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Quality of life in patients with multiple sclerosis and its association with depressive symptoms and physical disability

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ABSTRACT

Objective: The aim of this work was to evaluate the quality of life of patients with multiple sclerosis and its association with depressive symptoms and physical health.

Method: A total of 117 patients clinically diagnosed with Multiple Sclerosis (MS) were studied. The MSQOL-54 scale was applied. The depressive symptoms were assessed using the Beck Depression Inventory (BDI), while degree of physical disability was evaluated with the EDSS (Expanded Disability Status Scale). The results of these last two instruments were associated with MSQOL-54 to determine its influence on the perception of quality of life.

Results: We evaluated 65 women (56%) and 52 men (44%), with a mean age of 35 years, a mean age of 27 years at the time of diagnosis, and a mean evolution of 8 years. 88% of the patients showed the relapsing-remitting subtype; 42% had paid employment; 29% of the studied patients required help to perform daily activities; 75% took disease-modifying medications. They obtained on average a score of 3.62 ± 2.30 on the EDSS and 11.5 ± 9.21 on the BDI. The general average in MSQOL-54 was 64.67 ± 17.52.

Conclusions: Quality of life, in patients with multiple sclerosis is an issue that worries health personnel, it is essential to implement strategies for reducing the impact of the disease on patients' lives, mainly through the application of programs aimed to decrees depression and improve social support.

1. Introduction

Multiple sclerosis (MS) is the most common inflammatory and demyelinating disorder of the central nervous system and the second cause of neurological disability in young adults (Baumstarck et al., 2013). It is characterized by a wide range of symptoms, including fatigue, walking difficulties, stiffness, spasms, cognitive problems, urinary dysfunction, sexual disorders, pain, emotional or mood disorders, vision problems, dizziness, tremor, etc. (Chiaravalloti and DeLuca, 2008; Buchanan et al., 2010; Glanz et al., 2010). Depression is the most frequent in relation to emotional disorders since 50% of people with MS can suffer from it, and it affects their quality of life, therapy adherence, and the evolution of disability. It is estimated that the presence of depression in patients with MS is between two and three times higher than in the general population (Alschuler et al., 2013; Moore, 2013; Greeke et al., 2017). In addition, they can also suffer from anxiety, stress, and various psychiatric disorders. (Greeke et al., 2017; Jose Sa, 2008) Generally, the disease begins between 20 and 40 years. Although women are more prone to suffer from it, men tend to develop a more severe course (Lopez-Alava et al., 2017). There are two forms of beginning of disease, relapsing remitting form (90%) and primary progressive form (10%). A characteristic epidemiological aspect of MS is the well-recognized regional variation within countries in the prevalence rates of this disease; in North America it has been reported of up to 225 cases per 100,000 inhabitants, in Europe the estimated prevalence of MS is about 150 per 100,000, while in Australia it has been

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estimated at 60 per 100,000 (Vaughn et al., 2019); In Mexico, the estimated prevalence is 12–15 per 100,000 population (Flores et al., 2012). Literature reports that 90% of patients will eventually evolve to a secondary progressive form. The average period of time to develop a secondary progressive form is 10 years, and 50% will need walking assistance in 15 years (Flores, 2011). Over time, most patients with MS will have both physical and cognitive disabilities, as well as other neuropsychiatric disorders. Therefore, they will often have to depend on another person to carry out their daily activities, which can significantly affect their quality of life, as well as their social, family, and work dynamics (Buchanan et al., 2010; Mitchell et al., 2005; Katsavos et al., 2017).

Both physical limitations and neuropsychiatric disorders, mainly those that affect mood, can influence an individual perception about their quality of life, which includes: biological, economic, social and psychological needs. Quality of life comprises objective and subjective elements of social welfare based on individual and community experience within a social framework. Quality of life includes a sense of well-being at the individual level, the achievement of personal and family goals, as well as having good health. These aspects are also related to a family, social, and cultural environment (Algahtani et al., 2017).

However, poor health can have a significant impact on a person's life, especially if it is a chronic degenerative condition such as MS. Hence the objective of this work was to understand the perception that patients with MS, studied at the National Institute of Neurology and Neurosurgery MVS (INNN MVS) in Mexico City, have about their quality of life, and the relationship with the degree of physical disability and the presence of depressive symptoms.

2. Material and methods

This was a cross-sectional and descriptive study. Quota sampling was used from January 2016 to June 2017 to obtain the sample in the demyelinating disease clinic. Patients that were clinically diagnosed with MS were evaluated by two expert neurologists. The objective of the study was explained and data confidentiality was guaranteed. Those who agreed to participate received prior informed consent. Neither patients with chronic diseases that could affect their perception of their quality of life, nor those with a history of psychotic disorders and/or drug or alcohol abuse were included (> 2 drinks, 24 g of pure alcohol per day). The protocol was approved by the Research Ethics Committees of the National Institute of Neurology and Neurosurgery MVS.

2.1. Instruments

A questionnaire was developed to collect sociodemographic data of patients, including the degree of physical disability. To evaluate the quality of life, the MSQOL-54 scale was applied; the depressive symptoms were subsequently assessed using the Beck Depression Inventory (BDI) (Upton, 2013), both instruments were previously validated in Spanish language.

The BDI was applied, in order to determine the presence and severity of depressive symptoms and determine if these influenced the perception of quality of life (Alghwiri et al., 2018), it is a validated scale in the Mexican population (Jurado-Cardenas et al., 1998; Gonzalez et al., 2015), consists of 21 items, which are graded using a Likert scale with 4 points that are distributed in a score between 0 and 3, for each item and the total scores can vary from 0 to 63 with the following cut-off points: 0–13, no or minimally depressed; 14–19, slightly depressed; 20–28, moderately depressed; and 29–63, severely depressed (Gonzalez et al., 2015). The average BDI score and its distribution according to the severity of depression are shown in Table 1.

The degree of physical disability was assessed using the EDSS (Expanded Disability Status Scale) (Kurtzke, 1983). The score ranges from 0 (absence of disability and normal neurological examination) to 10 (death by MS) based on a neurological examination that evaluates several functional systems. This scale was applied by an expert neurologist. Idiman et al. classification was used in four groups in accordance with the disability status obtained in the EDSS (Table 1); group I (0.0–4.0), group II (4.5–5.5), group III (6.0–6.5) and group IV (7.0–9.5) (Idiman et al., 2006).

Table 1
Demographic and characteristics of the patients with multiple sclerosis.

Characteristics	*N* (%)
Mean age [a]	35.14 ± 10.95 (16–70)
Female	65 (55.6)
Male	52 (44.4)
Mean years of disease duration [a]	8.09 ± 8.70 (1–58)
1–5	59 (50.4)
6–10	25 (21.4)
11–19	22 (18.8)
20 +	11 (9.4)
Mean EDSS score [a]	3.62 ± 2.30 (0.0–9.5)
0.0 – 4.0	73 (62.4)
4.5–5.5	14 (12.0)
6.0–6.5	17 (14.5)
7.0–9.5	13 (11.1)
MS subtype	
RRMS	103 (88.0)
PPMS	14 (12.0)
Marital status	
Single	65 (55.6)
Married/Common in Law	41 (35.0)
Divorced/	8 (6.8)
Widowed	3 (2.6)
Mean Education [a]	13.15 ± 3.50 (3–20)
Primary school	4 (3.4)
Secondary school	23 (19.7)
High school	34 (29.1)
College	56 (47.9)
Occupation	
Paid employee	49 (41.9)
Unemployed	37 (31.6)
Unpaid employee	18 (15.4)
Retired	2 (1.7)
Student	11 (9.4)
Depression[a]	11.50 ± 9.12 (0–39)
No depression	80 (68.4)
Mild	15 (12.8)
Moderate	14 (12.0)
Severe	8 (6.8)
Support	
Yes	34 (29.1)
No	83 (70.9)

[a] Mean ± SD, standard deviation (range), EDSS - Expanded Disability Status Scale, RRMS - relapsing–remitting multiple sclerosis, PPMS - primary progressive multiple sclerosis.

The Likert- type MSQOL-54 scale (Multiple Sclerosis Quality of Life-54) (Aymerich et al., 2006) and the MSQOL-54 scale, a psychometrically multidimensional inventory, specific for MS. It comprises a health survey of 36 elements (SF-36) (Vickrey et al., 1995). In addition, 18 items were added, divided as follows: specific health problems for MS (4), sexual function (4), satisfaction concerning sexual function (1), overall quality of life (2), cognitive function (4), energy (1), pain (1) and social function (1). The MSQOL-54 scale contains 52 elements distributed in 12 scales and two individual elements (physical and mental dimension). Scores for physical and mental dimensions range from 0 to 100, where higher values indicate a better perception of quality of life. Data from the MSQOL-54 scale concerning each patient were used to obtain three different outcomes: (1). Perception of Overall Quality of Life (OvQOL); (2). Physical health composite score (PHCS); and (3). Mental health composite score (MHCS). This scale has high test-retest reliability and internal consistency with evidence that supports its content and construct validity (Yamout et al., 2013). Table 2 shows the alpha and the omega obtained in the dimensions of the scale,

Table 2
Mean scores on MSQoL-54 subscales and omega coefficients of the dimensions.

	Mean	SD	Range	Alpha omega (IC)
Physical health	62.95	30.52	0–100	0.955 [0.954–0.956]
Role limitations-physical	57.61	32.05	0–100	0.951 [0.950–0.952]
Role limitations-emotional	72.51	29.26	0–100	0.955 [0.953–0.957]
Pain	71.78	28.18	0–100	0.918 [0.918–0.918]
Emotional well-being	66.44	21.58	10–100	0.838 [0.833–0.893]
Energy/fatigue	50.81	21.15	5–100	0.788 [0.784–0.792]
Health perceptions	52.62	21.09	10–100	0.760 [0.737–0.783]
Social function	67.04	25.11	0–100	0.815 [0.798–0.828]
Cognitive function	66.18	27.90	0–100	0.813 [.807–0.819]
Health distress	62.31	26.23	0–100	0.899 [0.896–0.928]
Sexual function	80.99	29.09	0–100	0.803 [0.802–0.804]
Change in health	60.26	27.10	0–100	-[a]
Satisfaction with sexual function	63.68	32.25	0–100	-[a]
Overall quality of life	70.24	16.74	16.7–100	0.818 [0.808–0.839]
Physical Health Composite Score	61.93	19.53	9.0–96.3	0.865 [0.794–0.961]
Mental Health Composite Score	64.39	18.40	19.5–97.6	0.920 [0.919–0.922]

Abbreviations: SD Standard deviation.

[a] Alpha omega (Confidence Interval). Alpha omega could not be computed because the scale is based on a single item.

where it was noticed that most domains have an adequate level of reliability. It is important to mention that the health perception domain is the one that showed the lowest value. These three instruments were applied on the same day.

Both MSQOL-54 and BDI scales were performed under the supervision of qualified personnel trained on the application of this type of instrument. It took between 20 and 30 min to answer the scales. No patient showed auditory or cognitive problems that prevented him/her from participating in the study.

2.2. Statistical analysis

The statistical analysis was carried out using the SPSS 22.0 program (IBM, Chicago, IL, USA). The three outcome measures of the MSQL-54 survey were shown as mean ± standard deviation. The descriptive variables were reported as frequencies. The reliability analysis was performed using the coefficient omega, given that it is an internal consistency estimator which is more sensitive than others (β, H, and Ordinal Alpha). In addition, it is less risky concerning overestimation of reliability (Ventura-Leon, 2018). Student's *t*-test and ANOVA were used for the univariate comparison when data showed statistical normality, whereas Mann–Whitney *U* or Kruskal–Wallis *H* tests were used when they did not. Chi-square test and/or Fisher's exact test were applied in the analysis of proportions when one of the cells showed a value of less than 5. Spearman's rank-order correlation was applied to analyze the relationship between the study variables, given the nature of the data. The following criteria were used: $p < 0.3$ values were low, 0.3–0.7 moderate, and > 0.7 strong. Finally, a multiple linear regression analysis was applied to determine the predictors of OvQOL, PHCS, and MHCS. Context variables (sociodemographic, EDSS, and depression) and statistically significant quantitative variables were used in the analyzes performed to determine the most important predictors of quality of life. The analysis was conducted using the successive steps method. It should be noted that the variables of the patient's context (age, education, occupation, social support, period of time with the disease, EDSS and depression) were considered independent variables and OvQOL, PHCS, and MHCS were considered dependent variables. In addition to having conducted a collinearity diagnostics for each model, we considered the non-existence of a significant risk of collinearity between the different variables in accordance with tolerance values and variance inflation factors (VIF). Furthermore, the Durbin-Watson statistic value (close to or greater than 2.0) allowed us to assume that all residuals are independent.

3. Results

The study population consisted of 117 patients, the demographic and clinical characteristics (including MSQOL-54, BDI and EDSS scores) of the sample are shown in Table 1.

88% of the patients had the relapsing-remitting subtype and 12.0% had the primary progressive. The mean years of evolution was 8.09 ± 8.70 and the mean EDSS score was 3.62 ± 2.30. In addition, 13 (11.4%) patients obtained more than 7 points in this instrument, thus requiring a wheelchair to be able to move.

The general results of MSQOL-54 are shown in Table 2. The Overall QOL, PHCS, and MHCS obtained were equal to 70.24 ± 16.74, 61.93 ± 19.53, and 64.39 ± 18.40, respectively. Table 3 summarizes the univariate associations between each of these results and the demographic and evolution variables of the disease.

Table 4 shows the results of the correlation analysis for each of the 3 categories of quality of life (OvQOL, PHCS, and MHCS), demographic factors, years of evolution of the condition and depressive symptoms. It was observed that the EDSS score was lower in comparison with the results of the three items (OvQOL, PHCS and MHCS) and the depressive symptoms.

Finally, Table 5 shows the regression model for OvQOL, PHCS, and MHCS, which identified two outstanding factors as predictors of quality of life through multivariate analysis: depression and social support. It should be noted that the three models showed adequate VIF and Durbin-Watson values for each model with a range of 1.9 to 2.3. This led us to assume that all residuals are independent. Furthermore, it was observed that depression was the variable that best predicts the quality of life in all three areas.

4. Discussion

The perception of QOL among patients with multiple sclerosis is variable. OvQOL obtained a higher score than PHCS and MHCS in this work. This may be because OvQOL is the overall QOL evaluation of the patient with MS, while PHCS and MHCS involve questions from both physical and emotional spheres. Therefore, this could be considered a more objective measure of the patient's QOL status. Economically active individuals and students showed better scores on the MSQOL-54 scale and its dimensions (OvQOL, PHCS, and MHCS). This may be related to the fact that they face MS in a better way, and they are deemed as independent and/or socially productive thanks to a job. It is widely known that MS often causes job loss, or when the individual is able to get a job there is a risk of absenteeism due to the presence of flare-ups or even mistakes in the daily performance of work activities due to the

Table 3
Univariate analysis between QOL and demographic and clinical variables of patients.

Factor	Category	N	OvQOL (mean ± SD)	PHCS (mean ± SD)	MHCS (mean ± SD)
Gender	Female	65	69.00 ± 17.10	59.52 ± 18.71	61.73 ± 18.33
	Male	52	71.79 ± 16.32	64.95 ± 20.28	67.71 ± 18.11
	P value		0.373 [a]	0.136[a]	0.080[a]
MS Subtype	RR	103	70.92 ± 16.61	63.02 ± 19.59	64.89 ± 18.35
	SP	14	65.24 ± 17.48	53.94 ± 17.73	60.65 ± 19.03
	P		0.235[a]	0.103[a]	0.420[a]
Marital status	Single	65	68.82 ± 16.19	62.81 ± 18.29	63.62 ± 18.51
	Married	37	73.92 ± 15.44	61.28 ± 23.02	65.43 ± 18.70
	Divorced	8	71.87 ± 17.76	57.04 ± 10.67	66.20 ± 11.62
	Common Law	4	74.59 ± 9.55	73.09 ± 16.19	73.74 ± 17.02
	Widowed	3	45.55 ± 32.57	49.09 ± 21.26	50.78 ± 31.03
	P		0.344[c]	0.525[c]	0.760[c]
EDSS	0.0–4.0	73	72.81 ± 16.36	67.65 ± 18.29	68.50 ± 18.11
	4.5–5.5	14	60.12 ± 13.23	54.52 ± 16.19	55.23 ± 18.40
	6.0–6.5	17	70.00 ± 12.55	53.19 ± 20.34	58.26 ± 15.43
	7.0–9.5	13	67.05 ± 23.10	49.24 ± 17.24	59.18 ± 18.33
	P		0.061[b]	0.001[b]	0.016[b]
Occupation	Paid employee	49	73.25 ± 16.59	67.94 ± 16.46	68.47 ± 16.75
	Unemployed	37	66.84 ± 15.02	54.49 ± 20.91	59.62 ± 19.07
	Unpaid employee	18	65.33 ± 20.69	56.05 ± 22.57	58.44 ± 22.17
	Student	11	77.42 ± 13.85	72.39 ± 8.67	72.59 ± 11.29
	Retired	2	64.17 ± 5.90	47.81 ± 4.73	60.90 ± 1.84
	P		0.172[c]	0.004[c]	0.083[c]
Disease-modifying treatment	Yes	89	71.50 ± 15.74	63.44 ± 19.81	65.80 ± 18.42
	No	28	66.25 ± 19.36	57.15 ± 18.11	59.91 ± 17.92
	P		0.149[a]	0.138[a]	0.140[a]
Depression	No depression	80	75.76 ± 13.66	69.62 ± 15.40	71.70 ± 14.05
	Mild	15	64.89 ± 12.74	53.19 ± 15.65	56.56 ± 16.13
	Moderate	14	51.37 ± 17.97	40.81 ± 15.02	41.81 ± 14.05
	Severe	8	58.13 ± 18.06	38.39 ± 19.21	45.49 ± 17.99
	P		0.001[b]	0.001[b]	0.001[b]
Support	Yes	34	63.11 ± 19.08	49.70 ± 20.67	54.75 ± 19.68
	No	83	73.16 ± 14.84	66.94 ± 16.74	68.34 ± 16.39
	P		0.003[a]	0.001[a]	0.001[a]

Abbreviations: OvQOL = Perceived quality of life score of the respondent; PHCS = Physical health composite score; MHCS = Mental health composite score.

[a] Student's *t*-test.

[b] ANOVA.

[c] Kruskal-Wallis H test.

consequences arising from MS. As it was observed in this work, this situation also exerts a significant influence on the perception that an individual has about the quality of life, given that 31.6% of the patients were unemployed. In addition, these individuals had low QOL perception levels. Furthermore, these aspects were also reported by van der Hiele et al. (2016). It is also known that having a paid job contributes to improving the perception of quality of life, and when the individual is unemployed, then he/she is more prone to develop depression (Dorstyn et al., 2019). As it can also be noted in this work, unemployed patients had a higher score on the BDI. 25% of men showed moderate to severe depression, as well as 36.9% of women.

Given that there are no curative treatments available for MS, the medications currently used are aimed at modifying the condition or at reducing symptoms. Patients with MS disease- modifying medications in the study obtained better scores in the three dimensions (OvQOL, PHCS, and MHCS), unlike those who did not take them. However, there is no statistical significance when comparing them.

One of the physical problems that a significant percentage of patients faced (46.2%) was the lack of energy. This can generate a lack of initiative to perform physical activities, which also affects the perception that an individual has about the quality of life. Hence the importance of creating programs tailored to the patients' needs, so they can participate in physical activities that contribute to improving their quality of life (Fasczewski et al., 2017; Ryan et al., 2017).

Table 4
Correlation between quality of life, physical and mental health and quantitative variables of the study.

		Mean	SD	1	2	3	4	5	6	7
1 Overall QOL	70.24	16.74	1							
2 Physical Health	61.93	19.53	0.625**	1						
3 Mental Health	64.39	18.40	0.634**	0.901**	1					
4 Patient age	35.14	10.95	−0.205*	−0.288*	−0.136	1				
5 Scholarship	13.15	3.50	0.164	0.190*	0.162	−0.009	1			
6 Years of evolution	8.09	8.70	−0.019	−0.176	0.079	0.421**	0.060	1		
7 EDSS	3.62	2.30	−0.184*	−0.386*	−0.293**	0.166	−0.294**	0.290**	1	
8	Depression	11.50	9.21	−0.583**	−0.667**	−0.671**	0.212*	−0.139	0.157	0.256*

Note: EDSS- Expanded Disability Status Scale.

** The correlation is significant at the level 0,01 (2 tails).

* The correlation is significant at the level 0,05 (2 tails).

Table 5
Associations of OvQOL, PHCS, MHCS with the characteristics socio-demographic and depression.

	OvQOL	PHCS	MHCS
Variable	β	β	β
Gender (Man)		−0.075	−0.041
Unemployed		−0.156[*]	
Diagnostic age	−0.205[*]		
Support	−0.126	−0.232[**]	−0.200[*]
Depression	−0.516[**]	−0.572[**]	−0.604[**]
F	−2.725	−8.204	−8.366
*Adjusted **R^2***	0.357	0.511	0.457
ΔR^2	0.258	0.283	0.328

Note: OvQOL Perceived quality of life score of the respondent; PHCS Physical health composite score; MHCS Mental health composite score.

[*] $p \leq 0.05$.

[**] $p \leq 0.01$.

Another aspect to take into account is physical disability, which was determined through the application of EDSS. There are few studies that consider the relationship between this scale and the quality of life. An inverse correlation was observed in our work, which was also reported by Carnero Contentti et al. (2017).

In addition, the presence of pain may also contribute to the perception of quality of life in patients with MS. However, the mean was 71.78%, which indicates that pain was not significant for patients included in this study. However, the management and treatment are essential for people suffering from it in order to improve their perception. This experience has been previously reported in other conditions that produce chronic pain. Even in these cases, it is suggested that both patients and their caregivers participate in cognitive-behavioral therapy groups, which, in addition to contributing to pain reduction, improves both depressive and anxiety symptoms (Jongen et al., 2017).

Another factor that may affect the perception that MS patients have about their quality of life is sexual dysfunction, which can occur at any stage of the disease. It is also a frequent problem in people with this condition (Delaney and Donovan, 2017), and it has been associated with the presence of depression. We observed in our study an inverse correlation between depression and sexual function r (117) = −0.455, $p = 0.001$ and sexual satisfaction r (117) = −0.438; $p = 0.001$. In addition, we observed that men have greater sexual satisfaction unlike women ($t_{(1-115)} = 2.751$, $p = 0.006$); 23.1% of women and 9.6% of men expressed dissatisfaction with sexual function, which may also affect their perception about their quality of life. Depression is a common disease in many chronic conditions such as MS. Furthermore, several studies suggest that it is one of the most important factors contributing to sexual dysfunction (Basson et al., 2010). Due to the above, it is important that medical personnel evaluate these aspects and identify the possible causes, in order to provide patients with the attention they require in this key aspect of their lives, since sex can be a powerful source of comfort, pleasure, and intimacy in a life restricted by some disease (McInnes, 2003). This can in turn improve the perception of their quality of life.

Depression and social support are the variables that best predict the quality of life in the multivariate analysis. An inverse relationship between depression and age of MS diagnosis was observed with the perception of quality of life in the first model, whereas not having support, being unemployed, and showing depressive symptoms inversely predicted physical health in the second model. Also, having no support, and depression, inversely predicted mental health concerning the third model. This result supports the hypothesis about the influence of psychosocial factors, specifically those related to social support in the perception of QOL (Yamout et al., 2013).

Depression is a frequent symptom among patients with MS. In fact, reports indicate that between 40% and 50% of patients may suffer from it. Its incidence is higher than in the general population and even in patients with other types of chronic diseases, which can affect their quality of life (Greeke et al., 2017). The low score concerning depressive symptoms among patients studied in this research was directly related to a better perception of quality of life. This result can be explained by the fact that, by not showing depressive symptoms and perceiving oneself as independent enough in order to carry out daily, work, and/or school activities, the individual has a better perception of quality of life. Furthermore, the influence of depression in MS related to QOL has been reported in other studies (Amato et al., 2001). Studies on the elements that contribute to the deterioration of the quality of life in patients with MS, generally ignore the strong influence that social and psychological factors exert on it.

Although the study showed a good correlation between QOL and EDSS and the average score is similar to that reported in other studies, a high percentage of 64.2% (73 patients) obtained a score lower than 4, which may explain why it was not a predictor of QOL, given that it was not sufficiently represented in the different stages of disability (Yamout et al., 2013; Broersma et al., 2018). This showed the influence that psychosocial factors, such as support can have on the perception of QOL.

On the one hand, one of the limitations of the study was that data were collected from patients treated at a tertiary care center, specializing in neurological diseases. Therefore, they may not be representative of the population of MS patients in the country, given that not all of them are treated in specialized institutions. For this reason, we consider, like Amato et al. (2001), that the results of this work should be interpreted with caution. On the other hand, social factors may be specific to the sample studied, so they cannot be generalized, although they have already been reported (Yamout et al., 2013). Finally, our results are not applicable for patients with severe disability (EDSS = 6.0–9.5), given that the sample did not include enough of these cases.

Although the scales that were applied are useful to understand the quality of life of patients with MS, it is important to evaluate in later works the aspects that may also have a significant influence on the perception of quality of life, including conditions such as access to paid employment, other affective symptoms, and even the evaluation of cognitive impairment.

5. Conclusions

Quality of life in patients with multiple sclerosis is an issue that worries health personnel, given the influence it exerts on the adaptation and coping strategies of the disease. Furthermore, it is reflected in the therapy adherence and in the prognosis. Hence the importance of providing new elements that allow us to identify the factors that have and impact on it in order to try to improve it. It should not be forgotten that although MS does not directly cause death, it can cause neurological sequelae and multiple comorbidities, mainly mood disorders; therefore, it is important to improve research, mainly through the design and implementation of psychosocial programs, to create strategies that contribute to reducing the impact of the disease in the patients' lives.

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Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Clinical Research and Ethics in Research Committees of the National Institute of Neurology and Neurosurgery MVS (protocol number 15/17) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Declaration of Competing Interest

The authors declare that they have no conflict of interest.

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