

The Associations Between Fatigue, Disability, and Mobility and the Quality of Life in Patients With Multiple Sclerosis

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Abstract

Background: Multiple sclerosis (MS) is a chronic disease which is caused by demyelination in the central nervous system (CNS) in young adults. This disease affects independence and the ability to participate in family and community activities, thus affecting the quality of life.

Objectives: This cross-sectional study was designed to investigate the associations between fatigue, disability, and mobility and the quality of life in patients with MS in the city of Semnan, Iran.

Patients and Methods: Sixty-six MS patients completed the Rivermead mobility index (RMI), Guy's neurological disability scale (GNDS), modified fatigue impact scale (MFIS), and Multiple sclerosis quality of life-54 (MSQL-54) questionnaires, which assessed the physical and mental health of the participants in 12 dimensions.

Results: The results of this study showed significant correlations between fatigue ($P = 0.002$), disability ($P < 0.001$), and the quality of life. A significant relationship between mobility and physical activity ($P < 0.05$) was also observed, while no significant relationship was found between mobility and mental health. Moreover, no significant associations were seen between the quality of life and age, occupation, education, or gender ($P > 0.05$).

Conclusions: Our findings indicate that fatigue and disability may affect a patient's quality of life. Although mobility may affect the overall quality of life in patients with multiple sclerosis, it may also affect the physical health of MS patients. Therefore, the identification of factors affecting the quality of life in MS patients may help in predicting the quality of life, and designing a rehabilitation protocol.

Keywords: Fatigue, Disability, Mobility, Multiple Sclerosis, Quality of Life

1. Background

Multiple sclerosis (MS) is a chronic and progressive disease of the central nervous system (1), which is more common in young adults from 20 to 40 years old (2-5), and is more widespread in women than in men (3-5). This disease can cause blurred and double vision, muscle weakness, impaired balance and coordination, increased sensations of depression (average to severe), cognitive impairment, pain, forgetfulness, a lack of concentration, fatigue, tremors, dizziness, impaired bowels, and bladder and sexual dysfunctions in affected people (4, 6). The average annual death rate in MS patients is 2.6%, causing thousands of deaths in all age groups, while the mortality rate due to the direct effects of MS has been reported as 900/100,000 deaths (6). The cause of such a high mortality rate is unknown; however, studies have shown that genetic and environmental factors play important roles in the pathogenesis of this disease (7). The prognosis of MS is largely unknown, and patients suffer from both psychiatric disorders and physical experiences of the disease (8).

The incidence and prevalence of MS varies considerably around the world (9). In Iran, the prevalence of MS varies from 15 to 30 per 100 thousand people (10), which continues to grow (11). The disease process of MS patients increases the necessity of considering the issues in Iran; for example, the medical problems of the patient create a set of mental and physical problems that may affect most of the daily activities of a person, such as clothing, bathing, and taking care of themselves. These problems cause a decrease in individual independence, feelings of inadequacy, and a decrease in the quality of life. Approximately 75 to 95% of MS patients complain of fatigue, which is the most important factor in reducing individual independence and the quality of life, and may cause a lack of participation in physical activities (12). This may threaten the independence and the ability of the individual to effectively participate in the community, and have significant effects on their overall health and quality of life (13).

During the past decade, the concept of health-related

quality of life has attracted a lot of attention, and great effort has been made to assess its quality and quantity. The quality of life is the perception and personal experience of health and illness (14), which may present a multi-dimensional structure of the various dimensions of the functional, social, physical, emotional, and spiritual formation of the subject. Previous studies have shown the negative effects of MS on the quality of life of the affected patients (1). The general purpose of MS treatment is to decrease the negative impacts of this disease on the yield and quality of life of the patient. Overall, improving the quality of life is the most important step to control this disease.

A quality of life assessment in MS patients takes into account more than the nervous system aspect of the disease (3). Several studies have been done on the quality of life in MS patients, and their results have shown that the symptoms, including depression, pain, and fatigue, have a negative influence on the patient's quality of life (15), causing a reduction in the quality of life in these patients (1). These studies have shown a lower level in the quality of life of MS patients in terms of their physical and mental health, independence, social relationships, and satisfaction with their environments, when compared with the normal groups (5). In addition, higher levels of depression and fatigue in patients with MS were observed, when compared to the healthy subjects (2). Reports have shown that factors such as the age, education level, duration and type of the disease (6), and physical disability affect the quality of life (3). However, the predicted factors of life quality in Iranian MS patients is not clear, and there has been less study on the effects of fatigue, mobility, and disability on the quality of life in this community.

2. Objectives

This study was designed to investigate the roles of fatigue, mobility, and disability on the quality of life of patients with multiple sclerosis in Semnan, Iran. The results of our study can be used to design plans for recognizing individuals susceptible to a reduction in the quality of life, and the necessary interventions for increasing their quality of life.

3. Patients and Methods

This research consisted of a descriptive cross-sectional study, which was approved by the ethical committee of the Semnan University of Medical Sciences, performed on patients with multiple sclerosis from 2012 - 2013 in Semnan, Iran. Seventy-seven volunteers were recruited from the outpatient neurology clinic to participate in the study, and 66 patients (60 females and 6 males) were enrolled according to the inclusion and exclusion criteria. The inclusion criteria were: 1) ability to read and write for the interview, 2) ability to walk with or without a cane, 3) lack of pregnancy, and 4) being aware of the type of

disease. The exclusion criteria included: 1) severe mental disorder [a score of 3 or higher on the mental section of guy's neurological disability scale (GNDS)], 2) a combination of medical problems, such as joint arthritis in the lower extremities, diabetes, or unstable cardiovascular disease, and 3) the inability to walk, even with the help. All of the eligible participants signed the consent form, and completed the questionnaires assessing the fatigue index, mobility, disability, and the quality of life.

3.1. Disability Evaluation

The patients were asked to complete the GNDS in order to evaluate the extent of their disabilities. This questionnaire has been acknowledged as a reliable ($r = 0.636$ to 0.757) and valid ($r = 0.557$ to 0.910) tool for the evaluation of disabilities in MS patients (16).

3.2. Mobility Evaluation

The modified Rivermead mobility index (MRMI) was used to evaluate the mobility level with regard to the neurological conditions of the patients (17). The reliability and validity of the Persian version of the MRMI index have been confirmed for the evaluation of mobility in MS patients (18).

3.3. Fatigue Severity Evaluation

The modified fatigue impact scale (MFIS) was used for evaluating the fatigue severity of the MS patients, and included five questions scored from 1 (no fatigue) to 7 (severe fatigue). The validity and reliability of this instrument has been previously confirmed (19).

3.4. Quality of Life Assessment

The multiple sclerosis quality of life-54 (MSQOL-54) questionnaire, which measures 12 dimensions of life quality, was used to evaluate the MS patients. The 12 dimensions of the questionnaire are divided into two different fields: physical health (role limitations associated with physical problems, physical health, bodily pain, energy, understanding of health, and sexual function) and mental health (role limitations associated with mental problems, vitality, mental functioning, social functioning, lack of health, and life satisfaction) with scores ranging from 0 (lower quality of life) to 100 (higher quality of life). The reliability and validity of the Persian version of the MSQOL-54 has been evaluated and approved, with a correlation coefficient of 0.86 (20).

3.5. Method of Data Analysis

Statistical software, SPSS version 16, was used to examine the relationships between the indexes of fatigue, mobility, and disability and the quality of life. A correlation coefficient test with an $\alpha < 0.05$ and a confidence level of 95% was used to find any associations between the recorded parameters.

4. Results

Table 1 shows the demographic characteristics, mobility, disability, fatigue, and quality of life indices recorded from the patients with multiple sclerosis. Additionally, Table 2 shows the relationships between the age, disease duration, age at onset, and mental and physical health. A significant inverse association between the physical health and disease duration can be observed ($P < 0.05$) (Table 2). Moreover, a significant relationship was also found between the patients' ages, ages of onset, and physical and mental health ($P > 0.05$). However, no significant relationship was found between the quality of life of the patients and the ages, ages of onset, and duration of the disease ($P > 0.05$) (Table 2).

Table 3 shows the correlation between the mobility, disability, and fatigue indices, the overall quality of life, and its physical and mental components. There was no significant relationship between the mental health and mobility ($P > 0.05$); however, a meaningful relationship was found between the quality of life and the disability and fatigue index ($P < 0.05$). No significant association was seen between the mobility and overall quality of life ($P > 0.05$) (Table 3).

The relationships between the disability, mobility, and fatigue scores and the quality of life indicators are shown in Table 4. The most significant relationships were found between the disability and other indicators of life qual-

ity, such as pain, emotions, energy, physical health, role limitations due to physical and emotional problems, and health perceptions ($P < 0.05$). There was no significant association between the pain and mobility, but negative correlations between the pain, energy, fatigue, and disability were observed ($P < 0.05$). In addition, a significant relationship between the vitality and mobility was found. Although the relationships between the health, mobility, and disability were significant ($P < 0.05$), there was no significant relationship between the perceived health and fatigue (Table 4).

The correlations between the mobility, disability, and fatigue indices, and different dimensions of the QOL assessment can be seen in Table 5. A reverse meaningful relationship was found between the health-related distress, mental, and social function with the fatigue and disability severity ($P < 0.05$), while sexual dysfunction was only reversely associated with the disability ($P < 0.05$), but not the fatigue. The results also showed that the overall quality of life was better in the patients with decreased fatigue and disability (Table 5). While negative correlations were found between the disability and fatigue severity scales and all indicators of the quality of life, there was a positive relationship between the mobility and sexual function ($P < 0.005$).

Table 1. Demographic Characteristics and the Scores of Disability, Fatigue, Mobility, and the Different Dimensions of the Quality of Life Questionnaire From the Participating Multiple Sclerosis Patients in This Study

Parameters	N	Minimum	Maximum	Values ^a
Age, y	66	18.0	51.0	34.6 ± 7.1
Length of disease, mo	66	10.0	180.0	55.9 ± 36.9
Age of disease onset, y	66	16.0	45.0	29.4 ± 7.2
Fatigue severity scale	66	5.0	33.0	20.1 ± 10.1
Disability severity scale	66	3.0	19.0	9.9 ± 8.9
Mobility severity scale	66	8.0	19.0	13.9 ± 2.5
Overall quality of life	66	31.0	93.0	67.3 ± 21.2
Physical health	66	0.0	100.0	62.3 ± 26.4
Role limitations due to physical problems	66	0.0	100.0	52.1 ± 39.9
Role limitations due to emotional problems	66	0.0	100.0	49.9 ± 42.3
Pain	66	23.3	100.0	64.2 ± 23.9
Emotional well-being	66	4.0	96.0	51.3 ± 18.8
Energy	66	0.0	96.0	45.4 ± 18.7
Health perceptions	66	15.0	100.0	59.3 ± 21.8
Social function	66	25.0	100.0	72.8 ± 20.7
Cognitive function	66	25.0	100.0	73.6 ± 22.8
Health distress	66	5.0	100.0	69.8 ± 26.7
Sexual function	56	16.7	100.0	69.4 ± 26.3
Change in health	66	0.0	100.0	64.1 ± 30.8
Satisfaction with sexual function	66	0.0	100.0	61.7 ± 20.8
Overall quality of life	66	8.4	100.0	67.3 ± 21.2
Physical health composite score	66	17.6	96.8	60.6 ± 18.5
Mental health composite score	66	15.9	98.8	59.8 ± 20.1

^aValues are expressed as mean ± SD.

Table 2. Correlation Coefficients Between the Age, Length of Disease, and Age of Disease Onset With the Quality of Life and Physical and Mental Health

Parameters	Age	Duration of Disease	Age of Disease Onset
Overall quality of life			
Pearson correlation	-0.089	0.001	-0.052
P value	0.481	0.993	0.683
Physical health			
Pearson correlation	-0.022	-0.102	0.041
P value	0.859	0.417	0.745
Mental health			
Pearson correlation	-0.199	-0.375 ^a	-0.015
P value	0.109	0.002	0.905

^aCorrelation is significant at the 0.01 level (2-tailed).

Table 3. Correlation Coefficients Between the Fatigue, Disability, Mobility, Quality of Life and the Physical and Mental Health Dimensions

Parameters	Disability Scale	Fatigue Scale	Mobility Scale
Overall quality of life			
Pearson correlation	-0.494 ^a	-0.370 ^a	0.162
P value	0.000	0.002	0.196
Physical health			
Pearson correlation	-0.563 ^a	-0.489 ^a	0.439 ^a
P value	0.000	0.000	0.000
Mental health			
Pearson correlation	-0.524 ^a	-0.399 ^a	0.209
P value	0.000	0.001	0.092

^aCorrelation is significant at the 0.01 level (2-tailed).

Table 4. Correlation Coefficients Between the Fatigue, Disability, and Mobility and the Different Dimensions of the Quality of Life

Parameters	Disability Scale	Fatigue Scale	Mobility Scale
Physical health			
Pearson correlation	-0.538 ^a	-0.474 ^a	0.637 ^a
P value	0.000	0.000	0.000
Role limitations due to physical problems			
Pearson correlation	-.432 ^a	-0.396 ^a	0.275 ^b
P value	0.000	0.001	0.026
Role limitations due to emotional problems			
Pearson correlation	-0.363 ^a	-0.215	0.258 ^b
P value	0.003	0.084	0.037
Pain			
Pearson correlation	-0.411 ^a	-0.358 ^a	0.050
P value	0.001	0.003	0.690
Emotional well-being			
Pearson correlation	-0.321 ^a	-0.278 ^b	-0.064
P value	0.009	0.024	0.607
Energy			
Pearson correlation	-0.440 ^a	-0.498 ^a	0.162
P value	0.000	0.000	0.194
Health perceptions			
Pearson correlation	-0.306 ^b	-0.163	.0388 ^a
P value	0.013	0.191	0.001

^aCorrelation is significant at the 0.01 level (2-tailed).

^bCorrelation is significant at the 0.05 level (2-tailed).

Table 5. Correlation Coefficients Between the Fatigue, Disability, and Mobility and the Different Dimensions of the Quality of Life

Parameters	Disability Scale	Fatigue Scale	Mobility Scale
Social function			
Pearson correlation	-0.412 ^a	-0.409 ^a	0.172
P value	0.001	0.001	0.167
Cognitive function			
Pearson correlation	-0.582 ^a	-0.474 ^a	0.161
P value	0.000	0.000	0.196
Health distress			
Pearson correlation	-0.332 ^a	-0.352 ^a	0.206
P value	0.007	0.004	0.097
Sexual function			
Pearson correlation	-0.442 ^a	-0.174	0.338 ^b
P value	0.001	0.200	0.011
Change in health			
Pearson correlation	-0.010	-0.119	0.149
P value	0.938	0.340	0.234
Satisfaction with sexual function			
Pearson correlation	-0.272 ^b	-0.207	0.011
P value	0.042	0.126	0.937

^aCorrelation is significant at the 0.01 level (2-tailed).

^bCorrelation is significant at the 0.05 level (2-tailed).

5. Discussion

This study aimed to investigate the roles of the indicators of fatigue, mobility, and disability on the quality of life in patients with MS. The results showed that the level of fatigue and the quality of life in MS patients have a meaningful relationship, and confirm that the higher the level of disability and fatigue, the lower the quality of life; although, the mobility index did not show a meaningful relationship with the overall quality of life.

5.1. Relationship Between Disability and the Quality of Life

Our results showed that there is a correlation between physical and mental health and the level of disability; in other words, by increasing the level of disability, the quality of life decreases. Several studies have investigated the effects of disability on the quality of life in multiple sclerosis patients (3, 5, 21-25); for example, Pfaffenberger et al. showed that the levels of physical and mental disability have significant effects on the quality of life (3). These findings were confirmed by the results of Miller and Dishon (24). Alshubaili et al. (2008) and Baumstarck-Barrau et al. (2011) also confirmed that disabilities can affect the quality of life in patients with multiple sclerosis (22, 26). It seems that a reduction in the ability to manage the activities of daily living may cause a poor quality of life in these patients (5); therefore, negative solidarity between disabili-

ty and physical function may have meaningful effects on the dimension of the physical function of the quality of life (21). In addition, Haresabadi and et al. showed that the quality of life was significantly correlated with the disability score, while no correlation was shown with mental disabilities (3). Decreasing physical ability may reduce the quality of life by affecting the life independency in MS patients (26), while it has been suggested that improving the fatigue index via exercise may improve the quality of life by increasing the ability to manage the activities of daily living (27). However, decreasing both the disability and fatigue intensity may help MS patients to have a more independent and higher quality of life.

5.2. Relationship Between Fatigue and Quality of Life

Our findings confirm a meaningful relationship between fatigue severity and physical and mental health dimensions. The effects of fatigue on the quality of life of MS patients have been the subjects of some previous studies (15, 28); for example, Flensner et al. suggested that the capacity and quality of life in MS patients may be strongly affected by fatigue (2). In addition, it has been suggested that MS symptoms (depression, pain, and fatigue) have negative impacts on the quality of life (15). It seems that depression is the main cause of MS fatigue, which is influenced by disability and the reduced quality of sleep, as well as the other

factors affecting the quality of life of MS patients (28). Fatigue may affect the psychological and physical aspects of life and, therefore, the employment status of MS patients (24, 29). In general, it has been reported that fatigue, weakness, and depression are the most important factors affecting the quality of life in multiple sclerosis patients (30).

5.3. Relationship Between Mobility and Quality of Life

The results of this study showed a significant association between mobility and physical and mental health. It has been previously shown that physical activity may improve the quality of life in patients with MS, which is indirectly affected by depression, fatigue, and pain, while social and mood support may also help to control the disease (31). However, some of the studies that have examined the relationship between mobility, disability, and mental health are not focused (32). Other studies have emphasized the importance of increased mobility on the quality of life in MS patients, and have shown that exercise protocols may lead to increased levels of physical health through the increased mobility of the patients (25, 33, 34). Asadizaker et al. showed that exercise increased the walking speed in MS patients and improved the patients' physical health (33). In addition, Pfaffenberger et al. showed that the inability to walk can be considered as a measure which indicates that the quality of life of a patient is low, and a decrease in walking speed may be associated with a reduced quality of life in MS patients (25). These findings conform to the present study showing that physical health is associated with the mobility scale.

Our study showed that the duration of the disease was significantly associated with the physical health but not with the mental health groups. Moreover, in this study, the age, marital status, education, and age at the onset of MS were correlated with the quality of life. Pfaffenberger et al. stated that the course of the disease, age, and sex had a significant effect on the physical aspects of the patient; however, these parameters may not constantly affect the spiritual dimension (25). The authors concluded that femininity, older age, higher disability criteria, as well as the inability to walk may represent a low quality of life of the patient. The study also showed that a higher duration and rapid progression of the disease may significantly reduce the quality of life of MS patients.

In another study, significant relationships between sex, marital status, and the quality of life were found; however, a negative correlation between the age and quality of life was also reported (3). It seems that an increasing age and reduced mobility may induce higher disability, which may cause a lower quality of life. These findings emphasize the importance of the rehabilitation protocol in improving the mobility of patients with MS, and improving their quality of life (35). However, it should be taken into consideration that continuous long term exercises are more effective in providing supportive relief in

MS patients (36) by reducing disability and fatigue severity, as well as improving mobility (35).

5.4. Conclusions

To the best of our knowledge, this is the first study that aimed to evaluate the quality of life in MS patients living in Semnan, Iran. Despite the study limitations of excluding some MS patients due to the severity of their physical and mental disabilities, and not including all of the MS patients in the Semnan territory, the findings may be used for designing rehabilitation protocols. The results of the present study showed that the quality of life of MS patients may be affected by fatigue and the severity of their disability. These findings indicate the importance of rehabilitative intervention protocols that aim to decrease disability, improve mobility, and reduce fatigability in MS patients, in order to improve their quality of life.

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Footnotes

Authors' Contribution: Farideh Kamran developed the idea for the study, wrote the proposal, collected the data, and prepared the manuscript. Amir Hoshang Bakhtiari developed the idea for the study, wrote the proposal, managed the research, performed the statistical tests, and wrote the manuscript. Afshin Samaei and Nabiollah Asghari examined the patients, controlled the inclusion and exclusion criteria, and supervised the processes of collecting the data and preparing the manuscript. Soheila Bayat and Azadeh Naeiji filled out and completed the questionnaires and collected the data. Fatemeh Farrokhnezhad controlled the accuracy of collecting the data and helped in writing the manuscript.

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