

In young and middle-aged people, Multiple Sclerosis (MS) is the most frequent reason for disability. MS affects the central nervous system and is a long-term, inflammatory, demyelinating condition. Aim: evaluate the effect of implementing Cohesive Model of Nursing care on treatment adherence and Self-efficacy among patients with multiple sclerosis. A pre/posttest quasi-experimental research design was adopted. Mansoura University Hospital's neurology outpatient clinics and department, Egypt serves as a Setting for the study. Sample: 81 patients were recruited to conduct the study. Data were collected through 4 tools; Tool I: a structured interviewing questionnaire, Tool II: Multiple Sclerosis Knowledge Questionnaire (MSKQ), Tool III: Multiple Sclerosis Treatment Adherence Questionnaire, Tool IV: Multiple Sclerosis self efficacy scale (MSSS). Results showed improvement in mean scores of knowledge, adherence, and self-efficacy in the studied periods pretest, posttest and follow up and found self-efficacy improvement in from pretest with mean 20.70 to 66.48 in posttest and 63.63 in follow up, for level of knowledge in pretest 9.70 and improved to 16.22 in posttest then to 14.67 in follow up. Mean score for adherence improved from pretest with mean 44.83 to 54.30 in posttest and 50.90 in follow up. Conclusion: Cohesive nursing care implementation had a significant impact and improvement on fostering knowledge level, treatment adherence, and self-efficacy among MS patients and can be adopted as a standard model of care. Recommendations: Establishing a consistent nursing care approach through the cohesive model of nursing care to further MS patients in other MS units

**Keywords:** Cohesive Model of Nursing Care, Treatment adherence, Self-efficacy, Multiple Sclerosis

### Introduction

The inflammatory demineralization of the central nervous system in multiple sclerosis (MS), which is thought to be the second most common disabling disease in young adults between the ages of 20 and 40, has a considerable detrimental impact on the lives of patients and their families (Mohammadpour, Yaghoubinia, and Tabas, 2017). The number of MS patients globally is predicted to reach 2.8 million in 2020, up from an estimated 2.3 million in 2013 (The Multiple Sclerosis International Federation Atlas of MS, 2020).

The central nervous system (CNS) is affected by MS, a long-lasting inflammatory and neurodegenerative condition. On imaging scans, plaques or lesions can be seen in the brain and spinal cord, which are indicative of the disease's patchy myelin sheath loss that protects nerve fibers. The CNS's nerves' electrical transmission is disrupted by demyelination, which results in varying modifications to cognitive, motor, and sensory functions. Moreover, there could be ongoing disabilities throughout the range of illness presentations due to permanent and irreversible axonal damage (Harris & Halper, 2016).

According to The Multiple Sclerosis International Federation Atlas, in Egypt, 59,671 patients are living with MS. This translates to 1 in every 1,500 individuals, with the age of 27 years is an average of diagnosis, a female preponderance of 75%, and an annual diagnosis rate of 9,244 new cases of MS. That is 770 diagnoses each month, and 90% of those diagnoses are for relapsing-remitting MS. 10% have MS that progresses (The Multiple Sclerosis International Federation Atlas of MS, 2020). Although the precise causes of the condition are unknown, environmental, and genetic variables such as insufficiency of vitamin D, infections by Epstein-Barr virus, and infections that activate T cells and produce myelin sheaths, such as herpes virus, have been linked to the disorder (El-Tallawy, Farghaly, Badry, Metwally, Shehata et al., 2016). The progression and severity of the disease determine MS various types including, the first is primary progressive MS (PPMS), the second is, relapsing-remitting multiple sclerosis (RRMS), the third is secondary progressive MS (SPMS), and last, clinically isolated condition (Salime, Elzehiri, and Ibrahim, 2022).

MS symptoms can range in severity from mild to severe and are unpredictable. Acute symptoms, sometimes known as exacerbations or relapses, may emerge or develop into chronic symptoms, with functional and clinical worsening characterizing disease progression. Depending on whatever parts of the CNS are affected, each patient has symptoms that are unique in both type and severity. Individuals with MS may have weakness, visual difficulties, exhaustion, bowel and bladder issues, pain, and other strange symptoms. They may also develop sexual dysfunction. Vertigo, tremor, depression, difficulty speaking, cognitive problems, and Lhermitte's sign (a transient sudden electric shock sensation that occurs upon flexion of the neck that extends to the spine and extremities) are other symptoms (Harris & Halper, 2016).

According to the McDonald diagnostic criteria, the presence of spatial and temporal dissemination by either clinical or imaging findings is required for the diagnosis of MS in order to rule out other illnesses (Johansson Skjerbæk, Nørgaard, Boesen, Hvid, et al., 2021). Although multiple sclerosis is possible at any age, it is typically discovered in patients in the age range between twenty and thirty (Razazian, Kazeminia, Moayedi, Daneshkhah, Shohaimi, et al., 2020). There is currently no recognized treatment option for multiple sclerosis. The MS treatment goals focus on symptom management, restrict development of the disease, and speeding up recovery after attacks. Some persons simply display minor symptoms, requiring only minimum medical care. A vital member

of a multidisciplinary team that offers healthcare delivery, skill development, and education to MS patients and their families is the nurse (Thompson, Faan, Mauk, Barrett, Ben-Zacharia, et al., 2011).

Longterm treatment plans are typically necessary for chronic disease management in order to empower the patients. In addition to Disease-Modifying Treatments (DMTs), these plans frequently involve symptom management, supportive care, and rehabilitation. To lessen the likelihood of clinical relapses and maximize the therapeutic effects of MS treatment, compliance with DMTs is crucial (Kołtuniuk Kołtuniuk & Chojdak-Łukasiewicz, 2022). The World Health Organization (WHO) defines adherence as the degree to which a patient adheres to a doctor's recommendations for taking medication, following dietary recommendations, or changing their lifestyle (Alhazzani, Alqahtani, Alamri, Sarhan, Alkhashrami, et al., 2019).

On the other side, disregarding prescribed medications and plans of care raises complications risk, mortality, and healthcare expenses. According to the WHO, following the plans of treatment is a key component of successful treatment. Ineffective compliance lowers the desired therapeutic results, which lowers the effectiveness of healthcare systems (World Health Organization, 2003). Age, gender, socioeconomic status, patient attitude, MS type, side effects of drug, amnesia, anxiety, depression, and cognitive issues are just a few of the variables linked to treatment adherence. Other factors include the type of MS, the patient's attitude, and the limited treatment efficacy. Detection and removal of these influences improve treatment compliance and assist in selecting the best MS treatment (Kazemi, Rakhshan, Rivaz, & Izadi, 2022).

Bandura (1997) made the initial proposal for the idea of self-efficacy through his theory of self-efficacy which focuses on personal beliefs that influence one's capacity to manage disease-related symptoms (Hejazizadeh, Pazokian, & Nasiri, 2020). The primary requirement for behavior change, including the adoption of healthy habits, is self-efficacy. It is a crucial internal aspect for control and management of this condition, especially considering the chronic nature of the disease by encouraging safe, maximum function, facilitating symptom management that is wellness-focused, and supporting disease-modifying medicines. Nursing management for MS patients attempts both to control and affect the patient's illness. The MS Nursing Certification (MSCN) was created by the International Organization of Multiple Sclerosis Nurses (IOMSN) and the Multiple Sclerosis International Certification Board in recognition of the importance of MS nursing education, clinical practice, advocacy, and research on a global scale and the high standards of care in these areas (Thompson et al., 2011).

MS nursing practice through the comprehensive cohesive model is a gold standard of care across all nursing domains related to MS. Independent of the disease's categorization or the severity of a patient's disability, it makes up a comprehensive, cogent model of nursing care for patients with MS. There are three key categories of comprehensive cohesive model for MS nursing practice: the

first is establishing care, the second is continuing care, and the last is sustaining care (Harris & Halper, 2016). At the time of diagnosis, Establishing Care via educating patients and their families on MS, its symptoms, and self-management skills is crucial. This is the first part of cohesive model for MS nursing practice. The second part of the continuum of care is continuing care; the duty of the nurse in this part is to promote patient health by acting as an advocate, counselor, and educator. Maintaining patient wellbeing, acting as advisors when the requirements of patients and families change, coordinating referrals, and identifying community and information resources are the key goals of the third component, sustaining care (Maloni & Hillman, 2015).

### **Significance of Study**

Despite having relatively low prevalence rates, MS is a debilitating chronic condition with significant social and economic repercussions. As its duration is extended, increased incidence among productive young individuals, and the following early losses due to physical disability, weariness, and other factors, the MS burden is greater than that of Alzheimer's disease and stroke (El-Tallawy et al, 2016). Despite recent therapeutic developments, MS still has no recognized cure. As a result, it appears that ongoing care is required to prevent disease complications and recurrence. This care can be provided using the cohesive model of nursing care that is regarded as the gold standard of care in clinical practice (Kazemi, Rakhshan, Rivaz, & Izadi, 2022). So, the study was aimed to determine the effect of Cohesive Model of Nursing care on treatment adherence and Self-efficacy among MS patients.

### **3. Aim of the Study**

#### **The purpose of the study was to:**

Evaluate the effect of implementing the Cohesive Model of Nursing care on treatment adherence and Self-efficacy among patients with multiple sclerosis.

#### **Research hypothesis**

- The Cohesive Model of Nursing care will improve patients' knowledge regarding multiple sclerosis.
- The Cohesive Model of Nursing care will improve adherence to treatment.
- The Cohesive Model of Nursing care will improve MS patients' self-efficacy.

#### **Subjects and Methods**

##### **Research Design**

This study employed a pre/posttest quasi-experimental research design.

##### **Research Setting**

This research was conducted at the Mansoura University Hospital's neurology outpatient clinics and department.

##### **Subjects:**

A purposive sample of 81 patients. The calculation of the sample size was done using <https://clinical.com/stats/samplesize.aspx> (software for sample size calculation) at Alpha error 5%

(95% significance level) and 20% B error (power of study 80%) based on difference between patients' Knowledge about MS before and after implementing the educational program (El-Kattan & El-Zayat, 2019). The sample size was (74) and an additional 10% was added to account for dropouts to be (81). Male and female patients between the ages of 20 and 60 were chosen as participants based on the following inclusion criteria: diagnosed with multiple sclerosis as confirmed by medical records, accessible at the time the data was collected, able to converse, and ready to engage in the study.

Patients possessing a considerable disability, according to score of "The Expanded Disability Status Scale (EDSS)" 4 or higher were excluded. The EDSS was created by Kurtzke (1983) to determine multiple sclerosis patients' level of disability and track changes over time. It is based on scoring a few functional system scores (FSS) obtained from a neurological test. Half points are awarded for greater specificity and the scale runs from 0 to 10. Higher numbers denote a larger degree of disability, while lower numbers imply a less severe condition. It should be emphasized that before enrolling in the trial, one of the researchers measured the EDSS score on patients with the assistance of a physician. Moreover, patients having severe disease complications, mental illness, cognitive impairment, and apparent hearing or vision impairment were also excluded.

#### **Tools to conduct the study:**

##### **Tool I: Structured Interview Questionnaire:**

Based on a review of relevant literatures, the researchers developed this tool, which has two sections:

Section 1: demographic information about the patients, including their age, sex, marital status, occupation, level of education, income, and residence.

Section 2: Medical Health Status of patients, such as type of Multiple Sclerosis, duration of the disease, frequency of recurrence, and the number of hospitalizations.

##### **Tool II: Multiple Sclerosis Knowledge Questionnaire:**

It is a self-evaluation tool that was adapted and created by (Giordano, Uccelli, Pucci, Martinelli, Borreani et al., 2010) for MS patients to gauge their understanding of their condition. It has 25 multiple-choice questions, which the researchers reduced to 24. Each question's correct response receives a grade of one, while an incorrect response or an unanswered question receives a score of zero. A total of 24 degrees were used to calculate the total knowledge score (24). It was converted to percentages and given a grade of poor knowledge (less than 50%; 12 to less than 18 grade), moderate knowledge (50% to less than 75%; 12 to less than 18 grade), and good knowledge (equal and more than 75%; 18-24 grade).

##### **Tool III: Multiple Sclerosis Treatment Adherence Questionnaire:**

This instrument was developed in the United States by Wicks, Massagli, Kulkarni, and Dastani (2011) to identify barriers to adherence in patients with MS receiving disease-modifying therapy (DMTs). It consists of 30 items broken down into three subscales; the first is the DMT-Barriers, the second is the DMT-Side Effects, and the last is DMT-Coping Strategies. Thirteen questions about obstacles to adherence were asked to patients when they miss one dosage at least during the past 28 days on the DMT-Barrier's subscale. The DMT-Barrier's subscale is scored utilizing a

Likert scale with four points, where zero denoting "not important at all" and three denoting "very essential." Scores can range from "0 to 39," with lower values denoting improved adherence. Ten side effects of therapy that could have an adverse impact on compliance were included in the DMT-Side Effects subscale.

#### **Tool IV: Multiple Sclerosis self efficacy scale (MSSS)**

In England, this instrument was created by Rigby, Domenech, Thornton, Tedman & Young (2003). The MSSS consists of 14 questions, which are organized into four dimensions: independence and activity (five questions), worries and interests (four questions), personal control (three questions), and social confidence (two items). The responses of patients based on a Likert scale with six points ranged from strongly disagree (1) to strongly agree (6). As a result, the total score may be anything from 6 and 84, with a higher self-efficacy level represented through higher scores. The subscales, scores could be added up to determine scale's overall score.

#### **Tool validity:**

Seven specialists in the fields of medical surgery nursing and neurology served as a jury to assess the study instruments' validity by looking at their clarity, relevance, understanding, and suitability for use. The necessary adjustments were made in accordance with their suggestions.

#### **Test reliability:**

Reliability was assessed to determine whether all study tool items measure the same variable and how conceptually well the items used fit together. The tools' internal consistency was evaluated through using the test of Cronbach's alpha. The reliability of the produced tool was estimated to be equal, for Knowledge (0.914), 0.848 for adherence and 0.888 for self-efficacy.

#### **Pilot study:**

Pilot research was carried out on 8 patients (10% of the sample) in order to assess the usefulness, accuracy, and applicability of the study tools and make the required adjustments. Also, it gave an estimation of how long it would take to complete the questionnaires. Following the pilot research, adjustments were made in light of the findings. None of the patients who took part in the pilot research were included in the study's sample.

#### **Ethical consideration:**

To acquire authorization to do the study, a formal letter was sent by the Mansoura University nursing faculty to the hospital's administrative authority. In order to get their approval to interview the patients, the head of the neurological department was told of the study's objectives, its start date, and its start time. All patients who contributed to the study had the opportunity to stop participating whenever they liked or decline to answer a specific question without providing a justification after being aware of the study's goals and methodology. The confidentiality and anonymity of the subject's data are maintained by the researchers.

#### **Field Work**

Collection of the data started in September 2021 and continued through March 2022. The following phases of the investigation were involved:

#### **Preparatory Phase**

It involved creating organized tools. The researchers created Tool I by following a careful assessment of the related literature and various scholarly references (Baecher-Allan, Kaskow & Weiner, 2018; Oliveira-Kumakura, Bezutti, Silva & Gasparino, 2019; Hauser & Cree, 2020; Habibi, Sedighi, Jahani, Hasani & Iranpour, 2021). Tool II and Tool III were used. In accordance with the needs identified, goals, priority of care, and anticipated outcomes, a comprehensive cohesive model of nursing care for patients with MS was developed and centered on enhancing treatment adherence and self-efficacy of the patients. In order to provide patients with a comprehensive overview of the important information pertaining to therapies, a colorful, structured illustration book, PowerPoint presentations, and posters were created.

### **Implementation Phase**

For the pre-test, Patients who met the criteria for inclusion were gathered by the researchers from the inpatient and outpatient departments at the aforementioned setting. For the participant in the study, it took 20 to 30 minutes to complete the demographic, medical history, Multiple Sclerosis Treatment Adherence Questionnaire, and Multiple Sclerosis Self-Efficacy Scale (MSSS) questionnaires.

For post-test, The Multiple Sclerosis Treatment Adherence Questionnaire and the Multiple Sclerosis Self Efficacy Scale (MSSS) post-test took about 15-20 minutes to complete, and the results were used to assess the effectiveness of the comprehensive cohesive model of nursing care for patients with multiple sclerosis.

### **Application of comprehensive cohesive model of nursing care:**

According to the cohesive model of nursing care, activities that are crucial to the care of patients with multiple sclerosis can be divided into three primary categories: establishing care, continuing care, and sustaining care. All MS patients, regardless of disease classification or degree of disability, can get care using this framework, which is made up of these three interconnected domains. Three theoretical and practical seminars illustrated these areas:

**First session (Establishing Care):** Following the pretest, the first session (Establishing Care) began with a face-to-face interview and was a theoretical session. The purpose of this session is to support the development of a solid therapeutic alliance between nurses and patients and to lay the groundwork for empowerment, supportive attitudes, and hope. Building trust, forming partnerships, identifying information needs, exchanging information, and evaluating each patient's support system are all part of the process of establishing care.

**Second session (Continuing Care):** The objective of the second session (Continuing Care), which was performed through face-to-face interviews, was to concentrate on promoting patient health. It was a combination of a theoretical and practical session. In the context of ongoing care, nurse educator (nurses teach patients practical approaches for managing disease symptoms, medication side effects, stressing the importance of adherence to treatment). In addition to providing medical care, nurses also act as counselors, assisting patients in implementing self-care techniques that can improve their health and give them a sense of control over their sickness (self-injection, wellness strategies, focused on diet, exercise, and coping with stress). In addition to

assisting patients with family and employment concerns, nurses can also help them navigate the various health and life-related uncertainties that come with having MS.

Third session (Sustaining Care): focused on preserving patient wellbeing and was a combination of a theoretical and practical session that was conducted via face-to-face interview. When the needs of patients and families change, the nurses arrange referrals, discover information and community resources, and act as consultants. calls for the formation of cooperative liaisons between MS nurses and other medical specialists.

Each session began with a recap of the information presented in the previous session, followed by the goals of the new topics, taking into account the use of straightforward language to meet the level of the patients. The duration of each session varied depending on its content and the patient's reaction, and the patients were present throughout the intervention sessions. During sessions, learning was improved through discussion, inspiration, and reinforcement. Each client received direct reinforcement in the form of a copy of the content to have to hand for future reference.

#### Evaluation Phase

Reassessing the study variables and comparing the results before, immediately, and after 3 months of the nursing model's implementation help in determining how well patients with multiple sclerosis adhere to their treatment regimens and feel self-efficient.

#### Statistical Analysis:

With the aid of the IBM SPSS software package version 20.0, data was input into the computer for analysis (Armonk, NY: IBM Corp). Number and percentage were used to describe qualitative data. The normality of the distribution was examined using the Kolmogorov-Smirnov test. The range (minimum and maximum), mean, standard deviation, and median were used to characterize quantitative data. The 5 percent level was used to determine the significance of the data that were obtained. ANOVA with repeated measures, Cronbach's Alpha, Friedman test, F-test (ANOVA), Student t-test , Mann Whitney test, and Kruskal Wallis test were the tests that were utilized.

#### Results

**Table (1): Demographic distribution of the patients under the study (n =81)**

Demographic data	No.	%
<b>Age</b>		
<30	13	16.0
30-<40	28	34.6
40-<50	20	24.7
≥50	20	24.7
Min. – Max.	18.0 – 68.0	
Mean ± SD.	40.30 ± 10.85	
Median	39.0	
<b>Sex</b>		
Male	19	23.5
Female	62	76.5

Marital status		
Married	60	74.1
Single	21	25.9
<b>Educational level</b>		
Illiterate	31	38.3
Intermediate	43	53.1
High	7	8.6
<b>Employment</b>		
Employed	25	30.9
Non employed	56	69.1
<b>If yes</b>		
Need physical effort	20	80.0
Not need physical effort	5	20.0
<b>Residence</b>		
Alone	8	9.9
With others	73	90.1
<b>Income</b>		
Enough	34	42.0
Not enough	47	58.0

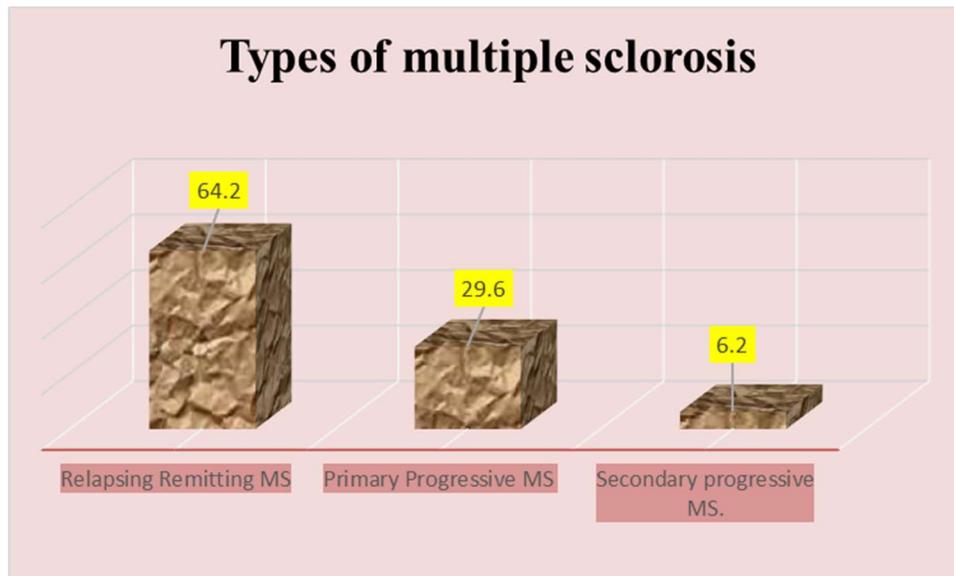
SD: Standard deviation

**Table (2): Data about the distribution of the studied patients based on their medical health status (n =81)**

Medical Health Status of patients	No.	%
<b>Date Or Duration of Disease</b>		
Min. – Max.	1.0 – 5.0	
Mean ± SD.	3.51 ± 1.48	
Median	4.0	
<b>Type of disease</b>		
Relapsing Remitting MS	52	64.2
Secondary progressive MS	5	6.2
Primary Progressive MS	24	29.6
<b>Hospitalization before</b>		
Yes	18	22.2
No	63	77.8
<b>Number of hospitalizations</b>		
Nothing	63	77.8
Once	4	4.9
Twice	5	6.2
Three times	4	4.9

Four times	5	6.2
Min. – Max.	0.0 – 4.0	
Mean ± SD.	0.57 ± 1.19	
Median	0.0	
<b>Number Of Relapses</b>		
Nothing	18	22.2
Once	23	28.4
Twice	19	23.5
Three times	9	11.1
Four times	6	7.4
Five times	6	7.4
Min. – Max.	0.0 – 5.0	
Mean ± SD.	1.75 ± 1.49	
Median	1.0	
<b>Signs and Symptoms</b>		
Pain	81	100.0
Fatigue	81	100.0
Speaking Problem	22	27.2
Mobility Problem	78	96.3
Vision Problem	42	51.9
Bladder Problem	31	38.3

SD: Standard deviation



**Figure (1): Distribution of the patients under the study based on types of multiple sclerosis (n =81)**

**Table (3): Comparison of study periods based on MS knowledge among the studied patients (n = 81)**

	Pretest	Posttest	Follow up		p
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Tool II: Multiple Sclerosis Knowledge Questionnaire	No.	%	No.	%	No.	%	Test of sig.	
Poor <50%	62	76.5	7	8.6	15	18.5	Fr= 116.404*	<0.001*
Moderate 50 - <75%	19	23.5	44	54.3	53	65.4		
Good ≥75%	0	0.0	30	37.0	13	16.0		
<b>Total Score</b>							F= 326.282*	<0.001*
Min. – Max.	5.0 – 15.0		9.0 – 23.0		8.0 – 23.0			
Mean ± SD.	9.70 ± 2.75		16.22 ± 3.33		14.67 ± 3.24			
Median	9.0		16.0		15.0			

SD: Standard deviation

Fr: Friedman test

F: F test (ANOVA) with repeated measures

p: p value for comparing between the studied groups.

\*: Statistically significant at  $p \leq 0.05$ .

**Table (4): Comparison of the study periods based on MS Treatment Adherence Questionnaire (n = 81)**

Tool III: Multiple Sclerosis Treatment Adherence Questionnaire	Pretest	Posttest	Follow up	Fr.	p
<b>DMT-Barriers</b>					
<b>Total Score</b>					
Min. – Max.	7.0 – 18.0	30.0 – 39.0	24.0 – 37.0	157.080*	<0.001*
Mean ± SD.	10.86 ± 2.28	34.85 ± 1.80	30.86 ± 3.33		
Median	11.0	35.0	31.0		
<b>MT-Side Effects</b>					
<b>Total Score</b>					
Min. – Max.	24.0 – 35.0	7.0 – 16.0	9.0 – 20.0	142.231*	<0.001*
Mean ± SD.	30.26 ± 2.74	12.85 ± 1.91	14.02 ± 2.18		
Median	31.0	13.0	14.0		
<b>DMT-Coping Strategies</b>					
<b>Total Score</b>					
Min. – Max.	1.0 – 6.0	5.0 – 7.0	4.0 – 7.0	132.007*	<0.001*
Mean ± SD.	3.70 ± 1.05	6.59 ± 0.54	6.01 ± 0.84		
Median	4.0	7.0	6.0		
<b>Overall adherence</b>					
<b>Total Score</b>					
Min. – Max.	35.0 – 53.0	52.0 – 60.0	42.0 – 58.0	131.316*	<0.001*
Mean ± SD.	44.83 ± 3.73	54.30 ± 1.97	50.90 ± 3.38		

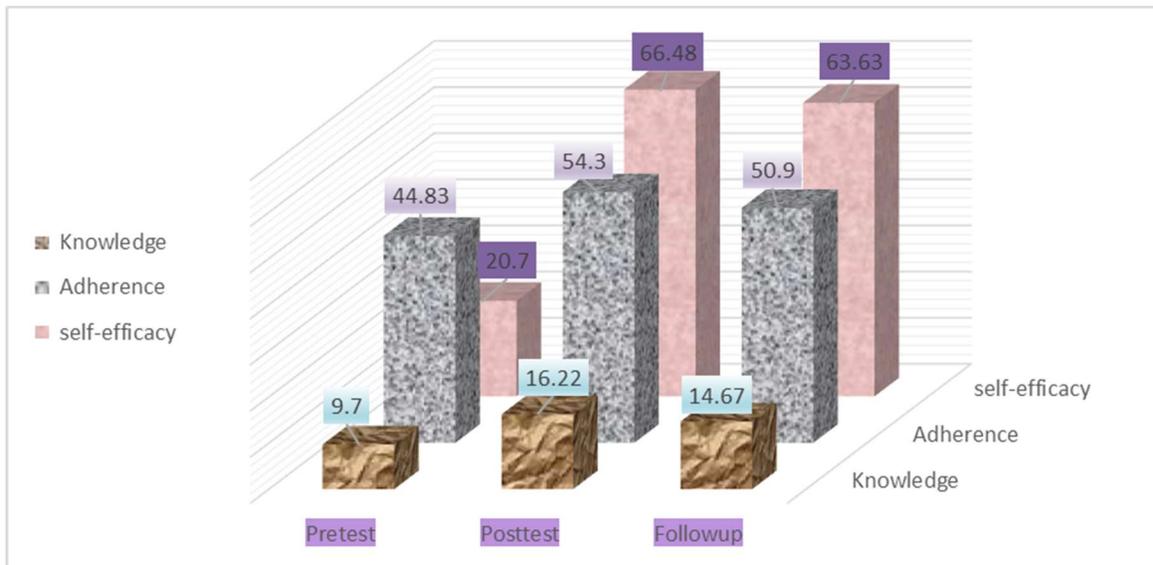
Median	45.0	54.0	51.0		
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SD: Standard deviation Fr: Friedman test  
 p: p value for comparing between the studied groups.  
 \*: Statistically significant at  $p \leq 0.05$

**Table (5): Comparison of study periods based on self-efficacy for studied patients (n = 81)**

Tool III: Multiple Sclerosis self-efficacy scale (MSSS)	Pretest	Posttest	Follow up	Fr	p
<b>Total Score</b>					
Min. – Max.	14.0 – 32.0	59.0 – 74.0	56.0 – 70.0		
Mean ± SD.	20.70 ± 5.12	66.48 ± 3.49	63.63 ± 3.81	138.141*	<0.001*
Median	21.0	66.0	65.0		

SD: Standard deviation Fr: Friedman test  
 p: p value for comparing between the studied groups.  
 \*: Statistically significant at  $p \leq 0.05$



**Figure (1): Figure (2): comparison between Mean Scores knowledge, adherence, and self-efficacy in the studied periods Pretest, Posttest and 3 months posttest (n =81)**

**Table (6): Relation between knowledge with demographic data for studied patients (n = 81)**

Demographic data	Overall knowledge (total Score)		
	Pretest	Posttest	Follow up
	Mean ± SD.	Mean ± SD.	Mean ± SD.
<b>Age</b>			
<30	10.08 ± 2.72	16.62 ± 3.43	14.54 ± 3.69
30-<40	9.46 ± 3.00	16.46 ± 3.88	15.21 ± 3.54
40-<50	9.45 ± 2.39	15.40 ± 2.87	13.80 ± 3.07
≥50	10.05 ± 2.86	16.45 ± 2.93	14.85 ± 2.66
<b>F(p)</b>	<b>0.306 (0.821)</b>	<b>0.539 (0.657)</b>	<b>0.765 (0.517)</b>
<b>Sex</b>			
Male	9.79 ± 2.37	16.89 ± 3.59	15.95 ± 3.36
Female	9.68 ± 2.87	16.02 ± 3.25	14.27 ± 3.13
<b>t(p)</b>	<b>0.155(0.877)</b>	<b>1.007(0.317)</b>	<b>2.006*(0.048*)</b>
<b>Marital status</b>			
Single	10.33 ± 3.21	16.48 ± 3.88	14.71 ± 3.64
Married	9.48 ± 2.55	16.13 ± 3.14	14.65 ± 3.12
<b>t(p)</b>	<b>1.225 (0.224)</b>	<b>0.404 (0.687)</b>	<b>0.078 (0.938)</b>
<b>Educational level</b>			
Illiterate	11.61 ± 2.65	17.52 ± 2.85	15.06 ± 3.09
Intermediate	8.79 ± 2.08	15.86 ± 3.34	14.77 ± 3.36
High	6.86 ± 0.90	12.71 ± 2.29	12.29 ± 2.43
<b>F(p)</b>	<b>20.177*(&lt;0.001*)</b>	<b>7.548*(0.001*)</b>	<b>2.209 (0.117)</b>
<b>Employment</b>			
<b>Employed</b>			
Employed	12.80 ± 1.94	18.84 ± 2.01	16.08 ± 2.90
Non employed	8.32 ± 1.74	15.05 ± 3.14	14.04 ± 3.21
<b>t(p)</b>	<b>10.339*(&lt;0.001*)</b>	<b>6.514*(&lt;0.001*)</b>	<b>2.726*(0.008*)</b>
<b>If yes</b>			
Need physical effort	13.55 ± 1.32	19.00 ± 1.45	15.70 ± 2.56
Not need physical effort	9.80 ± 0.45	18.20 ± 3.70	17.60 ± 3.97
<b>t(p)</b>	<b>10.535*(&lt;0.001*)</b>	<b>0.474(0.658)</b>	<b>1.331 (0.196)</b>
<b>Residence</b>			
Alone	14.25 ± 0.46	20.00 ± 1.07	17.38 ± 2.20
With others	9.21 ± 2.41	15.81 ± 3.23	14.37 ± 3.21
<b>t(p)</b>	<b>15.472*(&lt;0.001*)</b>	<b>7.841*(&lt;0.001*)</b>	<b>2.576*(0.012*)</b>
<b>Income</b>			
Enough	10.79 ± 3.16	17.03 ± 3.16	15.29 ± 2.79
Not enough	8.91 ± 2.10	15.64 ± 3.36	14.21 ± 3.49
<b>t(p)</b>	<b>3.017*(0.004*)</b>	<b>1.886 (0.063)</b>	<b>1.494 (0.139)</b>

t: Student t-test

F: F for One way ANOVA test

p: p value for comparison between the studied categories

\*: Statistically significant at  $p \leq 0.05$

**Table (7): Relation between treatment adherence with demographic data for studied patients (n=81)**

Demographic data	Overall adherence (total Score)		
	Pretest	Posttest	Follow up
	Mean $\pm$ SD.	Mean $\pm$ SD.	Mean $\pm$ SD.
<b>Age</b>			
<30	45.15 $\pm$ 2.67	55.15 $\pm$ 2.38	52.46 $\pm$ 2.60
30-<40	44.64 $\pm$ 3.12	53.79 $\pm$ 1.66	50.71 $\pm$ 2.71
40-<50	45.10 $\pm$ 4.49	54.20 $\pm$ 1.96	51.15 $\pm$ 3.73
$\geq$ 50	44.60 $\pm$ 4.45	54.55 $\pm$ 2.01	49.90 $\pm$ 4.08
<b>H(p)</b>	<b>0.271 (0.965)</b>	<b>3.822 (0.281)</b>	<b>6.022(0.111)</b>
<b>Sex</b>			
Male	45.68 $\pm$ 4.47	53.63 $\pm$ 1.50	50.16 $\pm$ 2.97
Female	44.56 $\pm$ 3.47	54.50 $\pm$ 2.06	51.13 $\pm$ 3.49
<b>U(p)</b>	<b>465.50 (0.167)</b>	<b>453.50 (0.125)</b>	<b>479.0 (0.218)</b>
<b>Marital status</b>			
Single	44.10 $\pm$ 3.13	54.67 $\pm$ 2.31	50.57 $\pm$ 3.43
Married	45.08 $\pm$ 3.91	54.17 $\pm$ 1.84	51.02 $\pm$ 3.38
<b>U(p)</b>	<b>507.50 (0.185)</b>	<b>564.0 (0.470)</b>	<b>619.0 (0.905)</b>
<b>Educational level</b>			
Illiterate	43.39 $\pm$ 4.36	54.87 $\pm$ 2.08	51.48 $\pm$ 3.34
Intermediate	45.81 $\pm$ 3.01	54.00 $\pm$ 1.81	50.40 $\pm$ 3.57
High	45.14 $\pm$ 3.02	53.57 $\pm$ 2.07	51.43 $\pm$ 1.81
<b>H(p)</b>	<b>7.509*(0.023*)</b>	<b>4.791(0.091)</b>	<b>2.221 (0.329)</b>
<b>Employment</b>			
<b>Employed</b>			
Employed	42.20 $\pm$ 4.32	54.72 $\pm$ 2.09	50.28 $\pm$ 2.64
Non employed	46.00 $\pm$ 2.75	54.11 $\pm$ 1.90	51.18 $\pm$ 3.65
<b>U(p)</b>	<b>303.50* (&lt;0.001*)</b>	<b>579.50 (0.211)</b>	<b>594.50 (0.278)</b>
<b>If yes</b>			
Need physical effort	40.80 $\pm$ 3.25	55.00 $\pm$ 2.15	50.00 $\pm$ 2.73
Not need physical effort	47.80 $\pm$ 3.56	53.60 $\pm$ 1.52	51.40 $\pm$ 2.07
<b>U(p)</b>	<b>5.000*(0.001*)</b>	<b>31.00 (0.216)</b>	<b>41.0 (0.575)</b>
<b>Residence</b>			
Alone	40.00 $\pm$ 2.45	53.63 $\pm$ 1.85	49.38 $\pm$ 2.73
With others	45.36 $\pm$ 3.47	54.37 $\pm$ 1.98	51.07 $\pm$ 3.42
<b>U(p)</b>	<b>56.50* (&lt;0.001*)</b>	<b>221.500 (0.257)</b>	<b>199.50 (0.141)</b>
<b>Income</b>			
Enough	43.76 $\pm$ 4.30	54.32 $\pm$ 2.14	49.65 $\pm$ 3.35
Not enough	45.60 $\pm$ 3.08	54.28 $\pm$ 1.86	51.81 $\pm$ 3.13

U(p)	616.50 (0.079)	780.00 (0.853)	491.50*(0.003*)
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U: Mann Whitney test      H: H for Kruskal Wallis test

p: p value for comparison between the studied categories

\*: Statistically significant at  $p \leq 0.05$

**Table (8): Relation between overall self-efficacy with demographic data for studied patients (n=81)**

Demographic data	Overall Self-efficacy (total Score)		
	Pretest	Posttest	Follow up
	Mean $\pm$ SD.	Mean $\pm$ SD.	Mean $\pm$ SD.
<b>Age</b>			
<30	19.77 $\pm$ 4.97	66.15 $\pm$ 4.41	63.38 $\pm$ 4.68
30-<40	20.96 $\pm$ 4.60	67.57 $\pm$ 2.94	63.96 $\pm$ 3.68
40-<50	21.20 $\pm$ 5.71	65.40 $\pm$ 3.50	63.55 $\pm$ 3.59
$\geq$ 50	20.45 $\pm$ 5.60	66.25 $\pm$ 3.37	63.40 $\pm$ 3.84
<b>H(p)</b>	<b>1.302 (0.729)</b>	<b>4.794 (0.188)</b>	<b>0.765 (0.858)</b>
<b>Sex</b>			
Male	21.37 $\pm$ 6.24	67.21 $\pm$ 3.58	63.53 $\pm$ 3.61
Female	20.50 $\pm$ 4.77	66.26 $\pm$ 3.46	63.66 $\pm$ 3.89
<b>U(p)</b>	<b>553.0 (0.686)</b>	<b>526.0 (0.480)</b>	<b>557.0 (0.719)</b>
<b>Marital status</b>			
Single	20.62 $\pm$ 5.00	67.05 $\pm$ 3.50	63.95 $\pm$ 4.30
Married	20.73 $\pm$ 5.21	66.28 $\pm$ 3.49	63.52 $\pm$ 3.65
<b>U(p)</b>	<b>610.0 (0.828)</b>	<b>550.0 (0.386)</b>	<b>546.0 (0.361)</b>
<b>Educational level</b>			
Illiterate	19.29 $\pm$ 5.32	66.84 $\pm$ 3.40	66.10 $\pm$ 1.94
Intermediate	21.35 $\pm$ 5.16	66.28 $\pm$ 3.72	61.53 $\pm$ 3.88
High	23.00 $\pm$ 1.73	66.14 $\pm$ 2.54	65.57 $\pm$ 1.27
<b>H(p)</b>	<b>5.210 (0.074)</b>	<b>1.282 (0.527)</b>	<b>26.504*(&lt;0.001*)</b>
<b>Employment</b>			
<b>Employed</b>			
Employed	17.88 $\pm$ 5.37	68.04 $\pm$ 2.82	66.40 $\pm$ 1.71
Non employed	21.96 $\pm$ 4.51	65.79 $\pm$ 3.56	62.39 $\pm$ 3.84
<b>U(p)</b>	<b>348.0*(&lt;0.001*)</b>	<b>417.0*(0.004*)</b>	<b>251.50*(&lt;0.001*)</b>
<b>If yes</b>			
Need physical effort	16.30 $\pm$ 2.23	68.05 $\pm$ 2.48	66.80 $\pm$ 1.58
Not need physical effort	24.20 $\pm$ 9.34	68.00 $\pm$ 4.30	64.80 $\pm$ 1.30
<b>U(p)</b>	<b>39.0 (0.488)</b>	<b>44.50 (0.717)</b>	<b>17.00* (0.024*)</b>
<b>Residence</b>			
Alone	18.13 $\pm$ 2.59	69.75 $\pm$ 1.91	66.88 $\pm$ 1.13
With others	20.99 $\pm$ 5.26	66.12 $\pm$ 3.44	63.27 $\pm$ 3.83
<b>U(p)</b>	<b>200.50 (0.144)</b>	<b>94.0*(0.002*)</b>	<b>100.500*(0.002*)</b>

<b>Income</b>			
Enough	20.56 ± 5.12	66.82 ± 3.33	63.38 ± 4.23
Not enough	20.81 ± 5.18	66.23 ± 3.61	63.81 ± 3.51
<b>U(p)</b>	<b>775.0 (0.817)</b>	<b>716.0 (0.425)</b>	<b>793.0 (0.954)</b>

**U: Mann Whitney test      H: H for Kruskal Wallis test**

p: p value for comparison between the studied categories

\*: Statistically significant at  $p \leq 0.05$

**Table (9): Correlation between knowledge, overall adherence, and self-efficacy (n = 81)**

Items		Pretest	Posttest	Follow up
<b>Knowledge vs. Overall adherence</b>	<b>r</b>	-0.487*	-0.153	-0.164
	<b>p</b>	<0.001*	0.172	0.144
<b>Knowledge vs. self-efficacy</b>	<b>r</b>	-0.531*	0.427*	0.139
	<b>p</b>	<0.001*	<0.001*	0.216
<b>Overall adherence vs. self-efficacy</b>	<b>r</b>	0.378*	-0.148	0.235*
	<b>p</b>	<0.001*	0.187	0.034*

r: Pearson coefficient

\*: Statistically significant at  $p \leq 0.05$

### Results:

Table 1: reveals that 76.5% of the studied nurses were females, 34.5% of them were in age group 30→40 with the mean age of 40.3 years, 74.1 % of nurses were married and 90.1 of them live with others family member. As regards to level of education, 53.1 had intermediate education. 69.1% of not employed and 58% of them had no enough income.

Table 2: reveals that mean of disease duration was 3.51 years while 22.2 % of patients hospitalized before and only 6.2% hospitalized four times. Related to number of relapse 28.4% relapse one time. All patients complained from pain and fatigue while 38.3% felt bladder problems related to signs and symptoms.

Figure 1: as regards to MS types, the underlying figure shows that 64.2 % of the patient had Relapsing Remitting MS, 29.6% had Primary Progressive MS and only 6.2% had Secondary progressive MS.

Table 3: displays a comparison of the studied periods based on knowledge level and found that 23.5% of the patients had moderate level of knowledge in pretest and improved to 54.3% in posttest then to 65.4 % in follow up. With a p value of less than 0.001, the difference between the pretest, posttest, and follow-up periods in the study periods was highly statistically significant.

Table 4: shows comparison between the studied periods according to multiple sclerosis treatment adherence questionnaire and found that there was improvement in overall adherence domains from pretest with mean  $44.83 \pm 3.73$  to  $54.30 \pm 1.97$  in posttest and  $50.90 \pm 3.38$  in follow up. With a p value of less than 0.001, the difference between the studied periods of the pretest, posttest, and follow-up was highly statistically significant.

Table 5: displays a comparison between the studied periods according to multiple sclerosis self-efficacy scale and found that there was improvement in self-efficacy from pretest with mean  $20.70 \pm 5.12$  to  $66.48 \pm 3.49$  in posttest and  $63.63 \pm 3.81$  in follow up. There was a highly statistically significant difference in the studied periods between pretest, posttest and follow up with p value <0.001.

Figure (2): displays comparison of the mean scores for self-efficacy, adherence, and knowledge during the research studied periods pretest, posttest and follow up and found that there was improvement in self-efficacy from pretest with mean 20.70 to 66.48 in posttest and 63.63 in follow up, for level of knowledge in pretest 9.70 and improved to 16.22 in posttest then to 14.67 in follow up. Mean score for adherence improved from pretest with mean 44.83 to 54.30 in posttest and 50.90 in 3 months posttest.

Table 6: reveals relation between overall knowledge with demographic information and found that there was there was a highly statistically significant difference in educational level and pretest and posttest periods & a highly statistically significant difference between pretest and posttest periods with p value <0.001 for employment and residence, but with a p value of less than 0.004, the difference between the monthly income and pretest was statistically significant..

Table 7: reveals relation between overall adherence with demographic data and found a highly statistically significant difference in employment and pretest with & a highly statistically significant difference between pretest with p value <0.001 for residence but there was there was statistically significant difference between the educational level and pretest with p value <0.023.

Table 8: reveals relation between overall self-efficacy with demographic data and found that there was a highly difference that is statistically significant between the educational level and follow up with p value <0.001. There was there was a highly statistically significant difference in employment in pretest and 3 months posttest with p value <0.001 and statistically significant difference with posttest with p value <0.004. There was a statistically significant difference between residence and posttest and follow up periods with p value <0.002.

Table 9: reveals Correlation between knowledge, overall adherence and self-efficacy and found that there was a highly difference which is statistically significant between Knowledge and Overall adherence with p value <0.001 in pretest period. There was a highly statistically significant difference between Knowledge and self-efficacy with p value <0.001 in pretest and posttest

periods. There was a highly statistically significant difference between Overall adherence vs. self-efficacy with  $p$  value  $<0.001$  in pretest period. Finally, there was a negative correlation between Knowledge and overall adherence during all periods of the study.

## Discussion

The human central nervous system is impacted by MS, an autoimmune inflammatory demyelination disease. The condition is accompanied by a wide range of symptoms, such as decreased motor function, bladder & bowel dysfunction, fatigue, visual disturbances, diplopia, imbalance, and emotional-cognitive disorders (Schaeffer, Cossetti, Mallucci & Pluchino, 2015). MS affects 2.8 million persons globally (Walton, King, Rechtman, Kaye, Leray, et al., 2020).

Assisting patients in overcoming psychological, cognitive, and physical barriers to therapy is one way that nurses can engage as an advocate. As a result, they actively participate in decision-making and treatment options. The principles of effective symptom management and coping methods are necessary knowledge for patients with multiple sclerosis (Shawli, Abdulmutalib & Nagshabandi, 2019). Consequently, the aim of this study was to evaluate the knowledge, treatment adherence, and self-efficacy of MS patients, as well as to implement a cohesive model of nursing care and analyze its effect on patients' knowledge, treatment adherence, and self-efficacy.

The six key aspects of this study's discussion are as follows: data of the patients regarding demographic and medical health status; implementation of the Cohesive Model of Nursing Care's effect on patients' knowledge; the effect of implementing the Cohesive Model of Nursing care on patient's adherence to treatment; the effect of implementing the Cohesive Model of Nursing care on patient's self-efficacy; relationships between patients, demographic characteristics and study variables; as well as correlation between study variables.

### **Regarding studied patients, demographic and medical health status data:**

According to the study findings, more than one-third of the studied patients were between ages of thirty to less than forty years old with mean age ( $40.30 \pm 10.85$ ) years. Additionally, more than two thirds were females, these results concur with those of El-Kattan and El-Zayat (2019) who reported in their study done on Egyptian MS patients evaluating self-care education program's effect on their Quality of Life, about two thirds of Participants were females and About half of them aged 30 to  $<40$  years old. As well as, Al Wutayd, Mohamed, Saeedi, Otaibi, & Jumah (2018) reported that females represents over one third of research participants and in age range between 18 and 40 years old. This may be linked to female hormones during this period of age.

The study's findings regarding marital status demonstrated that over two-thirds of the patients were married. This result is validated by Pourfarid, Dehghani, and Hojat (2021) who said that patients were married in almost two-thirds of cases. Additionally, Dashti, Yousefi, Maghsoudi, and Etemadifar (2016) revealed that most patients were married. In contrast, Afrasiabifar, Mehri, and Shirazi (2020) stated that more than half of the participants were single. This can be the result of the setting's unique characteristics and the varied characteristics of the individuals under study.

In terms of employment, this study illustrated that studied patients were unemployed in over two thirds of the studied participants. This finding is validated by Radmehr, Meghdadi, Bahmanzadeh,

& Sabbagh (2015) who clarified that the bulk of the study's participants were unemployed. Additionally, Rakhshan, Ganjalivand, Zarshenas, & Majdinasab (2018) clarified that greater than 50% of the patients were unemployed. However, these findings run counter to Estrutti, Cardoso, Novais, Oliveira, & Bichueti (2019) who reported in their study of about employment status of MS diagnosed people in Brazil that about two thirds of participants had jobs.

The current study's findings regarding residence showed that patients living with others were most of the sample. This results is coherent with Bass, Van Wijmeersch, Mayer, Mäurer, Boster, et al. (2020) who stated that most of patients lived with others. Also, Da Silva, Takemoto, Damasceno, Fragoso, Finkelsztejn, et al. (2016) reported that the vast majority of patients were married or living with family.

The current study's findings regarding income found that over 50% of the patients in the study had insufficient income. It is coherent with study done in Egypt by ABDEL-AZEM, FOUAD, and IBRAHIM (2021) who reported that 24.8% didn't have enough income and Insufficient income forced 49.2% of patients to take out loans.

As detected from the study findings, the mean disease duration was  $(3.51 \pm 1.48)$  years and roughly two thirds (64.2%) of participants have Relapsing Remitting MS. This finding is sustained by Salime, Elzehiri, and Ibrahim (2022) who reported that almost 50% of the studied sample disease duration ranged from 2-5 years and about two third of them has Relapsing Remitting MS. Additionally, Dashti, Yousefi, Maghsoudi, and Etemadifar (2016) said that approximately two thirds (65.4%) of patients have the disease from 1-4 years. In contrast, Gerges, Alesh, Khalil, and El Din (2018) revealed that the mean disease duration was 14.5 years, ranged from 1 to 28 years among the cases.

Additionally, the findings of the current investigation indicated that fatigue and pain were prevailing among patients being studied. It is coherent with an Egyptian study done by Shawli, Abdulmutalib, and Al Nagshabandi (2019) who mentioned that majority of MS patients (approximately two thirds) have severe physical fatigue, while a minority experience medium and a fourth experience light physical fatigue. Additionally, Oliva Ramirez, Keenan, Kalau, Worthington, Cohen et al. (2019) discovered that MS frequently manifests as fatigue, which has a substantial negative impact on quality of life and financial stability.

#### **Effect of Implementing the Cohesive Model of Nursing Care on patient's Knowledge:**

The study's results found that greater than 75% of patients had "poor" understanding about Multiple Sclerosis (MS) before implementing the Cohesive Model of Nursing care, according to the overall patients, knowledge score. This level of knowledge was improved immediately and after 3 months post implementing the cohesive model of nursing care. These results come in accordance with Egyptian study by Salime, Elzehiri, and Ibrahim (2022) who showed that about three quarters of the MS patients lacked adequate information pre nursing intervention, but after the nursing intervention, most of them had good understanding of the disease.

Moreover, ABDEL-AZEM, FOUAD, and IBRAHIM (2021) revealed through the program phases of preprogram, post, and follow up (3 months post program's implementation), there was a considerable rise in dietary awareness that was statistically significant among Multiple Sclerosis

patients; 85.2 percent, and 80 percent, of MS patients, respectively, had satisfactory levels of dietary knowledge in posttest and follow up tests, as compared to 2.8 percent in the pretest.

**Effect of implementing the Cohesive Model of Nursing care on patient's adherence to treatment:**  
Regarding adherence to treatment, the study found that compared to before applying the Cohesive Model of Nursing care, the total score of the patient's treatment adherence saw a statistically significant improvement both immediately post implementation and 3 months later. This finding is agreed with Mohammadpour, Yaghoubinia, and Tabas (2017) who made it clear that putting self-management programs in place improved patient's treatment adherence across all subscales and offered patients the capacity to handle symptoms and coping methods better. Also, Taibanguay, Chaiamnuy, Asavatanabodee, and Narongroeknawin (2019) concluded that treatment adherence is considerably improved by patient education.

**Effect of implementing the Cohesive Model of Nursing care on patient's self-efficacy:**

Concerning patient's self-efficacy, the study results determined a significantly higher mean self-efficacy score immediately ( $66.48 \pm 3.49$ ) and follow up ( $63.63 \pm 3.81$ ) post implementing the cohesive model of nursing care compared to pre implementation ( $20.70 \pm 5.12$ ). This result is coherent with Hemmati Maslarpak & Raiesi (2014) who clarified that the intervention group's mean self-efficacy scores considerably improved ( $59.80 \pm 5.27$ ) than control group ( $50.90 \pm 5.71$ ) after an MS patient self-management program was put in place. Additionally, Dahmardeh & Amirifard (2018) claimed that patients' self-efficacy in controlling their multiple sclerosis increased thanks to a program concerning self-care built on the Orem model. Moreover, Kazemi, Rakhshan, Rivaz, and Izadi (2022) reported that the intervention group outperformed the control group in terms of self-efficacy and treatment adherence using a smartphone application, both immediately following the session and at the two-month follow-up.

**Relationships between patients' demographics and research variables:**

The study's findings demonstrate that there is a relation between a patient's educational attainment and overall knowledge both before and immediately after the cohesive model of nursing care was implemented, which is a statistically significant. It follows in the footsteps of Shawli, Abdulmutalib, and Al Nagshabandi's (2019) argument that multiple sclerosis patients with lower educational levels affected negatively on the course of their disease through the adoption of unhealthy lifestyles, as opposed to those with higher levels of education.

As detected from the study findings prior to the implementation of the cohesive model of nursing care, the patient's educational level and overall adherence had a statistically significant relation. It agrees with Rimkus, Avolio, Miotto, Pereira, Mendes, et al. (2018) who clarified that low education levels might indirectly contribute to poor treatment adherence. Additionally, Alhazzani, Alqahtani, Alamri, Sarhan, Alkhashrami, et al. (2019) claimed that patients with higher levels of education exhibit higher treatment adherence.

**Correlation between study variables:**

Regarding the correlation between study variables, A highly statistically significant difference was found in the study's findings between Knowledge and Overall adherence. Additionally, Knowledge and self-efficacy had a high difference, which is statistically significant with a p value

of less than 0.001. Moreover, a highly statistically significant difference was found between Overall adherence and self-efficacy pre implementation of the cohesive model of nursing care. It is consistent with the findings of Abd Elsalam & Ali (2022) who stated that MS patients' self-management characteristics, such as knowledge, adherence, and self-efficacy, all had a favorable statistically significant correlation.

Finally, these previous results emphasize the significance of the cohesive nursing care model on the adherence to treatment and the level of self-efficacy in MS patients as its implementation proved successful in enhancing those patients' adherence to treatment and self-efficacy. It was determined that the research hypothesis was shown to be correct.

### **Conclusion**

As a consequence of the study, the researchers concluded that; implementing cohesive model of nursing care had a great impact and improvement on promoting the knowledge level, treatment adherence, and self-efficacy among patients with multiple sclerosis and can be used as a routine model of care.

### **Recommendations**

The following recommendations are put out considering the findings of the current study:

- Dissemination of cohesive model of nursing care among other patients in other MS units.
- Researches should be done in the future to study the effect of cohesive model of nursing care on MS patients on another sample and different setting.

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