Journal of Health Study and Medicine
2024, Article 17
pp. 349–374
DOI 10.2478/jhsm-2024-0017

Disease Acceptation and Health-Related Quality of Life (HR-QoL) in Physical and Mental Sphere of Patients with Multiple Sclerosis (MS) (Relapsing Remitting Type) Compared to a Healthy Control Group – Case-Control Study

Submitted: 27 February 2025; Accepted: 25 March 2025;
Published: 17 April 2025

Marlena Krawczyk-Suszek[1]
https://orcid.org/0000-0003-4100-588X

Miroslawa Sekh[2]
https://orcid.org/0000-0002-4242-6689

Joanna Maciejewska[3]
https://orcid.org/0009-0007-0680-5976

Jerzy Bednarski[4]
https://orcid.org/0000-0002-0186-3268

Andriy Zimenkovsky[2]
https://orcid.org/0000-0002-9649-293X

[1] Department of Physiotherapy, Medical College, University of Information Technology and Management in Rzeszow, Poland
[2] Department of Healthcare Management, Pharmacotherapy and Clinical Pharmacy, Danylo Halytsky Lviv National Medical University, Ukraine
[3] Rehabilitation Clinics RUDEK, Rzeszow, Poland
[4] Department of Human Anatomy, Medical University of Lublin, Poland

Corresponding author

Marlena Krawczyk-Suszek
Department of Physiotherapy, Medical College, University of Information Technology and Management in Rzeszow
Sucharskiego 2, 35-225, Rzeszow, Poland
m.krawczyk.umlub@gmail.com

Abstract

Background: *Multiple sclerosis (MS) affects the health-related quality of life (HR-QoL) of patients. Constantly changing living and functioning conditions and patient expectations force continuous monitoring of HR-QoL.*

Objective or hypothesis: *The main aim of the study was to analyze HR-QoL among MS patients (MS), compared to a control group of healthy people (HG). Another aim was indication of the spheres in the SF-36 that were assessed the worst by patients.*

Methods: *The study was conducted in a group of 78 patients with MS and on 106 healthy individuals (HG). The SF-36 questionnaire was used to assess QoL. The analysis used Kruskal Wallis test, U-Mann Whitney's test, student's t-test, ANOVA, and a correlation coefficient.*

Results: *The biggest significant differences in the average level of HR-QoL between MS and HG were noted in the physical functioning. Men in this area, both with MS (34.4±22.9) and in HG (97.6±4.7), indicated a higher HR-QoL compared to women (29.7±24.4; 95.5±13.5, respectively). The analysis of the impact of disease symptoms on HR-QoL indicated a significant influence of fatigue and visual impairment on MCS, PCS, and ILQ. Motor coordination disorders and decreased well--being significantly reduced the HR-QoL in MCS. Sexual dysfunction significantly reduces HR-QoL in PCS ($p=0.002$) and ILQ ($p=0.008$). Motor coordination disorders significantly worsened HR-QoL in ILQ ($p=0.040$).*

Conclusions: *The greatest difference in HR-QoL between MS and HG was noted in the case of physical functioning. Including aspects aimed at minimizing chronic fatigue and improving visual function in the treatment strategy and rehabilitation program for patients will improve the quality of life of these patients, increase satisfaction with treatment, and maintain an appropriate level of compliance with pharmacotherapy.*

Key words: *quality of life, health-related quality of life, sclerosis multiplex*

Introduction

Multiple Sclerosis (MS)

Multiple Sclerosis is a chronic, progressive disease with inflammatory and demyelinating features of the central nervous system. Several phenotypes of the disease are distinguished, including the form of relapsing-remitting MS [1]. It is estimated that there are about 2.3 million people with MS worldwide, which indicates 50–300 cases per 100,000 people. According to the epidemiological report of the International MS Federation, 2.8 million people suffered from MS in 2020. In the years 2013–2020, the incidence of this disease increased by 500,000 people, with an average of 2.1 cases diagnosed per 100,000 inhabitants per year [2]. In Poland, the estimated incidence is 120 cases per 100,000 people, which yields an estimated number of 46,000 patients [3]. The average age of patients is 32 years old [3–4]. At the same time, these are not fully verified data due to the lack of detailed information on large populations such as China or India [5]. There is strong evidence of a much higher risk of developing MS in women compared to men (2.3–3.5:1) [6], especially relapsing-remitting onset [7–8]. Some forms of MS are characterized by progressive deterioration of the patient's motor functions and related problems with functioning in everyday life and performing activities of daily living (ADL). These deficits usually affect the private life, professional work, and broadly understood functioning in the social life of a person with MS [9]. These problems reduce the patient's HR-QoL, and often also the family's QoL, negatively affecting family life [10].

Health-related Quality of life (HR-QoL) in patients with Multiple Sclerosis (MS)

The studies of the last decade show that personal perception of HR-QoL in MS patients influences subjective well-being assessment, becoming one of the important factors increasing the understanding of patients' expectations, as well as becoming a helpful factor in clinical decisions and therapy planning. By considering the aspects of perceived HR-QoL and highlighting areas important for the patient, comprehensive treatment programs are more effective and meet the basic expectations of the patient [11]. The comprehensiveness of the treatment based on the patient's expectations is increased by his/her HR-QoL.

MS occurs most often between 20 and 40 years of age and is the most commonly diagnosed cause of disability among young people, which leads to long-term inability to work [1], as well as dysfunctions related to social roles, which significantly reduces the perceived QoL. Multiple Sclerosis International Federation (MSIF) published "Seven principles to improve quality of life with MS" based on the observations and experiences of people affected by MS. These include "Empowerment, independence and a central role for people affected by MS in decisions that affect their lives" and "Access to comprehensive and effective treatments and care for the changing physical and mental health needs of life with MS" [12]. This emphasizes the importance of independence in decision-making of MS patients and the desire for equal access to the most modern and, above all, effective therapies.

The literature emphasizes the need to evaluate HR-QoL in patients in order to diagnose in detail areas of reduced quality of life and patient expectations. There are many articles describing HR-QoL considering specific forms of treatment, patient support, but it is worth looking at the overall HR-QoL index among this group of patients without a detailed assessment of treatment methods and other factors that cannot be included in the predictive model. Over the last decade, a number of initiatives have been undertaken in Europe, North America, Australia, and New Zealand to identify the needs of MS patients, both in terms of services and expertise necessary to comprehensively meet the needs of this group of people [5]. However, it should be remembered that the conditions in which we live are variable and the level of HR-QoL as an independent determinant of the well-being of patients should be constantly studied and analyzed.

An attempt was made to assess HR – QoL among patients with relapsing-remitting MS. The aim of the study was to assess the quality of life considering the mental and physical dimension compared to healthy people, indicating to which of the spheres assessed using SF-36 MS patients assign the lowest value, and thus indicate the lowest subjectively perceived HR-QoL. These areas should be specifically analyzed in the aspect of the treatment and rehabilitation plan in this group of patients to increase the overall perceived HR-QoL.

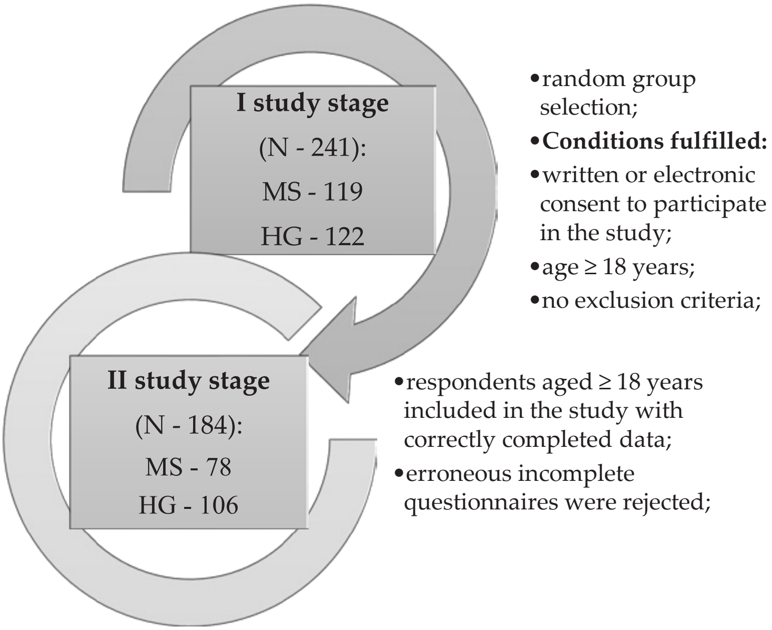
Material and methods

Organization of the study

In order to properly assess HR-QoL, the following criteria for selecting a group of patients for the study were used. Inclusion criteria for the group of patients with MS: age ≥ 18 years, relapsing-remitting form, independent movement > 50 meters, correctly completed questionnaire, informed and voluntary consent to participate in the study. Inclusion criteria for the healthy group: age ≥ 18 years, correctly completed questionnaire, informed and voluntary consent to participate in the study.

The study was carried out in a group of 119 people with MS. As a result of the application of the above inclusion criteria, 78 people were included in the actual study. The exact flow of the respondents is illustrated by the flowchart (Figure 1).

Figure 1. Flowchart of the participants selection process



Source: own elaboration.

A positive opinion was obtained from the Commission on Ethics of Scientific Research of the UITM no. 2/2022. The study was conducted in accordance with the Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects [13].

Study group

The study was carried out in a group of 184 people, out of the total 78 people surveyed were patients with MS (relapsing-remitting type), the remaining part was the control group – 106 healthy people. The type of symptoms occurring in patients and their frequency in the studied group of patients were analyzed. The most frequently indicated symptoms of the disease were: chronic fatigue (92.3%), decreased well-being (83.3%), impaired vision (67.9%), and impaired motor coordination (60.3%). The least commonly mentioned by the patients were speech disorders (14.1%) and urination and defecation disorders (20.5%). Accurate data describing the total study group are presented in Table 1. The two compared groups did not differ significantly in terms of age (p=0.961). In the group of patients with MS, the larger group were women, which is a reflection of the proportion observed in populations. Women are more likely to suffer from the form of MS included in the author's study [7] (Table1).

Table 1. General characteristics of the study group of the respondents. Categorical and continuous variables

Variable	MS (n – 78)		HG (n – 106)	
	n	%	n	%
Gender (n – 184) female / male	61 / 17	78.2 / 21.8	58 / 48	54.7 / 45.3
Education (n – 184) elementary / secondary / higher	8 / 20 / 50	10.3 / 25.6/ 64.1	7 / 47 / 52	6.6 / 44.3 / 49.1
Profession (n – 184) White collar worker/ White collar worker & worker / worker / Unemployed / disability pension	25 / 31 / 14 / 7 / 1	32.1 / 39.7 / 17.9 / 9.0 / 1.3	46 / 0 / 55 / 4 / 1	43.3 / 0.0/ 51.9 / 3.8 / 0.9
MS in family members (n – 78) yes / no / unknown	10 / 51 / 17	12.8 / 65.4 / 21.8	–	–
***Symptoms**	n	%	–	
chronic fatigue	72	92.3	–	
increased muscle tension	36	46.1		
balance disorders	41	52.6		
speech disorders	11	14.1		
trembling limbs	31	39.7		
impaired motor coordination	47	60.3		
sensory disturbances	41	52.6		
visual impairment	53	67.9		
urinary and stool disorders	16	20.5		
sexual dysfunction	23	29.5		

Variable	X	SD	Me	Q1	Q2	Min	Max
Age: SM (n – 78)	36.2	8.3	35.5	30.0	40.0	21.0	62.0
HG (n – 106)	37.6	10.9	34.0	28.0	45.0	27.0	64.0
Age: SM vs HG	0,961						
Number of people living together in the household SM (n – 78)	3.3	1.3	3.0	2.0	4.0	1.0	7.0
HG (n – 106)	3.0	1.2	3.0	2.0	4.0	0.0	5.0
Time since diagnosis MS [in years] (n – 78)	6.3	5.6	5.0	3.0	8.0	0.2	37.0

MS – patients with Multiple Sclerosis; HG – group of healthy respondents; n – number of observation; % – percent; *multiple question – ∑≠100%; X – average; SD – standard deviation; Me – median; Q1 – lower quartile; Q3 – upper quartile; Min – minimum value; Max – maximum value; Source: own elaboration.

Questionnaire SF-36 and Questionnaire AIS

The study was carried out using the SF-36 questionnaire to assess the quality of life. A license was obtained to use the SF-36 tool for assessing the quality of life (License Number: QM039882). The SF-36 questionnaire allows for the analysis of the quality of life in the following dimensions: physical functioning – PF; role physical – RP; bodily pain – BP; general health – GH; vitality – VT; social functioning – SF; emotional roles – RE; mental health – MH. Individual spheres were assigned to two of the main dimensions. The assignment was as follows: PF+RF+BT+GH form the Physical Component Summary (PCS). VT+SF+RE+MH form the Mental Component Summary (MCS). Both of these dimensions, PCS and MCS, constitute the Index of Life Quality (ILQ). The variables were encoded according to the SF-36 tool coding key [14]. Due to the fact that the SF-36 questionnaire is a recognized tool for assessing the quality of life among both sick and healthy people, the comparison of both groups in this study allowed for the correct use of the questionnaire. Tool key encoding was applied [15].

Acceptance of Illness Scale (AIS) is a questionnaire designed to measure disease acceptance in adults. The tool consists of eight statements forming one scale: "**1)** I have problems with adapting to limitations imposed by my illness; **2)** I cannot do what I like best because of my health condition;

3) My illness makes me sometimes feel unwanted; **4)** My health problems make me rely on others more than I want to; **5)** My illness makes me a burden for my family and friends; **6)** My health condition makes me feel not valuable; **7)** I will never be self-dependent to the extent I would like to be; **8)** I think people around me often feel embarrassed because of my illness"; each of which is evaluated on a scale from 1 ("I strongly agree") to 5 ("I strongly disagree"). The sum of AIS points can range from 8 to 40. A low AIS score indicates a lack of adaptation to the disease, low acceptance of the state of health and mental discomfort. A high score indicates high acceptance of the disease and lack of dysfunction in the mental sphere [16–17].

Statistical analysis

Qualitative data were presented by means of number and percentage, measurable by means of: mean (M), standard deviation (SD), median (Me), lower quartile (Q1), upper quartile (Q3), minimum and maximum. The Shapiro-Wilk test was used to assess the normality of the distribution of measurable variables, the Leven test was used to assess the equality of variance. For non-parametric analysis, for two independent variables – Mann Whitney's test was used, for many variables – the Kruskal-Wallis test. The student's t-test and the ANOVA test were used for parametric analysis. Correlations between measurable variables were assessed using a correlation coefficient. The value of the correlation coefficient takes values from the range [-1;1]. To assess the degree of dependence of the analyzed two measurable variables, the following distribution was adopted: 0–0.3 – weak correlation; 0.3–0.5 – medium correlation; 0.5–0.7 – high correlation; 0.7–0.9 – very high correlation; 0.9–1 – almost complete correlation. The correlation coefficient sign indicates a positive correlation and a negative correlation, respectively. A positive correlation confirms that an increase in one variable means an increase in the other variable, while a negative correlation means an increase in one variable and a decrease in the other. The absolute value of the correlation coefficient allows verifying the strength of the relationship of the analyzed measurable variables [18]. Statistical dependences were considered significant if their level of significance was $p \leq 0.05$.

Result

The analysis of the HR-QoL level showed significant differences in the average level of perceived HR-QoL between MS patients and healthy people. The largest difference was recorded in the PF sphere. Men in this sphere, both from the MS (34.4±22.9) and the control (97.6±4.7) group, indicated a higher perceived level of HR-QoL compared to women (respectively: 29.7±24.4; 95.5±13.5), but the differences between the group of patients and healthy subjects were significant (p<0.001). The exact data are presented in Table 2 and Figure 2 (Supplementary materials).

The reliability of the AIS scale was assessed in the analyzed group of patients. The value of the Cronbach's Alpha coefficient >0.80 indicates satisfactory reliability and internal consistency of the tool used to analyze the level of disease acceptance in the study group of patients with MS. Average values of the scale obtained in individual AIS subscales indicate a moderate level of acceptance of the disease most often oscillates around 3.0. The highest average value of the AIS scale was recorded in subscale 8 (4.0±1.1) assessing the response of other people to the disease of the examined person ("I think that people staying with me are often embarrassed because of my disease"). The lowest average level of disease acceptance was recorded in subscale 4 (2.7±1.3) indicating large health problems that make the patient dependent on the help of third parties ("Health problems make me more dependent on others than I want"). Table 3 shows the exact data.

Table 3. Reliability of the AIS scale of the examined group of people with MS and the distribution of variable values for all respondents. Data coded in accordance with the Polish adaptation of the AIS scale (point values)

AIS	Σ	X (-95CI;+CI)	SD (-95CI;+CI)	Me	Reference (Min – Max)	Q1	Q3	Cronbach's alpha (α)
1	5	3.2 (2.9–3.5)	1.3 (1.1–1.6)	4.0	(1.0–5.0)	2.0	4.0	0.81
2	5	3.0 (2.7–3.4)	1.4 (1.2–1.9)	3.0	(1.0–5.0)	2.0	4.0	0.81
3	5	3.4 (3.0–3.7)	1.5 (1.3–1.7)	4.0	(1.0–5.0)	2.0	5.0	0.81
4	5	2.7 (2.4–3.0)	1.3 (1.2–1.6)	2.0	(1.0–5.0)	2.0	4.0	0.82
5	5	3.7 (3.4–4.0)	1.4 (1.2–1.7)	4.0	(1.0–5.0)	2.0	5.0	0.81
6	5	2.7 (2.5–3.0)	1.0 (0.9–1.2)	3.0	(1.0–5.0)	2.0	3.0	0.91
7	5	2.5 (2.3–2.7)	1.0 (0.9–1.2)	2.5	(1.0–5.0)	2.0	3.0	0.84
8	5	4.0 (3.8–4.3)	1.1 (0.9–1.3)	4.0	(1.0–5.0)	3.0	5.0	0.83
Total	8–10	25.2 (23.5–26.8)	7.2 (6.2–8.6)	25.0	(8.0 – 40.0)	19,0	31,0	–

X – average; SD – standard deviation; -95CI/+95CI – confidence interval for X or SD; Me – median; Reference (Min – Max) – range of values between the minimum and maximum value; Q1 – lower quartile; Q3 – upper quartile

Source: own elaboration.

The impact of factors such as gender, level of education, and the occurrence of MS in the family of patients was analyzed. Almost none of these variables were associated with HR-QoL of MS patients (p>0.05). The only significant relationship was recorded in subscale 6. Men (3.2±1.0) showed a higher level of acceptance of the disease compared to women (2.6±1.1) (p=0.040) (Table 4).

Table 4. The level of acceptance of the disease considering gender, education, and MS in family members

AIS	Gender X (SD)			Education X (SD)				MS in family members X (SD)			
	F	M	*p	I	II	III	**p	I	II	III	**p
1	3.3 (1.4)	2.9 (1.1)	0.388	3.4 (1.7)	3.2 (1.2)	3.2 (1.3)	0.890	3.3 (1.3)	3.3 (1.3)	2.9 (1.3)	0.543
2	3.1 (1.4)	2.8 (1.3)	0.414	3.1 (1.8)	3.0 (1.3)	3.0 (1.4)	0.976	3.2 (1.5)	3.0 (1.4)	3.1 (1.4)	0.889
3	3.4 (1.5)	3.2 (1.3)	0.669	3.6 (1.5)	3.7 (1.4)	3.2 (1.5)	0.551	3.4 (1.3)	3.3 (1.6)	3.5 (1.3)	0.952
4	2.7 (1.3)	2.6 (1.5)	0.758	3.0 (1.4)	2.5 (1.4)	2.7 (1.3)	0.674	3.0 (1.3)	2.7 (1.4)	2.4 (1.2)	0.504
5	3.7 (1.5)	3.7 (1.0)	0.685	3.3 (1.7)	3.9 (1.3)	3.7 (1.4)	0.796	3.3 (1.4)	3.7 (1.5)	3.8 (1.2)	0.641
6	2.6 (1.1)	3.2 (1.0)	**0.040**	2.7 (1.1)	2.9 (1.1)	2.7 (1.0)	0.882	2.9 (0.6)	2.8 (1.1)	2.6 (1.0)	0.771
7	2.5 (1.0)	2.6 (1.1)	0.954	2.9 (1.5)	2.2 (0.9)	2.6 (1.0)	0.266	2.4 (0.7)	2.6 (1.2)	2.4 (0.8)	0.930
8	4.0 (1.0)	4.2 (1.3)	0.161	3.9 (1.1)	4.0 (1.1)	4.0 (1.1)	0.829	3.9 (1.0)	4.0 (1.1)	4.2 (1.1)	0.425
Total	25.2 (7.5)	24.9 (6.3)	0.628	26.4 (7.8)	25.5 (5.7)	24.8 (7.8)	0.831	25.2 (7.4)	25.3 (7.7)	24.6 (6.1)	0.948

X – average; SD – standard deviation; F – female; M – male; Education: I – elementary, II – secondary, III – higher; MS in family members: I – yes, II – no, III – unknow; *p – significance level Mann-Whitney U test; **p – significance level – Kruskal-Wallis test

Source: own elaboration.

The level of acceptance of the disease determined using the AIS scale did not depend on age ($p>0.05$) nor on the number of people living together in one household ($p>0.05$). The value of the correlation coefficient in most analyses was negative, which means that with age and the number of people living together, the level of acceptance of the disease decreased. Only single index values indicate a positive correlation but the strength of the correlation in these analyses is very weak (Table 5).

Table 5. Correlation between the level of acceptance of the disease and age and the number of people living together in the household

AIS	Age		Number of people living together in the household	
	r	p	r	p
1) I have problems with adapting to limitations imposed by my illness	-0.23	0.044	-0.14	0.223
2) I cannot do what I like best because of my health condition	-0.16	0.172	-0.12	0.309
3) My illness makes me sometimes feel unwanted	0.03	0.812	-0.13	0.272
4) My health problems make me rely on others more than I want to	-0.16	0.159	-0.20	0.084
5) My illness makes me a burden for my family and friends	0.002	0.988	-0.06	0.590
6) My health condition makes me feel not valuable	-0.11	0.356	0.08	0.490
7) I will never be self-dependent to the extent I would like to be	-0.24	0.034	-0.14	0.211
8) I think people around me often feel embarrassed because of my illness	0.07	0.555	0.02	0.852
Total AIS	-0.11	0.327	-0.11	0.326

r – correlation coefficient; p – p value, Pearson correlation coefficient r

Source: own elaboration.

The analysis of the impact of disease symptoms on the level of HR-QoL perception indicated a significant impact of fatigue and visual impairment on MCS, PCS, and ILQ. Disorders of motor coordination and reduced well-being significantly reduced the quality of life in the MCS dimension. Sexual dysfunctions significantly reduced HR-QoL in PCS (p=0.002) and ILQ (p=0.008). Disorders of motor coordination significantly worsened HR-QoL in ILQ (p=0.040). The exact data are presented in Table 6.

Table 6. Influence of disease symptoms on the level of disease acceptance and on HR-QoL

Symptoms	p X±SD	MCS	PCS	ILQ	AIS
chronic fatigue (n – 72)	p	**0.001**	**<0.001**	**<0.001**	*0.904
	Yes	27.0±13.8	27.4±8.4	27.2±9.9	25.5±5.4
	No	46,9±12,9	52.0±9.6	49.4±9.4	25.1±7.4
increased muscle tension (n – 36)	p	0.648	0.869	0.869	*0.240
	Yes	44.6±14.2	50.5±11.1	47.6±10.8	24.1±7.5
	No	46.0±13.8	49.7±12.0	47.8±11.5	26.0±7.0
balance disorders (n – 41)	p	0.940	0.329	0.806	*0.634
	Yes	45.0±15.1	48.6±12.4	46.8±12.7	25.6±7.5
	No	45.7±12.9	51.4±10.7	48.6±9.6	24.8±7.1
speech disorders (n – 11)	p	0.373	0.774	0.625	*0.848
	Yes	41.0±15.3	49.7±16.3	45.4±14.6	25.5±6.0
	No	46.1±13.7	50.2±10.7	48.1±10.6	25.1±7.4
trembling limbs (n – 47)	p	0.927	0.253	0.713	***0.045**
	Yes	45.2±14.1	51.3±12.1	48.2±10.9	23.8±7.3
	No	45.6±13.8	48.3±10.6	47.0±11.6	27.2±6.6
impaired motor coordination (n – 31)	p	**0.041**	0.056	**0.040**	*0.955
	Yes	40.6±16.0	47.8±13.2	44.2±13.0	25.1±8.2
	No	48.5±11.5	51.6±10.2	50.0±9.2	25.2±6.6
sensory disturbances (n – 37)	p	0.496	0.515	0.465	*0.162
	Yes	44.6±13.0	50.3±10.8	47.5±9.7	23.9±7.4
	No	46.0±14.8	49.9±12.3	48.0±12.4	26.2±6.9
visual impairment (n – 25)	p	**0.048**	**0.034**	**0.015**	***0.040**
	Yes	40.1±16.2	45.2±14.0	42.6±13.4	22.7±6.8
	No	47.8±12.2	52.4±9.4	50.1±9.1	26.3±7.2
urinary and stool disorders (n – 16)	p	0.872	0.131	0.338	*0.986
	Yes	44.9±14.7	48.8±12.0	46.9±12.0	25.2±7.7
	No	46.9±10.8	54.9±8.4	50.9±5.9	25.1±5.4
sexual dysfunction (n – 23)	p	0.089	**0.002**	**0.008**	0.399
	Yes	43.3±14.8	47.7±11.7	45.5±12.0	24.7±7.6
	No	50.2±10.3	55.9±9.1	53.0±6.1	26.3±6.1

Symptoms	**p X±SD**	**MCS**	**PCS**	**ILQ**	**AIS**
decreased well-being (n – 65)	p	**0.035**	0.174	0.105	0.081
	Yes	37.1±16.4	47.2±17.2	42.1±14.6	21.9±6.3
	No	47.0±12.9	50.7±10.1	48.8±10.1	25.8±7.3

N – number of observation; X – average; SD – standard deviation; p – significance level, test U Mann – Whitney test; * – Student's t-test

Source: own elaboration.

Discussion

The research on the quality of life of MS patients has been the subject of many studies over the last ten years, because determining the components of HR-QoL perceived by patients is extremely important for assessing the progression of the disease, the effectiveness of the treatment used (pharmacotherapy adherents), patient satisfaction, subsequent proper compliance with the prescribed pharmacotherapy (drug adherence), and the development of future effective strategies for comprehensive treatment and rehabilitation of these patients. Quite often, there are significant discrepancies between the clinician's and patient's perception of the importance of those areas that lower the HR-QoL of MS patients.

It should also be taken into account that the assessment of HR-QoL may vary depending on the socio-cultural characteristics of patients. In Poland, several studies have been carried out assessing the relationship between depressive symptoms and physical disability, as well as the perception of the disease, life satisfaction, and acceptance of stress on the quality of life of MS patients [19–20]. In our study, we focused on identifying factors in the physical and mental sphere that, according to patients with relapsing-remitting MS, are characterized by the highest and lowest subjectively accepted HR-QoL. Common symptoms reported by MS patients were chronic fatigue (92.3%), visual disturbances (67.9%), motor coordination disorders (60.3%), balance disorders and sensory disturbances (52.6% each). Deterioration of general well-being was reported by 83.3% of patients.

The results of several studies on endpoints [21–22] show that MS patients, regardless of their place of residence, generally positively assess the quality of their lives. The authors attribute this to the increased availability of MS treatment. However, the results of our study showed significant differences in the average level of perceived HR-QoL between MS patients and healthy people in all areas. The quality-of-life index of patients with multiple sclerosis was 47.7±11.1 compared to 75.1±11.1 in the comparison group. At the same time, no significant differences were observed between the genders in the total indicators of quality of life in terms of physical and mental health. These results are consistent with the results of many studies [23–26]. However, the results of our study show that in the case of men, the physical component had a greater impact on reducing the quality of life (49.8 – men vs. 50.2 – women), while the mental component had a greater impact on reducing the quality of life of women (45.1 women vs. 46.2 – men), although the difference was insignificant. Similar data were obtained in another study, which showed lower quality of life indicators in men, but only in terms of physical quality of life parameters [27].

The greatest difference was observed in the range of physical functioning (30.7±16.5 vs. 96.5±10.5; $p< 0.001$). These data are consistent with the results of a number of other studies [28–29] and can be explained by the fact that with the progression of MS, there is a decrease in physical fitness and mobility of patients, increased fatigue that affects the ability to function normally and perform daily activities.

It was found that factors such as gender, age, the occurrence of MS in the patient's family, and the number of people living together in the household do not have a significant impact on the level of acceptance of the disease ($p>0.05$). Only in the case of the statement "My health condition makes me feel not valuable" was the difference between the genders noted on the borderline of significance ($p=0.040$). Women presented a significantly lower level of acceptance of the disease (2.6±1.1) compared to men (3.2±1.0), confirming that in their current state of health (at the time of participation in the study), they did not feel like a fully valued person. In another study carried out in Poland, there were also no significant differences in the AIS scale between the sexes ($p=0.292$), but the average values obtained on the AIS scale in the compared groups were slightly higher compared to the author's studies [15]. In the author's study, women obtained on average: 25.2±7.5, and men 24.9±6.3, in the study [15] 30.4±7.7 and 28.8±7.3, respectively.

The difference in the meaning of the level of education of patients was noted between the author's studies, where the level of education did not affect the perception of the disease (p=0.831), and the results of the Polish study confirming the significant impact of the level of education on the obtained value in the AIS scale (p=0.008). In addition, another study showed that a higher level of education of MS patients was associated with higher scores in each area of quality of life [30].

In general, the average value obtained on the AIS scale indicates a moderate level of acceptance of the disease by MS patients. On the other hand, the lowest average level of disease perception was associated with the occurrence of serious health problems that make the patient dependent on external assistance (2.7±1.3) ("Health problems make me more dependent on others than I would like"). In addition, the strongest effects on HR-QoL in MCS, PCS, and ILQ parameters were found to be chronic fatigue (92.3%) and visual dysfunction (67.9%) reported by patients. Therefore, we believe that when developing treatment strategies and rehabilitation programs for MS patients, the focus should be on aspects that will minimize chronic fatigue and improve visual function in this group of patients.

To sum up, the strengths of the conducted study are the size of the group included in the study, which allows for correct conclusions about the community. Comparison with a group of healthy people (control group) allows for a real analysis of the differences in the perception of HR-QoL and QoL in these two groups of people.

Limitation

The study has some limitations. The primary objective of the study was to assess the level of HR-QoL in MS patients and to verify the level of disease acceptance. Factors such as the type of treatment used were not analyzed. A lot of scientific evidence provides many conclusions closely related to the method of treatment, rehabilitation, while the author's study aimed at assessing the level of acceptance of one of the types of MS and verification of the overall level of perceived HR-QoL in various spheres and dimensions.

Conclusion

- Patients with MS show a significantly lower level of HR-QoL in almost all spheres and dimensions compared to healthy people. There were no significant changes between the men in the MS patients group and men in the control group in the case of physical role and between women in the case of the health change sphere.
- The greatest difference in the level of HR-QoL between MS patients and the control group was recorded in the case of physical functioning.
- Chronic fatigue and visual dysfunctions had the strongest impact on the sense of HR-QoL in the dimensions of MCS, PCS, and ILQ.
- Women show a lower degree of acceptance of the disease according to the AIS scale compared to men.
- Including aspects aimed at minimizing chronic fatigue and improving visual function in the treatment strategy and rehabilitation program of MS patients will improve the quality of life of these patients, increase treatment satisfaction, and maintain an adequate level of adherence to medications (pharmacotherapy).

Abbreviations

MS – patients with Multiplex Sclerosis
HG – group of healthy people
QoL – Quality of life
HR-QoL – Health-related quality of life
AIS – Acceptance of Illness Scale
PCS – Physical Component Summary
MCS – Mental Component Summary
ILQ – Index of Life Quality

Acknowledgements

The research is the result of a research internship carried out at the Department of Healthcare Management, Pharmacotherapy and Clinical Pharmacy of Danylo Halytsky Lviv National Medical University from 04/01/2023 to 10/02/2023.

Funding

Statutory funding for Physiotherapy Departments. Ministry of Education and Science, Poland.

References

1. Pérez de Heredia-Torres M, Huertas-Hoyas E, Sánchez-Camarero C, Máximo-Bocanegra N, Alegre-Ayala J, Sánchez-Herrera-Baeza P, Martínez-Piédrola RM, García-Bravo C, Mayoral-Martín A, Serrada--Tejeda S. Occupational performance in multiple sclerosis and its relationship with quality of life and fatigue. Eur J Phys Rehabil Med 2020 Apr; 56(2): 148–154. https://doi.org/10.23736/S1973-9087.20.05914-6.
2. MS International Federation. Atlas of MS. 3rd Edition. September 2020.
3. Brola W, Sobolewski P, Flaga S, Fudala M, Jantarski K. Increasing prevalence and incidence of multiple sclerosis in Poland. Neurol Neurochir Pol 2017 Jan-Feb; 51(1): 82–85. https://doi.org/10.1016/j.pjnns.2016.11.005.
4. Barbosa MC, Torres S, Barbosa R, Vieira F, Lencastre L, Guerra MP. Quality of Life in Multiple Sclerosis: The Predictive Roles of Positive Body Image and Meaning in Life. Sclerosis 2023 May; 1(2): 76–90. https://doi.org/10.3390/sclerosis1020010.
5. Browne P, Chandraratna D, Angood C, Tremlett H, Baker C, Taylor BV, Thompson AJ. Atlas of Multiple Sclerosis 2013: A growing global problem with widespread inequity. Neurology 2014; 83(11): 1022–1024. https://doi.org/10.1212/WNL.0000000000000768.

6. Hajric S, Suljic E, Serdarevic A, Mahmutbegovic G. Quality of Life in Multiple Sclerosis Patients: Influence of Gender, Age and Marital Status. Materia Socio Medica 2022 Mar; 34(1): 19–24. https://doi.org/10.5455/msm.2022.33.19-24.
7. Orton SM, Herrera BM, Yee IM, Valdar W, Ramagopalan SV, Sadovnick AD, Ebers GC; Canadian Collaborative Study Group. Sex ratio of multiple sclerosis in Canada: a longitudinal study. Lancet Neurol 2006 Nov; 5(11): 932–936. https://doi.org/10.1016/S1474-4422(06)70581-6.
8. Thompson AJ, Baranzini SE, Geurts J, Hemmer B, Ciccarelli O. Multiple sclerosis. The Lancet 2018 Apr; 391(10130): 1622–1636. https://doi.org/10.1016/S0140-6736(18)30481-1.
9. Dendrou CA, Fugger L, Friese MA. Immunopathology of multiple sclerosis. Nat Rev Immunol 2015 Aug; 15(9): 545–558. https://doi.org/10.1038/nri3871.
10. Eilertsen G, Ormstad H, Kirkevold M, Mengshoel AM, Söderberg S, Olsson M. Similarities and differences in the experience of fatigue among people living with fibromyalgia, multiple sclerosis, ankylosing spondylitis and stroke. J Clin Nurs 2015 Feb; 24(13–14): 2023–2034. https://doi.org/10.1111/jocn.12774.
11. Hadgkiss EJ, Jelinek GA, Weiland TJ, Rumbold G, Mackinlay CA, Gawler I. Health-related quality of life outcomes at 1 and 5 years after a residential retreat promoting lifestyle modification for people with multiple sclerosis. Neurol Sci 2013 Feb; 34: 187–195. https://doi.org/10.1007/s10072-012-0982-4.
12. MS International Federation. Seven principles to improve quality of life with MS. Retrieved from http://www.msif.org/wp-content/uploads/2017/05/Seven-principles-to-improve-quality-of-life-with-MS-ENGLISH.pdf. Access: 07.04.2024.
13. WMA Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects. Retrieved from www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human- subjects/. Access: 30.04.2023.

14. Item Short Form Survey (SF-36) Scoring Instructions. Retrieved from www.rand.org/health-care/surveys_tools/mos/36-item-short-form/scoring.html. Access: 01.05.2023.
15. Krawczyk-Suszek M, Gaweł A, Kleinrok A. Ranking of diseases affecting the health-related quality of life of patients in Poland – a cross-sectional study. Arch Med Sci 2024; 20(5): 1567–1578. https://doi.org/10.5114/aoms/171634.
16. Kołtuniuk A, Pytel A, Kulik A, Rosińczuk J. The Role of Disease Acceptance, Life Satisfaction, and Stress Perception on the Quality of Life Among Patients With Multiple Sclerosis: A Descriptive and Correlational Study. Rehabilitation Nursing 2021; 46(4): 205–213. https://doi.org/10.1097/RNJ.0000000000000288.
17. Czerw A, Religioni U, Szumilas P, Sygit K, Partyka O, Mękal D, Jopek S, Mikos M, Strzępak Ł. Normalization of the AIS (Acceptance of Illness Scale) questionnaire and the possibility of its use among cancer patients. Ann Agric Environ Med 2022; 29(2): 269–273. https://doi.org/10.26444/aaem/144197.
18. Schober P, Boer C, Schwarte LA. Correlation Coefficients: Appropriate Use and Interpretation. Anesth Analg 2018 May; 126(5): 1763–1768. https://doi.org/10.1213/ANE.0000000000002864.
19. Kołtuniuk A, Pawlak B, Krówczyńska D, Chojdak-Łukasiewicz J. The quality of life in patients with multiple sclerosis – Association with depressive symptoms and physical disability: A prospective and observational study. Front Psychol 2023 Jan; 13: 1068421. https://doi.org/10.3389/fpsyg.2022.1068421.
20. Kołtuniuk A, Pytel A, Kulik A, Rosińczuk J. The Role of Disease Acceptance, Life Satisfaction, and Stress Perception on the Quality of Life Among Patients With Multiple Sclerosis: A Descriptive and Correlational Study. Rehabil Nurs 2021; 46(4): 205–213. https://doi.org/10.1097/RNJ.0000000000000288.
21. Al Jumah M, Kojan S, Alroughani R, Cupler E, Bohlega S, Daif A, Al Mujalli M, Al Harbi T, El Tamawy M, Ashour S, Mhiri Ch, Gouider R, Jawhary A, El Boghdady A, Hussein M. A Prospective Multicenter Study

for Assessing MusiQoL Validity among Arabic-Speaking MS Patients Treated with Subcutaneous Interferon β-1a. Mult Scler Int 2021 Mar; 2021: 1–7. https://doi.org/10.1155/2021/6681431.

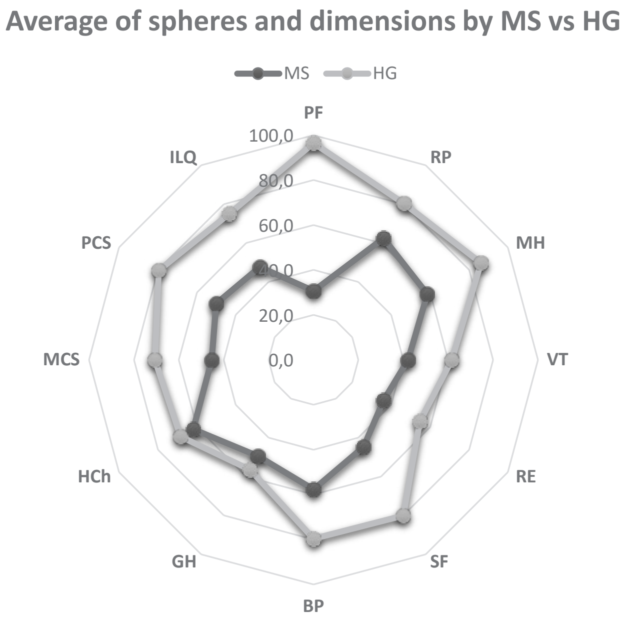
22. Farran N, Safieddine BR, Bayram M, Abi Hanna T, Massouh J, AlKhawaja M, Tamim H, Darwish H. Factors affecting MS patients' health-related quality of life and measurement challenges in Lebanon and the MENA region. Mult Scler J Exp Transl Clin 2020 Jan; 6(1): 2055217319848467. https://doi.org/10.1177/2055217319848467.
23. Albuquerque C, Geraldo A, Martins R, Ribeiro O. Quality of Life of People with Multiple Sclerosis: Clinical and Psychosocial Determinants. Procedia Soc Behav Sci 2015 Jan; 171: 359–365. https://doi.org/10.1016/J.SBSPRO.2015.01.133.
24. Brola W, Sobolewski P, Fudala M, Flaga S, Jantarski K. Multiple sclerosis: patient-reported quality of life in the Świętokrzyskie Region. Medical Studies 2017; 3: 191–198. https://doi.org/10.5114/ms.2017.70345.
25. Boogar IR, Talepasand S, Jabari M. Psychosocial and Medical Determinants of Health-related Quality of Life in Patients with Relapsing--Remitting Multiple Sclerosis. Noro Psikiyatr Ars 2018 Mar; 55(1): 29–35. https://doi.org/10.29399/npa.16983.
26. Sabanagic-Hajric S, Suljic E, Memic-Serdarevic A, Sulejmanpasic G, Mahmutbegovic N. Quality of Life in Multiple Sclerosis Patients: Influence of Gender, Age and Marital Status. Mater Sociomed 2022; 34(1): 19–24. https://doi.org/10.5455/msm.2022.33.19-24.
27. Rezapour A, Almasian Kia A, Goodarzi S, Hasoumi M, Nouraei Motlagh S, Vahedi S. The impact of disease characteristics on multiple sclerosis patients' quality of life. Epidemiol Health 2017 Feb; 39: e2017008. https://doi.org/10.4178/epih.e2017008.
28. Barbosa MC, Torres S, Barbosa R, Vieira F, Lencastre L, Guerra MP. Quality of Life in Multiple Sclerosis: The Predictive Roles of Positive Body Image and Meaning in Life. Sclerosis 2023 Jul; 1(2): 76–90. https://doi.org/10.3390/sclerosis1020010.
29. Ochoa-Morales A, Hernández-Mojica T, Paz-Rodríguez F, Jara-Prado A, Trujillo-De Los Santos Z, Sánchez-Guzmán MA, Guerrero-Camacho JL,

Corona-Vázquez T, Flores J, Camacho-Molina A, Rivas-Alonso V, Dávila--Ortiz de Montellano DJ. Quality of life in patients with multiple sclerosis and its association with depressive symptoms and physical disability. Mult Scler Relat Disord 2019 Nov; 36: 101386. https://doi.org/10.1016/j.msard.2019.101386.

30. Zengin O, Erbay E, Yıldırım B, Altındağ Ö. Quality of Life, Coping, and Social Support in Patients with Multiple Sclerosis: A Pilot Study. Turkish Journal of Neurology 2017; 23(4): 211–218. https://doi.org/10.4274/tnd.37074.

Supplementary materials

Figure 2. Average quality of life in SF – 36 including MS patients and control group



MS – patients with Multiple Sclerosis; HG; HG – group of healthy respondents; PF – physical functioning; RP – role physical; RE – role emotional; VT – vitality; MH – mental health; SF – social functioning; BP – bodily pain; GH – general health; HCh – health change; MCS – Mental Component Summary; PCS – Physical Component Summary; ILQ SF – 36 – Index of Life Quality

Source: own elaboration.

Table 2. General characteristics of individual spheres and dimensions of SF-36 in the group of patients vs healthy group [in percentages]

SF-36	**MS**									**HG**									**Female MS vs HG p**	**Male MS vs HG p**	**Overall MS vs HG p**
	Female (n – 61)			**Male (n – 17)**			**Overall (n – 78)**			**Female (n – 58)**			**Male (n – 48)**			**Overall (n – 106)**					
	X	**SD**	**Me**	**X**	**SD**	**Me**	**X**	**SD**	**Me**	**X**	**SD**	**Me**	**X**	**SD**	**Me**	**X**	**SD**	**Me**			
PF	29.7	14.3	31.0	34.4	22.9	32.0	30.7	16.5	31.0	95.5	13.5	100.0	97.6	4.7	100.0	96.5	10.5	100.0	**<0.001**	**<0.001**	**<0.001**
RP	62.7	38.1	75.0	61.8	40.6	75.0	62.5	38.4	75.0	87.1	30.1	100.0	72.4	36.6	100.0	80.4	33.8	100.0	**<0.001**	0.330	**<0.001**
RE	37.4	14.8	36.0	31.1	14.9	32.0	36.0	14.9	36.0	53.7	6.9	54.0	56.1	9.5	56.0	54.8	8.2	56.0	**<0.001**	**0.002**	**<0.001**
VT	42.1	13.7	40.0	42.1	13.0	40.0	42.1	13.4	40.0	63.9	7.7	65.0	58.9	8.1	60.0	61.6	8.2	60.0	**<0.001**	**<0.001**	**<0.001**
MH	56.8	39.6	66.7	64.7	38.1	66.7	58.5	39.2	66.7	82.8	28.1	100.0	90.3	20.6	100.0	86.2	25.1	100.0	**<0.001**	**<0.001**	**<0.001**
SF	44.1	17.5	50.0	47.1	22.3	50.0	44.7	18.5	50.0	83.2	19.5	87.5	76.3	27.0	87.5	80.1	23.3	87.5	**<0.001**	**<0.001**	**<0.001**
BP	58.2	24.4	57.5	56.0	22.1	57.5	57.7	23.8	57.5	78.8	20.7	80.0	80.6	19.7	85.0	79.6	20.2	80.0	**<0.001**	**<0.001**	**<0.001**
GH	50.2	6.8	50.0	47.1	10.5	45.0	49.5	7.8	50.0	55.3	10.2	55.0	58.0	13.0	60.0	56.5	11.6	55.0	**<0.001**	**0.003**	**<0.001**
HCh	61.1	23.1	50.0	64.7	23.5	75.0	61.9	23.0	50.0	64.2	40.3	75.0	73.4	35.5	75.0	68.4	38.3	75.0	0.068	**0.049**	**0.002**
MCS	45.1	13.3	48.1	46.2	16.3	47.3	45.3	13.9	47.7	70.9	10.2	73.7	70.4	8.8	72.5	70.6	9.5	72.8	**<0.001**	**<0.001**	**<0.001**
PCS	50.2	11.2	51.8	49.8	13.0	54.1	50.1	11.5	52.1	80.6	15.6	85.3	78.3	15.5	83.4	79.6	15.5	85.0	**<0.001**	**<0.001**	**<0.001**
ILQ	47.6	10.5	50.0	48.0	13.6	50.4	47.7	11.1	50.1	75.7	11.4	79.1	74.4	10.8	79.2	75.1	11.1	79.1	**<0.001**	**<0.001**	**<0.001**

* MS – patients with Multiple Sclerosis; HG – group of healthy respondents; X – average; -95Cl/+95Cl – 95% confidence interval of average or standard deviation; SD – standard deviation; Me – median; Reference (Min – Max) – range of values between the minimum and maximum value; Q1 – lower quartile; Q3 – upper quartile; PF – physical functioning; RP – role physical; RE – role emotional; VT – vitality; MH – mental health; SF – social functioning; BP – bodily pain; GH – general health; HCh – health change; MCS – Mental Component Summary; PCS – Physical Component Summary; ILQ SF – 36 – Index of Life Quality; p – significance level. U Mann – Whitney test

Source: own elaboration.