

Effect of A health Promotion Self-Care Program on Knowledge, Health Promoting Behaviors and Quality of life for Patients with Multiple Sclerosis: A quasi-Experimental Study

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Abstract

Background: Multiple Sclerosis is a long-term autoimmune, neurodegenerative and inflammatory condition that impacts on the central nervous system. This study **aimed** to evaluate the effect of a health promotion self-care program on knowledge, health promoting behaviors and quality of life for patients with multiple sclerosis. A quasi-experimental (pre/posttest) **research design** was utilized to conduct the study. **Setting:** The study was conducted at Neurology Outpatient Clinic at Benha Health Insurance Hospital, Benha City, Egypt. **Sampling:** A simple random sample was used to select 133 patients with multiple sclerosis. **Three tools** were used to collect data: I: Interviewing questionnaire divided into three parts including the sociodemographic characteristics, health related data, and patients' knowledge regarding multiple sclerosis disease, II: The Health-Promoting Lifestyle Profile II (HPLP II), and III: Hamburg Quality of Life Questionnaire for MS. **Results** showed that after applying the health promotion self-care program, there was a significant difference in the mean scores of knowledge, health promoting behavior, and quality of life of patients with MS ($p < 0.001$), the scores were significantly higher in posttest. **Conclusion:** The health-promoting self-care program had a substantial positive impact on MS patients' knowledge, health promoting behaviors, and quality of life. **Recommendations:** Incorporate the health-promoting self-care programs into routine care for individuals with MS to enhance knowledge, health promoting behaviors, and quality of life. In addition, provide continuous education and support to sustain the improved knowledge and health promoting behaviors over time.

Keywords: Health Promotion Self-Care Program, Health Promoting Behaviors, Knowledge, Multiple sclerosis, Patients & Quality of life

Introduction

Multiple Sclerosis (MS) is a long-term autoimmune, neurodegenerative and inflammatory condition that impacts on the Central Nervous System (CNS) with an unclear etiology. Immune dysregulation is a hallmark of multiple sclerosis, causes immune cells to infiltrate CNS, resulting in neurodegeneration, axonal injury, and demyelination. Among young adults, it is the most prevalent non-traumatic debilitating illness. MS is twice as common in women and most cases are identified between the ages of 20 and 40. An estimated 2.8 million persons globally (35.9 per 100,000 population) have MS, and the frequency is rising (Walton et al., 2020 & Rodríguez et al., 2022).

Focused lymphocytic CNS infiltration causes myelin deterioration and axonal damage, which causes symptoms related to the nervous system and physical impairment in MS. The location of CNS lesions affects the clinical symptoms of MS. Also fatigue,

pain, sensory impairment, sexual, bladder, and bowel dysfunction, visual problems, motor, and cognitive dysfunction are among the many symptoms of MS, which vary in substance and severity from mild to severe (Henson et al., 2024).

Around the age of 15, major environmental exposures linked to the development of adult MS occur. Risk exposures may happen in pregnancy and in newborns age, according to new researches. For example, maternal illnesses other than diabetes and pre-eclampsia during pregnancy are linked to an elevated risk of pediatric-onset. Post-summer birth is less prevalent and post-winter delivery is more frequent in MS patients; however, there is some disagreement as to whether this is because of residual confounding. White people are more likely to develop MS if they have lower vitamin D levels during pregnancy or infancy (Waubant et al., 2019).

The physical, mental, and social aspects of a person's health are all impacted by MS. Doctors and medical professionals should focus especially on MS patients'

self-care in addition to medication therapy. The disease's symptoms can have an adverse impact on a patient's QOL, and in addition to causing bodily discomfort, the difficulties can put the patient and the family under financial, social, and emotional strain. The capacity of individuals to play a role in life, the career position, and subsequently the QOL (i.e., the physical and mental health) are all significantly impacted by this disease, which lowers the personal and social achievements (Aghayi et al., 2017 & Momenabadi et al., 2020).

Health promotion programs will be more successful if they provide a suitable model for promoting health, provide care of essential health needs, and encourage self-care practices that promote health. Which include (self-efficacy, self-esteem, social support, perceived barriers and benefits, awareness, resilience, and sense of coherence). These results then aid in discovering and understanding the essential components for long-term modifications in behavior (Estebarsari et al., 2018).

Health promotion is the primary technique for motivating individuals to have healthy lifestyles and preventing non-communicable diseases. The six fundamental components of healthpromoting behaviors are selfactualization, interpersonal relationships, physical activity, diet, stress management and health responsibility. The outcome of certain studies on MS patients indicates that self-care promoting behaviors assist patients in managing the adverse consequences of the illness such as stress and depression, increase self-esteem, meet the basic medical needs, enhance the effectiveness of programs for health promotion, and help identify the essential components of long-term behavior modification (Alzahrani, et al., 2019 & Momenabadi, et al., 2020).

Nurses serve a crucial part in promoting the health of MS patients by educating those who have been diagnosed and the families about the disease's progression, available treatments, and self-management techniques. Offer emotional support and counseling as well, assisting people in managing the difficulties posed by multiple sclerosis. Work with the medical team to create individualized treatment plans, prescribe the right drugs, and instruct patients in self-care practices. Nurses help patients maintain and increase the mobility through exercise assistance, mobility aids, and energy conservation education, encourage independence in everyday tasks, and maximize the quality of life. Contribute significantly to encouraging a healthy lifestyle and avoiding MS-related problems through assisting with the adoption of self-care techniques, stress management, regular exercise, and a balanced diet. Emphasize the benefit

of preventative actions as well, routine health checkups (Hernandez, 2024; Thornton et al., 2024).

Significance of the Study

The progressive disability caused by multiple sclerosis has a significant impact on quality of life. Health programs that address the needs and demands of individuals with MS are crucial to minimizing QoL impairment. Promoting self-care program as a critical strategy for enhancing the quality of life in patients with MS is a challenging issue (Robles-Sanchez et al., 2023). The MS prevalence in Egypt ranged from 1.41% to 14.1%, with Cairo having the highest distribution of cases. At Assuit, the stated prevalence was 0.4%, but in Cairo, it was 1.78%. The MS prevalence in Al-Qusair City was 1.37%. Other centers in Egypt showed a higher prevalence of MS (25/100.000) (Ramadan et al., 2023).

Public health initiatives have increased, but there is still a shortage of health promotion programming for individuals with disabilities, and programs clearly need to be more widely disseminated and reached. There are numerous and well-established advantages to people with MS using physical activity and health-promoting activities in the daily life. (MacDonald et al. 2017; Rooddehghan et al., 2023). Therefore, health Promotion self-care program can enhance MS patients' knowledge, health promoting behavior and quality of life.

Aim of the Study

This study aimed to evaluate the effect of a health promotion self-care program on knowledge, health promoting behaviors and quality of life for patients with multiple sclerosis.

Research Hypotheses

Null hypotheses:

H0: The patients' knowledge, health promoting behavior, and QoL will be not improved after applying the health promotion self-care program.

Alternative hypotheses:

H1: The knowledge of patients with MS will be higher after applying the health promotion self-care program.

H2: The health promoting behavior of patients with MS will be improved after applying the health Promotion self-care program.

H3: After applying the health promotion self-care program, the quality-of-life of patients with MS will be improved.

Subjects & Methods

Research design:

This study used a quasi-experimental design (one group pre/post-test).

Setting:

The study was conducted at Neurology Outpatient Clinic at Health Insurance Hospital at Benha City in Egypt.

Subjects:

The sample size consisted of 133 patients with multiple sclerosis selected randomly from the previous setting. The sample size was determined using the following formula:

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

Where 'n' is sample size.

'N' is total number of multiple sclerosis patients in 2023 (200).

e' is coefficient factor= 0.05

Tools of data collection:

Three tools were used:

Patients' interviewing questionnaire: It consisted of three parts:

- **First part:** Includes the sociodemographic characteristics of the patients under study, including their age, sex, residence, marital status, level of education, occupation, and monthly income.
- **Second Part:** Concerned with patient's health related data which included 8 items (disease duration, stages, follow up, treatment methods, symptoms, family history of MS, current smoking status, and other chronic diseases).
- **Third part:** Knowledge questionnaire adapted from (Kamal, 2022): This part includes 10 questions formulated by the researchers to assess patients' knowledge regarding MS (meaning, causes, risk factors, clinical manifestation, types, complications, factors leading to multiple sclerosis relapse, diagnosis tests, prevention, and management of MS).

Knowledge scoring system: Each correct and complete answer was taken (2points), (1point) for correct and incomplete answer, while (0 point) for don't know or incorrect answer. The total score is the sum of points (20). The total score then categorized into three levels as: **Good:** when the total score was between 75% and 100% (more than 15 points), **Average** if 50% to less than 75% (10–15 points). **Poor:** when the total score was less than 50% (<10 points) (Kamal, 2022).

Tool (II): The Health-Promoting Lifestyle Profile II (HPLP II): Developed by Walker et al., 1987. A 4-point Likert scale consists of 52 items measuring the individual's health-promoting behaviors towards a healthy lifestyle. This questionnaire includes 6 dimensions (health responsibility, physical activity, nutritional habits, spiritual growth, interpersonal relation, and stress management). This tool has been translated and validated to be use in Arabic by Haddad, et al., 1998.

Scoring system: Each item in the HPLP II was taken 1 (never), 2 (sometimes), 3 (often), 4 (routinely). To calculate an overall health-promoting behavior score, the individual's responses to all 52 items were averaged. Six subscale scores were calculated similarly by computing the mean of the replies to each subscale item. As the mean score rises, the rating of health-promoting behaviors increases (Momenabadi et al., 2020).

Tool (III): The Hamburg quality of life questionnaire for MS (HAQUAMS): Adapted from (Gold et al, 2001) it consists of 35 questions in 9 domains (sensory symptoms, fatigue/cognitive function, vision, mobility/lower extremities, mobility/upper extremities, bladder/bowel/sexuality, communication, mood and handicap).

Scoring system: Each item of the HAQUAMS taken 1 point (not at all), 2 points (a little bit), 3 points (somewhat), 4points (quite bit), and 5points (very much). Questions number (11, 19, 21, 29, 30, 31, and 32) are negatively worded questions, these were considered in statistical analysis. The total score is the sum of all items (175), then transformed into a percentage score and categorized as the (Pawar, 2006).

- Good QoL: If the total score < 60 % (< 105 points).
- Poor QoL: If the total scores ≥ 60 % (≥ 105 points).
- The Higher scores indicate low QoL.

Tools' Validity:

A team of five Community Health & Medical Surgical Nursing experts from Benha University examined the materials to verify the information's accuracy and make sure it was relevant, applicable, and thorough.

Tools' Reliability:

The Cronbach's Alpha coefficient test was used to assess reliability. The consistency was shown by the knowledge questionnaire's internal consistency (0.814), the health promotion lifestyle's internal consistency (0.842), and the QOOL's internal consistency (0.849). The tools' reliability indicates that they had homogenous items.

Pilot Study:

A pilot study was conducted on thirteen individuals (10%) of the study sample, to ensure that the study aids were easy to use and relevant. Furthermore, to recognize any challenges that the researchers may encounter during the data collection process. The patients who took part in the pilot were excluded.

Administrative process:

A formal letter from the dean of Faculty of Nursing, Benha University was sent to the director of Neurology Outpatient Clinic at Health Insurance Hospital in Benha City for a legal permission to carry out the study after explanation of its purpose.

Ethical consideration:

An ethical approval was obtained from the Benha University Nursing Faculty's Scientific Research Ethical Committee (No16). The researchers explained the study's objectives to each patient in order to obtain their informed consent to participate. Additionally, they assured the patients can withdraw from the study at any time. The researchers further disclosed to the participants that all data was utilized only for study.

Field Work

The main stages which utilized to conduct the study were assessment, planning, implementation, and evaluation. The study was conducted over ten Months period, beginning in the start of May 2024 to the end of February 2025. Three days a week, from 9:00 am to 1:00 pm. To implement the program and give the patients the instructional content and learning materials, the researchers scheduled meetings with the patients.

The health Promotion Self-Care Program was carried through:

Assessment phase: For the purpose to collect baseline data, the patients were interviewed. At the beginning of the interview, the researchers met each patient, discussed the objectives, schedule, and study activities, and obtained oral consent. This phase lasted roughly six weeks (pretest).

Planning phase: The researchers developed the health promotion self-care program in accordance with patient needs identified during the assessment phase, taking into account relevant literature. Using basic Arabic, the researchers calculated the number of sessions, topics, various teaching methods, and media depending on the patient's understanding level. After that, objectives of the program were made as follows:

- **The general objective** of the health promotion self-care program was to enhance patients' knowledge, health promoting behavior and QOL regarding MS.
- **Specific objectives:** After the health Promotion Self-Care Program, the studied patients should be able to:

Identify Knowledge about:

- Meaning, causes, and high-risk people for MS.
- Clinical manifestation, types, complications of MS.
- Factors leading to multiple sclerosis relapse, diagnostic tests of MS.
- Prevention and management of MS.

Obtain specific Practical skills toward

- Health promoting behaviors (health responsibility, physical activity, nutrition, spiritual, personal relation, and stress management).
- Quality of life (sensory symptoms, fatigue/cognitive function, vision, mobility/lower extremities, mobility/upper extremities, bladder/bowel/sexuality, communication, mood and handicap).

Implementation phase:

The developed health promotion self-care program was implemented for studied patients through two – three groups per day (ranged from 3-4 patients per group) during the patients' follow up visits in Outpatient Clinic. It was conducted in 6 sessions (four sessions for the practical part and two for the theoretical part). Every session lasted for thirty to forty-five minutes. A variety of teaching methods were used, including lectures, discussion groups, and instructive PowerPoint. The health promotion self-care program began with the distribution of educational booklets to every patient. During the first session, a quick overview of the program and its goals was given. Each session started with a summary of the previous one. The curriculum was put into practice during the program sessions.

Theoretical sessions (2 sessions)

- The first session: Included a quick overview of the program and goal and an explanation about meaning, causes, and high-risk people for MS, manifestation, and types of MS.
- The second session: Included an explanation about complications, factors leading to multiple sclerosis relapse, diagnosis, prevention, and management of MS.

Practical sessions (4 sessions)

- The first session: Included activities about how to promote health responsibility, physical activity, and nutrition.
- The second session: Included how to promote spiritual, personal relation and stress management.
- The third session: Involved how to improve sensory symptoms, fatigue/cognitive function, vision, mobility/lower extremities, mobility/upper extremities.
- The fourth session: Included how to improve bladder/bowel/sexuality, communication, mood and handicap.

Evaluation phase:

The effect of the health Promotion Self-Care Program was evaluated immediately through posttest using the same tools utilized in pre-test.

Statistical analysis:

IBM SPSS software package version 28.0 was used for data analysis. Quantitative data were described using number and percent, mean \pm standard deviation. Paired sample t-test used to compare means between pre & posttests, significance of the obtained results was judged at the 5% level. Spearman correlation test (r) was used to determine the correlations between the study variables.

Results**Table (1): Sociodemographic Characteristics of Patients with MS (n = 133)**

Variables	Frequency	Percent
Age		
< 20 years	10	7.5
20-<30 years	44	33.1
30-< 40 years	58	43.6
40-< 50 years	12	9.0
>= 50 years	9	6.8
Sex		
Male	42	31.6
Female	91	68.4
Residence		
Urban	50	37.6
Rural/	83	62.4
Marital Status		
Single	26	19.5
Married	64	48.1
Divorced	33	24.8
Widowed	10	7.6
Level of Education		
Illiterate	3	2.3
Primary	15	11.3
Secondary	46	34.6
University	64	48.1
Postgraduate Degree	5	3.8
Occupation		
Working	81	60.9
Not working	52	39.1
Income		
Enough	61	45.9
Not Enough	72	54.1

Table (2): Health Related Data for Patients with MS (n = 133)

Present History	No	%
Duration of MS		
<2 years	55	41.4
2 – 5 years	47	35.3
>5 year	31	23.3
Stage of MS		
Clinically isolated syndrome (CIS)	43	32.3
Primary progressive MS (PPMS)	10	15.8
Secondary progressive MS (SPMS)	21	7.5
Relapsing-remitting MS (RRMS)	14	10.5
Don't Know	45	33.8
Follow up		
Every 3 months	39	29.3
Every 6 months	63	47.4
Every year	24	18.0
As needed	7	5.3
*Treatment Methods of MS		
Injection	93	69.9
Oral	51	38.3
Intravenous	13	9.8
Corticosteroids	11	8.3
Plasma pharse	23	17.3
Immunotherapy	4	3.0
Physiotherapy	44	33.1

Present History	No	%
Family History of MS		
Yes	44	33.1
No	89	69.6
Current smoking Status		
Yes	33	24.8
No	100	75.2
Other Chronic Diseases		
Hypertension	13	9.8
Diabetes Mellitus	10	7.5
Cardiac Diseases	3	2.3
Kidney Diseases	6	4.5
Cancer	3	2.3
Respiratory Diseases	1	0.8
Hematologic Disorders	2	1.4
None	95	71.4

*Answers aren't mutual exclusive

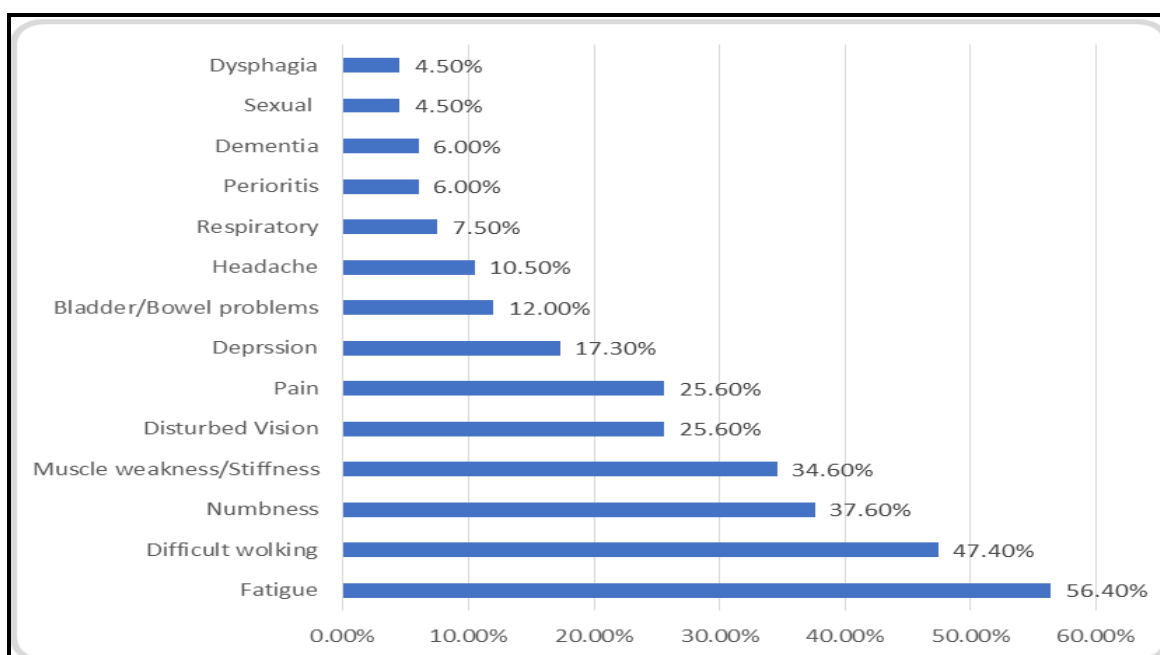


Figure (1): Symptoms Experienced by Patients with MS (n = 133)

Table (3): Knowledge of the Patients with MS in Pre & Posttest (n = 133)

Knowledge regarding MS	Mean Scores		t-test	p-value
	Pretest	Posttest		
Meaning	0.17±0.48	1.86±0.44	29.57	0.000**
Causes	0.35±0.65	1.88±0.44	22.29	0.000**
Risk Factors	0.26±0.55	1.86±0.44	24.69	0.000**
Clinical Manifestations	1.25±0.83	1.98±0.15	9.75	0.000**
Types of MS	0.38±0.70	1.76±0.55	19.17	0.000**
Complications	0.56±0.81	1.68±0.56	12.97	0.000**
Factors worsen symptoms	0.36±0.57	1.86±0.42	24.3	0.000**
Diagnostic Tests	0.36±0.57	1.91±0.33	25.6	0.000**
Prevention	0.44±0.63	1.93±0.28	22.74	0.000**
Management	1.29±0.62	1.95±0.21	11.91	0.000**
Total Knowledge	5.4±2.3	18.7±1.3	59.3	0.000**

(**) highly statistically significant at ($p < 0.001$)

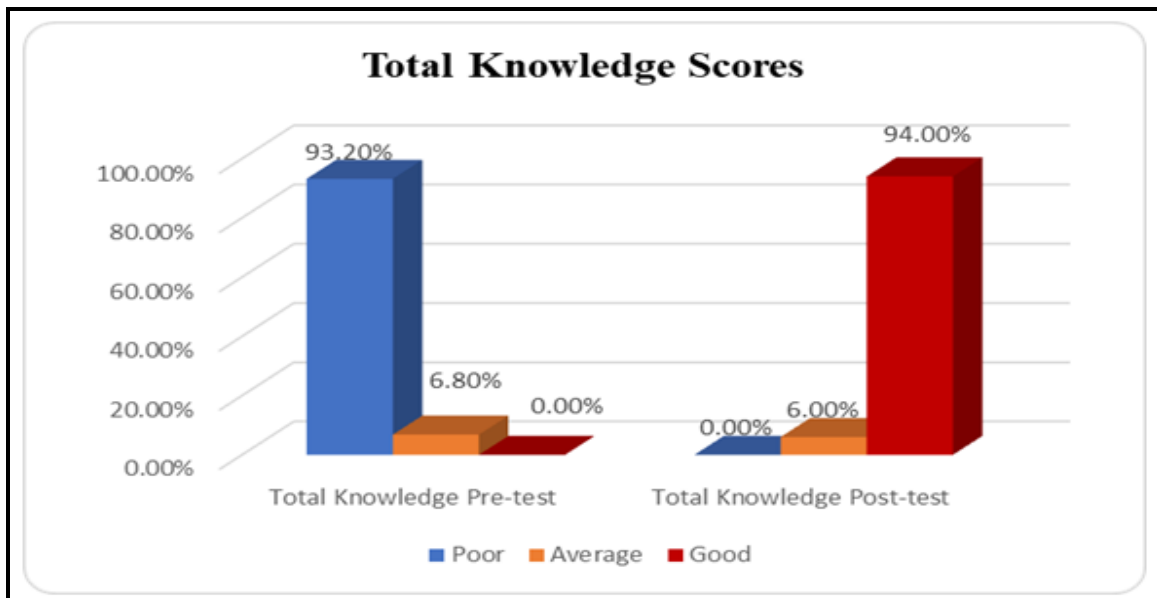


Figure (2): Percentage Distribution of Total Knowledge level of Patients with MS in Pre & Posttests (n = 133)

Table (4): Health promoting behaviors of Patients with MS in pre & Post-test (n = 133)

Health Promotion	Mean Scores		t-test	p-value
	Pretest	Posttest		
1. Health Responsibility	16.0±2.8	23.7±3.7	17.6	0.000**
2 Physical Activity	12.0±2.4	23.7±3.7	35.0	0.000**
3. Nutritional Habits	17.6±2.8	27.2±4.7	21.6	0.000**
4. Spiritual Growth	16.6±3.0	29.7±3.4	37.1	0.000**
5. Interpersonal Relationship	16.4±3.3	30.4±5.0	30.5	0.000**
6. Stress Management	14.1±3.1	26.6±4.0	33.7	0.000**
Overall	92.6±7.5	161.2±12.6	60.7	0.000**

(**) highly statistically significant at ($p < 0.001$)

Table (5): Quality of Life of Patients with MS in pre & Post-test (n = 133)

Quality of Life	Mean Scores		t-test	p-value
	Pretest	Posttest		
Sensory symptoms	6.8±1.7	4.0±2.0	14.7	0.000**
Fatigue/Cognitive Functioning	10.7±2.8	5.9±2.3	18.1	0.000**
Vision	3.2±1.4	2.1±1.4	9.0	0.000**
Mobility/Lower Extremities	16.31±2.7	10.2±3.4	18.5	0.000**
Mobility/Upper Extremities	16.0±2.8	7.7±4.4	19.0	0.000**
Bladder/Bowel/Sexuality	8.1 ±3.0	7.2±2.7	3.1	0.003
Communication	16.1±3.4	10.3±2.6	16.5	0.000**
Mood	25.4±4.5	23.7±6.9	2.7	0.009**
Handicap	9.7±3.8	5.2±3.4	11.2	0.000**
Overall	112.3±10.3	76.3±11.3	30.4	0.000**

(**) highly statistically significant at ($p < 0.001$)

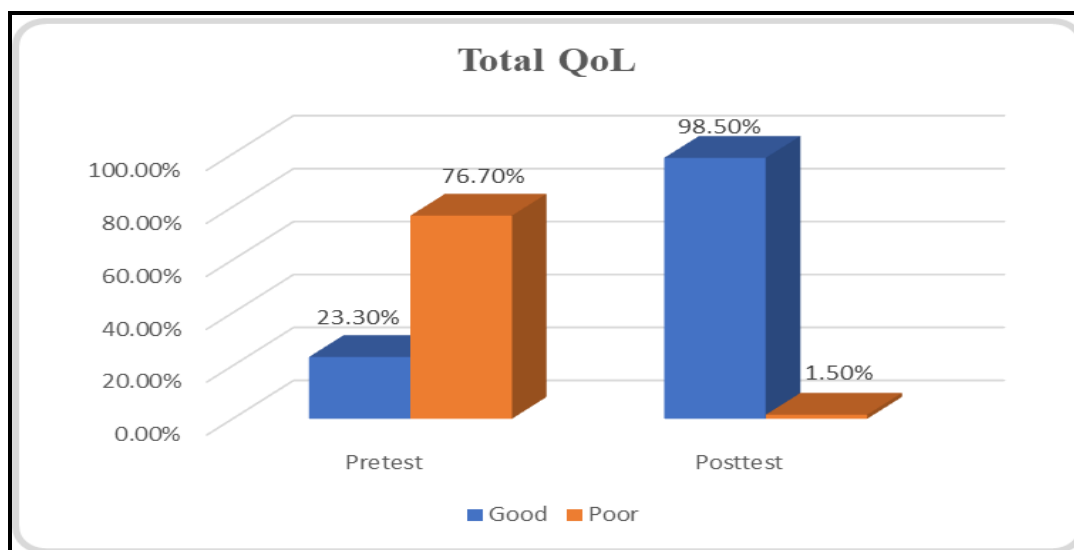


Figure (3): Percentage distribution of total quality of life level of Patients with MS in Pre & Posttests(n=133)

Table (6): Correlations between variables of the study(n=133)

Study Variables		Total Knowledge (Pre-test)	Total HP (Pre-test)	Total OOL (Pre-test)	Total Knowledge (Post-test)	Total HP (Post-test)	Total QOL (Post-test)
Total Knowledge (Pre-test)	R	1	-0.049	0.084	0.029	-0.098	0.019
	P/value		0.579	0.335	0.739	0.263	0.825
Total HP (Pre-test)	R	-.049	1	-0.200*	0.070	0.243**	-0.047
	P/value	0.579		*0.021	0.422	**0.005	0.592
Total OOL (Pre-test)	R	0.084	-0.200*	1	-0.026	0.004	0.202*
	P/value	0.335	*0.021		0.765	0.967	*0.020
Total Knowledge (Post-test)	R	.029	0.070	-0.026	1	-.049	0.002
	P/value	0.739	0.422	0.765		0.577	0.978
Total HP (Post-test)	R	-0.098	0.243**	0.004	-0.049	1	-0.244**
	P/value	0.263	**0.005	0.967	0.577		**0.005
Total QOL (Post-test)	R	0.019	-0.047	0.202*	0.002	-0.244**	1
	P/value	0.825	0.592	*0.020	0.978	**0.005	

*. Statistically significant at ($p < 0.05$) .

HP: Health Promotion

**. Highly statistically significant at ($p < 0.001$)

Table (1): Demonstrates that 43.6% of patients who took part in the study were between the ages of 30 to less than 40 years old, 68.4% of them were females, 62.4% of them were living in rural areas, and 48.1% were married. Regarding education and occupation, it was found that 48.1% & 60.9% of the patients were educated at university and were working respectively.

Table (2): Reveals that 41.4% of patients participated in the study had diagnosed with multiple sclerosis for less than two years, 32.3% of them were in clinically isolated syndrome stage, and 47.4% of them scheduled for follow up every 6 months. As regards to treatment methods of MS, 69.9% were treated with injection, 38.3% were on oral therapy, and 33.1% of them were on physiotherapy. In relation to family

History of MS, it was noticed that only 33.1% of the patients had family history of MS. 75.2% of them were nonsmokers. Regarding other chronic diseases, hypertension had the highest percent (9.8%), followed by diabetes mellitus (7.5%), and kidney diseases (4.5%).

Figure (1): Shows that 56.4%, 47.4%, 37.6%, and 34.6% of the patients in the study were suffering from fatigue, difficult walking, numbness, and muscle weakness respectively. While 4.5% of studied patients had dysphagia and sexual problems.

Table (3): Reveals that there were highly significant statistical differences in knowledge mean \pm SD of patients participated in the study regarding MS in pre and posttest, p-value < 0.001 .

Figure (2): Reveals that the total knowledge level of patients participated in the study had improved after applying the program, 93.2% of them had poor knowledge in pretest while 94.00% of them had good in posttest.

Table (4): Reveals that there were highly significant statistical differences in health promoting behavior mean \pm SD of patients participated in the study in pre and posttest ($p < 0.001$).

Table (5): Indicates that there were highly significant statistical differences in quality-of-life mean \pm SD of patients participated in the study in pre and posttest, p -value < 0.001 .

Figure (3): Reveals that the QoL of patients participated in the study had improved after applying the health promotion self-care program; good QoL represents 98.5% in posttest instead of 23.3% in pretest.

Table (6): Reveals that there was a highly positive significant correlation between the total health promotion and the total QoL scores of patients participated in the study in pre & post intervention phases.

Discussion

Promoting self-care program as a vital means for improving knowledge, health promoting behavior and quality of life in MS patients is a difficult task. This study aimed to assess the effect of a health promotion self-care program on knowledge, health promoting behavior and quality of life for patients with multiple sclerosis. According to the sociodemographic characteristics of the studied sample, the present study results showed that, the age of patients participated in the study was ranged from 30 to less than 40 years in more than two fifth, this is attributed to this lifelong autoimmune disease frequently appearing in early adulthood. More than two thirds of them were female, female increased rates of MS may be due to their physiological factors such as sex hormones and anxiety. These findings were similar to those of (El-Tantawy et al. 2024), who pointed out that the mean age of their studied group was (34.26 ± 8.48) with a higher percent of them were female. As well, the current study revealed that less than half of patients were married and were educated at university. These findings were in the same line with (Momenabadi et al., 2020 & Rooddehghan et al. 2024), who found that about half of the studied groups were married and had a university degree education.

The current study revealed that slightly more than two fifth of patients participated in the study had diagnosed with MS since less than two years and clinically isolated syndrome was more common, accounting for fewer than one-third of the studied

patients. These findings were inconsistent with Wilski et al. (2020), who mentioned that the mean length of illness was 11.6 ± 9.1 , and two fifth of patients experiencing relapsing-remitting episodes. The present study also showed that about three quadrants of studied subject were non-smokers and did not have any chronic disease. These findings were consistent with Rooddehghan et al. (2024), who said that most patients with MS did not smoke and did not have any other disease.

According to symptoms experienced by the studied subjects, the present study elaborated that more than half of the patients participated in the study were suffering from fatigue, less than half reported difficulty walking, over one-third experienced numbness, and muscle weakness. This might be due to these symptoms result from MS which causes damage in the central nervous system. These findings agreed with Koltuniuk et al. (2023), who stated that fatigue, mobility and balance problems were the most common concerns reported by the respondents.

Regarding patients' knowledge, the knowledge mean of patients participated in the study increased significantly after applying program sessions where P - values were found to be ($p < 0.001$). As evidence, less than one tenth of them had average level of total knowledge regarding MS in pretest which significantly improved in posttest as most of them demonstrated good scores. These significant differences show the program's effectiveness and the studied subject's desire to learn about the disease, enhancing their knowledge about MS. Similar finding was reported by Mohamadirizi et al (2017), who found that there was a significant increase in the mean knowledge score post the intervention compared to before the intervention. Moreover, Smith & Langdon (2024), concluded that interventions can increase MS patients' knowledge, which has crucial consequences for treatment choices and compliance.

Concerning total health promotion, the present study declared that there was a significant improvement in all domains of patients' health promoting behaviors regarding MS posttest. This suggests that MS patients will take better care of themselves as a result of the Health Promotion Self-Care Program. Therefore, the Health Promotion Self-Care Program may be a useful intervention for enhancing MS patients' health promoting behaviors. This finding was supported by Dashti et al (2016), who demonstrated that the mean of overall health-promoting behaviors and its dimensions varied statistically significantly in the intervention group two weeks, and one month after the intervention ($P < 0.05$). Also, Dehghani et al (2023), found that after the intervention, the intervention group's mean HPB score rose

considerably from 119.21 ± 22.45 to 145.38 ± 26.66 ($p = 0.001$).

According to **quality of life**, the current study declared that there were highly significant differences in quality-of-life mean scores of the participants' pre and posttests. This is demonstrated by the fact that the mean score for overall quality of life was 112.3 ± 10.3 prior to program implementation and dropped to 76.3 ± 11.3 after. Lower mean scores indicate high QoL which suggest that implementing a health-promoting self-care program could enhance the quality of life for people with MS. This finding was congruent with **Momenabadi et al (2020)**, who illustrated that there was a significant difference between the intervention group and the baseline one week and two months later in terms of higher mean scores in all quality-of-life measures ($P < 0.05$). As well, **Bijani et al, (2022)** clarified that there was significant change were observed in the intervention group's mean scores for quality of life both immediately and three months later.

Finally, the present study revealed a highly positive significant correlation between the total health promotion and the total QoL in pre & post intervention phases. This highlights the need of raising awareness and implementing health-promoting behaviors to improve quality of life, this was supported by **Bijani et al (2022)**, who demonstrated that the quality of life of people with multiple sclerosis are improved by peer education based on Pender's health promotion paradigm. Moreover, **Dashtaki et al (2024)**, who found a strong correlation between health-promoting habits and abilities of MS patients for taking care of themselves ($P < 0.001$). Also, **Rakhshani et al (2024)**, concluded in their study the efficiency of an organized education course on wellness in improving MS patients' quality of life.

Conclusion

The findings concluded that the health-promoting self-care program had a substantial positive impact on MS patients' knowledge, health promotion behaviors, and quality of life. Knowledge levels improved markedly, significant improvements were also observed in health promotion scores and all quality-of-life scores after the intervention. Additionally, a strong positive correlation was observed between health promotion and quality of life in both pre- and post-intervention phases, confirming the program's effectiveness in improving both knowledge and overall well-being among individuals with MS. Thus, the alternative hypotheses have been accepted, and the study purposes were met.

Recommendations

Incorporate health-promoting self-care programs into routine care for individuals with MS to enhance knowledge, health behaviors, and quality of life, and provide continuous education and support to sustain the improved knowledge and health promotion behaviors over time. Also apply similar programs across different healthcare settings to reach a broader population of MS patients.

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