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Quality of life in patients with multiple sclerosis in Eastern Slovakia

JARMILA SZILASIOVA[1], MARTINA KROKAVCOVA[2,3], ZUZANA GDOVINOVA[1,3], JAROSLAV ROSENBERGER[4,5] & JITSE P. VAN DIJK[3,5]

[1]Department of Neurology, University of PJ Safarik, Tr. SNP 1, Kosice 04001, Slovakia, [2]Faculty of Medicine, Neurology, Tr.SNP 1, Kosice 04001, Slovakia, [3]Faculty of Medicine, 1st Department of Psychiatry, Tr.SNP 1, Kosice 04001, Slovakia, [4]Faculty of Medicine, 1st Internal Clinic, Tr.SNP 1, Kosice 04001, Slovakia, and [5]Department of Social Medicine, University Medical Center Groningen, Ant. Deusinglaan 1, AV Groningen, Groningen 9713, Netherlands

Abstract

Purpose. Quality of life (QoL) is an important measure of the burden of disease and could be useful in evaluating patient management and practical interventions. The aim of this study was to explore the association of psychological and clinical variables with QoL in patients with multiple sclerosis (MS).

Methods. One hundred and fourteen consecutive patients (mean age 36.1 ± 10.3 years, 72% female) from one MS centre completed the Hospital Anxiety and Depression Scale, the Fatigue Severity Scale and the Short-Form-36 Health Survey (SF-36). Functional disability was assessed using the Expanded Disability Status Scale. Multiple linear regression analyses were performed to analyse demographic, psychological and clinical data.

Results. Functional disability, depression and fatigue were found to be related inversely to the physical health subscale. Disease course, anxiety and depression were associated negatively with the mental health subscale.

Conclusions. Functional disability, depression and fatigue were the main variables related to the perceived physical health subscale, and disease course, anxiety and depression to the perceived mental health subscale in the group of patients with MS. Thus, effective treatment of fatigue, anxiety and depression could be assumed to increase a patient's QoL.

Keywords: *Multiple sclerosis, fatigue, anxiety, depression, quality of life*

Introduction

Functional disability, fatigue, depression and anxiety were found to be associated with quality of life (QoL) in patients with multiple sclerosis (MS) [1–4]. MS is a chronic autoimmune disease of the central nervous system (CNS) and one of the most common causes of neurological disability in young and middle-aged adults. QoL assessment is considered to be more sensitive to changes during a disease than conventional disability measurements [1,2,5–8]. Patients consider their QoL, a subjective perception of their overall status, as more important than their impaired physical functioning [8,9]. Therefore, QoL instruments might be of some use in assessing several important domains of health and various aspects of impairment from the perspective of patients. The physical, mental and social health domains have been included in QoL assessments [5,6,10–13].

Many studies have previously examined QoL in patients with MS [1–3,9,11,12,14–16], but only a few authors have investigated the association between MS-related disability, fatigue, depression, anxiety and QoL [2,17]. Brunet et al., Miller et al. and Drulovic et al. investigated the relationships between disability and QoL as measured by the Short-Form-36 Health Survey (SF-36) [5,12,15,18–20].

Most studies have shown that functional disability and fatigue are associated with QoL in patients with MS [1,2,5,13,17,20,21], but results about the association between demographic and disease-specific variables and QoL in patients with MS have been somewhat inconsistent [5,16,17,22].

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Fatigue has been related to poor physical and mental health [1–3,17] and has also been linked to disability and depression [21]. Depression appeared to be associated with poor QoL in many studies [1,2,4,10,11,15,17] and with a poor score on both the physical and mental health subscales. In addition, disability, fatigue and depression were found to be related to the physical health subscale and depression with fatigue to the mental health subscale in a study by Amato et al [1]. Similarly to depression, anxiety showed a negative relationship to both QoL domains in a study by Benito-León et al. [11].

The aforementioned variables are relevant for QoL and for improving it by means of practical interventions. The results of this study might identify potential targets for practical interventions. Thus, the aim of this study was to assess which socio-demographic variables, clinical data and psychological variables are related to QoL in a sample of patients with MS, and how clinical and psychological variables explain QoL after controlling for socio-demographic data.

Methods

Study population

One hundred and fourteen consecutive patients from the MS Centre (mean age 36.1 ± 10.3 years; 28% males) at the Department of Neurology of the Faculty Hospital in Košice, Eastern Slovakia (774,000 inhabitants) met the criteria for clinically defined MS [23]. They were enrolled into this cross-sectional study between September 2009 and May 2010. Patients were recruited from those who were eligible to participate. Once written informed-consent forms were received, an interview and neurological examinations were conducted and questionnaires filled out. Neurological examinations were handled by the same neurologist for all of the patients with MS.

Sociodemographic variables including age, gender and education were derived from the interview. Clinical data including disease history, disease course – evaluated as relapsing-remitting (RRMS), secondary-progressive (SPMS) or primary-progressive (PPMS) [24] – disease duration, functional disability and treatment used were assessed by the neurologist and compared with data in the patient's medical file. Anxiety, depression, fatigue and perceived physical and mental health status were obtained through self-reporting questionnaires. The framework of the formal procedure for translation and adaptation of questionnaires to the Slovak language was respected. The exclusion criteria were as follows: current MS relapse, pregnancy and a history of psychiatric or other medical conditions affecting the outcomes of the study. Assistance was provided if the patient was not capable of filling out the questionnaires because of vision problems, motor problems or fatigue. Each patient provided a signed written informed-consent form before participating in the study. The local Ethics Committee approved the study.

Measures

In all patients, QoL was assessed using the Short-Form-36 Health Survey (SF-36), which was originally designed as a generic indicator of health status for use in population surveys [1,18,19]. The SF-36 includes 36 self-administered items spanning eight different domains which can be summarised into two summary scales. One is the physical health summary scale, which contains four dimensions: physical functioning (10 items), physical role (four items), bodily pain (two items) and general health (five items). The second is the mental health summary scale, which also contains four dimensions: vitality (four items), social functioning (two items), emotional role (three items) and mental health (five items). One question covers changes in health status over the past year (one item), and all item scores are coded and transformed into a scale from 0 (poor health) to 100 (optimal health), with higher scores indicating better functioning. A summary score, which reflects the overall physical and mental QoL, is calculated as the Physical health summary score (PHSS) and the Mental health summary score (MHSS). Cronbach's alpha in this study was 0.82 for the PHSS and 0.84 for the MHSS.

Functional disability was determined using the Kurtzke's Expanded Disability Status Scale (EDSS). The EDSS is based on the neurological testing of functional systems: visual, pyramidal, brainstem, cerebellar, sensory, bowel and bladder, mental and 'other'. Each functional system is graded to the nearest possible grade, with a range from 0 to 5 or 6, where 0 means normal grade, 6 means loss of function. Disability caused by MS is graded from 0 (normal neurological finding) to 10 (death due to MS) in half-score steps [25]. This scale is the most frequently-used scoring system with MS in neurological practice [26]. An EDSS score was given by the same neurologist for all patients in this study.

The Hospital Anxiety and Depression Scale (HADS) was given to each patient to explore feelings and attitudes relating to general mood status [19,27]. The HADS is a quick, self-reported questionnaire used for screening in hospital settings. It consists of 14 items, each rated 0–3. The questionnaire is split into two independent seven-item scales, one for

anxiety (HADS-A) and one for depression (HADS-D). The summary score for the both subscales range from 0 to 21, with a higher score meaning worse condition. A score below 8 is considered to be normal. Cronbach's alpha was 0.81 for anxiety and 0.82 for depression in this study.

Fatigue was measured using the nine-item Fatigue Severity Scale (FSS) [28]. The FSS quantifies the severity, frequency and impact of fatigue in daily living. The respondent is asked to read each statement and answer from 1 (strongly disagree) to 7 (strongly agree), depending on how appropriate he/she feels that the statement applied to him/her over the preceding week. A higher total score indicates more severe fatigue. The suggested cut-off point is 4 [28]. Cronbach's alpha was 0.96 in this study.

Educational level was trichotomised as low (elementary), middle (secondary) or high (university).

Statistical analyses

Continuous data were given as a mean, and scores computed from questionnaires were considered continuous variables. Categorical data were given as counts and percentages. Next, variables were compared by disease duration and by disease course.

Finally, linear regression analyses were performed to evaluate the association of covariates with the QoL dimensions. The Physical health summary score (PHSS) and the Mental health summary score (MHSS) of the SF-36 were set as dependent variables. The independent variables were added into the model all at one time via the enter method in order to show the explained variance of PHSS and MHSS. The model of independent variables consisted of demographic data (age, gender, education), clinical data (disease duration, disease course, EDSS, FSS) and psychological data (HADS-A, HADS-D) in significant relationships with PHSS and MHSS (QoL). The Statistical Package for Social Sciences, v.16.0 (SPSS, Chicago, IL) was used to analyse the data.

Results

Basic description of the sample

A basic description of the sample is given in the Table I ($n = 114$). The average disease duration, measured as time from MS diagnosis, was 8.4 ± 6.8 years; patients with a disease duration of over 10 years made up nearly one-third of the sample (31.5%). More than three-quarters of the sample had a relapsing-remitting disease course (72%) (Table I).

The main study variables, including the means, standard deviations and differences measured be-

Table I. Description of the sample ($n = 114$).

Variable	N (%)	Mean	SD	Range
Age		36.1	10.3	19–60
Gender				
Men	32 (28.0%)			
Women	82 (72.0%)			
Education				
Elementary	9 (8.0%)			
Secondary	85 (74.5%)			
University	20 (17.5%)			
Disease duration (in years)		8.4	6.8	0.5–37
≥10 years	36 (31.5%)			
<10 years	78 (68.5%)			
EDSS		3.3	1.4	1.0–8.5
Disease course				
Relapsing-remitting	88 (77.2%)			
Secondary-progressive	21 (18.4%)			
Primary-progressive	5 (4.4%)			
Treatment				
Interferon beta	85 (74.6%)			
Glatirameracetate	14 (12.3%)			
Immunosuppressants	8 (7.0%)			
Antidepressants	67 (60.0%)			

EDSS, expanded disability status scale; SD, standard deviation.

tween the two disease duration subgroups and disease course subgroups, are given in Table II. Fatigue scores ranged from 0–0.5 (6%) to 4.0–7.0 (44%). Anxiety was present in 31 (27%) patients, depression in 10 (8.7%) patients.

The subgroup of patients with disease duration over 10 years had a significantly higher score than those with disease duration less than 10 years regarding functional status, the physical health domains of quality of life, fatigue and depression (Table II).

Patients with a relapsing-remitting disease course had a significantly lower score in functional status. Relapsing-remitting disease course showed a better score in the physical health domain of QoL, fatigue and depression than those with secondary-progressive and primary-progressive disease course (Table II).

Physical health summary scale

Table III shows that 60.13% of the variance in PHSS was explained by a model consisting of EDSS, FSS and HADS-D. Higher scores in disability, fatigue and depression were associated with worse PHSS. The variable explaining most of the variance in PHSS was fatigue (Table III).

Mental health summary scale

The model consisting of disease course ($\beta = 0.14$, $p \leq 0.05$), depression ($\beta = -0.35$, $p \leq 0.001$) and

Table II. Comparison of disease duration and disease course in patients with MS.

Variable	Total sample (N = 114) Mean (±SD)	Disease duration			Disease course		
		< 10 years (N = 78) Mean (±SD)	≥10 years (N = 36) Mean (±SD)	p	RRMS (N = 88) Mean (±SD)	SP + PPMS (N = 26) Mean (±SD)	p
EDSS	3.3 (±1.4)	3.0 (±1.4)	3.9 (±1.2)	***	2.7 (±0.9)	5.3 (±1.2)	***
Physical functioning†	40.6 (±11.5)	42.8 (±11.1)	35.8 (±10.8)	*	43.9 (±9.3)	29.3 (±10.9)	***
Role functioning physical†	39.5 (±11.7)	41.3 (±11.7)	35.5 (±10.9)	*	40.2 (±11.5)	37.1 (±12.3)	
Bodily pain†	45.8 (±11.9)	47.3 (±12.5)	42.5 (±10.2)	*	47.1 (±11.8)	41.4 (±11.7)	*
General health†	38.9 (±11.2)	41.2 (±11.6)	33.9 (±8.5)	*	40.4 (±11.5)	33.9 (±8.5)	**
PHSS (SF-36) †	39.9 (±10.5)	42.2 (±10.2)	34.8 (±9.3)	***	42.3 (±9.5)	31.9 (±9.9)	***
Vitality†	45.5 (±9.9)	46.8 (±10.5)	42.7 (±7.8)	*	46.5 (±9.9)	42.2 (±9.2)	
Social functioning†	41.0 (±11.0)	42.8 (±11.1)	37.1 (±9.9)	**	42.8 (±10.1)	34.9 (±11.9)	***
Role functioning emotional†	41.3 (±12.9)	42.2 (±12.6)	29.4 (±13.5)	***	41.1 (±12.7)	42.1 (±13.7)	
Mental health†	43.0 (±11.6)	43.4 (±11.1)	42.2 (±10.6)		43.2 (±11.7)	42.5 (±11.6)	
MHSS (SF-36)†	43.8 (±11.1)	44.5 (±11.5)	42.5 (±10.2)		43.7 (±11.1)	44.3 (±11.6)	
Fatigue (FSS)	3.4 (±1.7)	3.2 (±1.7)	4.1 (±1.4)	*	3.2 (±1.7)	4.3 (±1.4)	**
Anxiety (HADS-A)	7.5 (±4.3)	7.1 (±4.3)	8,3 (±4.1)		7.3 (±4.2)	8.2 (±4.5)	
Depression (HADS-D)	4.8 (±3.7)	4.4 (±3.7)	5.9 (±3.7)	*	4.4 (±3.6)	6.4 (±3.9)	*

RRMS, relapsing-remitting multiple sclerosis; SP+PPMS, secondary-progressive + primary-progressive multiple sclerosis; EDSS, Expanded Disability Status Scale; SF-36, Short Form-36 Health Survey; PHSS, Physical Health Summary Scale; MHSS, Mental Health Summary Scale; FSS, Fatigue Severity Scale; HADS, Hospital Anxiety and Depression Scale.
†Higher scores indicate 'better functioning'.
p - statistical significant value; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table III. Final models after multiple linear regression analysing of sociodemographic variables, disease duration, disease course, EDSS, fatigue, anxiety, depression on perceived physical and mental health summary scales in the total sample.

	Unstandardised coefficients		Standardised coefficients	
	B	Std. error	β	p
Dependent variable: PHSS				
(Constant)	60.13	1.78		<0.001
EDSS	−2.61	0.48	−0.36	<0.001
FSS	−2.55	0.45	−0.41	<0.001
HADS-D	−0.57	0.20	−0.20	<0.01
$R^2 = 0.61$; adjusted $R^2 = 0.57$				
Dependent variable: MHSS				
(Constant)	53.92	2.28		<0.001
HADS-A	−1.32	0.23	−0.51	<0.001
HADS-D	−1.04	0.27	−0.35	<0.001
Disease course	3.93	1.60	0.14	<0.05
$R^2 = 0.63$, adjusted $R^2 = 0.59$				

For abbreviations, see Table II.
Adjusted R^2 are displayed; p, statistical significant value.

anxiety ($\beta = -0.51$, $p \leq 0.001$) explained 53.92% of the variance in mental health status PMSS. Patients with progressive disease courses reported higher score in MHSS. Higher scores in depression and anxiety were associated with worse MHSS. The variable explaining the most variance in PHSS was anxiety (Table III).

Discussion

The aim of this study was to evaluate which sociodemographic, clinical and psychological variables are associated with QoL in a group of people with MS.

Our patients generally achieved middle and low scores in all SF-36 dimensions. Our results are similar to earlier studies reporting that QoL was poor in patients with MS [2,3,5, 8,14,17]. Very low scores were found in the dimensions of general health, role of physical functioning and physical functioning in the SF-36.

Our study showed that disability, fatigue and depression were related to physical health status, whereas anxiety, depression and disease course were related to perceived mental health status. Although some studies found disability to be related with both dimensions of the SF-36 [29,30], our findings were in line with the majority of previous studies in that disability was associated only with the physical subscale of the SF-36 [1–4,12,17,31,32]. These discrepancies in the association of disability with the physical and mental dimensions of the SF-36 can probably be attributed to the included covariates, such as fatigue, anxiety and depression [29]. Janssens et al. [33] reported that disability was significantly related to both the physical and mental health subscales, but after adjustment for anxiety and depression, regression analyses no longer showed a significant relation between disabilty and mental

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health scales, assuming that anxiety and depression are intermediating factors in the association of disability and QoL.

Fatigue is one of the three most disabling symptoms of MS and was described as being present in 65–97% of the patients with MS [7,34–36]. MS-related fatigue is likely to be associated with motor disturbances and/or mood disorders and to have an effect on QoL [6,7,35,37]. Our study showed a strong association between fatigue and perceived physical health status. Only a few studies have been conducted on QoL and the impact of fatigue in patients with MS [1–3,17,32]. Our results are consistent with the findings of Turpin et al. [32], while results from studies by Lobentanz et al. and Ghaem et al. found associations of higher scores of fatigue with lower scores on all domains of QoL [3,17]. Also, the studies of Amato et al. [1] and Benedict et al. [2] reported that the fatigue score was related to poor physical and mental summary scores.

This study shows that anxiety and depression are found to be the strongest predictors of the mental health status. These results might be explained in three ways. First, by the patient's ability to cope with the disease [19] and to highlight the important role of mood disorder treatment. Depression and anxiety are highly prevalent among persons with MS and have been associated with poorer functional status [11,22,38–40]. Earlier studies also showed that depression is an important independent predictor of the mental health score of QoL [1,2,10,22]. Second, the results might result from comparable questions on mental health in the SF-36 with questions in HADS-D and HADS-A. Third, anxiety and depressive mood might also result from the disease process itself [41]. Mood disorders might be a major determinant of QoL in MS, despite a mild 'physical disability' [1].

Ford et al. [16] concluded that progressive disease courses were related to worse disability compared to the relapsing-remitting disease course. As assumed in our study, disability, fatigue and depression were significantly worse in the progressive disease course compared with the relapsing-remitting one. In our sample, a unique finding emerged from the regression analysis used: Progressive disease course was associated with better perceived mental health status. This result may be explained by coping with a progressive chronic disease.

Regarding age, we did not find an association between age with either QoL dimensions, similarly as in studies by Fruehwald et al. and Amato et al. [1,22]. In contrast, Krokavcova et al. [30] reported that increasing age was a significant predictor of worse perceived physical health status. DiLorenzo et al. [9] concluded that the process of getting older enhances perceptions of mental health in MS, because the oldest age group (65 and older) reported significantly better mental health compared with the middle age groups (50–64), but not with the youngest (under 49). Similarly, in a study by Ford et al. [16] older persons reported better QoL. Solari et al. [4] found that age and depression were predictors of both physical and mental health summary scales. A different multiple linear regression modelling might be a potential explanatory factor of these results.

With respect to gender we did not find any differences, similarly as in earlier studies [3,11, 22,32]. Education and disease duration were not associated with QoL, similar to the results of previous studies [3,19,30]. It might be assumed that QoL was already diminished at disease onset when a patient is getting used to new conditions caused by MS.

Strengths and limitations

To the best of our knowledge, only a few studies have previously focussed on the association of disability, fatigue, anxiety and depression with quality of life in patients with MS using linear regression analyses [1–3,17,32]. In addition, we decided to include disease course and disease duration into the analysed variables. Some limitations of this study should be mentioned. First, the sample included patients from the eastern part of the country grouped in one MS centre, thus the outcomes might not be representative of the whole MS population. To prevent such sample fluctuations, a large multicenter study is needed. Second, quality of life could be related to follow-up factors, including immunomodulatory or immunosupressive treatment, cognitive dysfunction, social support or employment status [30,42]. These aspects have not yet been analysed in this sample. Third, the study has a cross-sectional design, which does not provide us with information about changes in patients over time, and thus does not allow us to explore causal pathways.

Implications

The results of this study might identify potential targets for practical interventions. Despite intensive research, pharmacologic disease modifying treatment is mostly effective in, and limited to, less disabled patients with MS. It has been suggested that neurorehabilitation, a fundamental part of neurological care, is the only approach which can improve the limitations in activity and restrictions in social participation of people with MS [43]. Participation in exercise by persons with MS has been associated with positive benefits, including those related to QoL, fatigue and depression [44–47]. Hence, custom-tailored

rehabilitative programmes appear to be very important by improving disability, decreasing fatigue and increasing emotional functioning. Neurologists can measure QoL and recommend appropriate interventions – psychotherapy, physiotherapy and compensatory strategies. Depression can hinder a patient's ability to cope with a disease and to adhere to treatment. Effective treatment of anxiety and depression is available, but these disorders continue to be underdetected and undertreated by MS providers.

We plan to follow this sample over time; future longitudinal design will provide us with information about changes during the disease over time and will thus enable us to explore causal pathways. It is at least important to distinguish whether fatigue is related to the disease itself or to depression, or whether it is a kind of autonomous symptom which is more often present in chronic disease [36,48].

In conclusion, this study demonstrates that people with MS had poor and moderate quality of perceived physical and mental health status. Disability, disease course, fatigue, depression and anxiety were found to be strongly and negatively related to the perceived physical and mental health status. Thus, the assessment of fatigue, anxiety and depression seems to be important for clinical practice. QoL gives a broader measure of disease burden than disability alone. Our findings bolster the notion that patients with MS should be screened for fatigue and mood disorders and treated as soon as possible. We suggest earlier and more effective treatment of these limiting aspects of the disease as a means of contributing to their social participation as much as possible.

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Declaration of interest

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