ORIGINAL PAPER

The Effect of Fatigue and Pain Self-Efficacy on Health-Related Quality of Life Among Patients with Multiple Sclerosis

Fevronia Adamopoulou[1], Victoria Alikari[2], Sofia Zyga[2], Maria Tsironi[2], Fotini Tzavella[2], Natalia Giannakopoulou[3], Paraskevi Theofilou[4,5]

[1]Affiliation University of Central Lancashire, UK

[2]Department of Nursing, Faculty of Human Movement and Quality of Life Sciences, University of Peloponnese, Sparta, Greece

[3]Department of Nursing, University of West Attica, Athens, Greece

[4]Ministry of Health, Athens, Greece

[5]Institution for Counseling & Psychological Studies, Athens, Greece

Corresponding author:
Victoria Alikari, Ph.D., Department of Nursing, Faculty of Human Movement and Quality of Life Sciences, University of Peloponnese, Laconia, Greece. E-mail: vicalikari@gmail.com. ORCID ID: https://orcid.org/0000-0003-1733-6208.

ABSTRACT

Introduction: Health-related quality of life is a major issue among patients with Multiple sclerosis (MS). **Aim:** To explore the effect of fatigue and pain self-efficacy on health-related quality of life among patients with MS. **Methods:** Between March and May 2018, 85 MS patients from a large Hospital of Athens region completed the questionnaires: a) Missoula-VITAS Quality of Life Index-15, which examines 5 dimensions of quality of life, b) Pain Self Efficacy Questionnaire which measures the pain self-efficacy that an individual perceives, c) Fatigue Assessment Scale (FAS) which measures fatigue, d) a questionnaire about the sociodemographic elements. Statistical analysis was performed using the IBM SPSS Statistics version 21. The significance level was set up to 0.001. **Results**: Fatigue might predict the dimension of quality of life "Function" while Pain Self-Efficacy might, also, predict the dimension of quality of life "Interpersonal". A strong correlation was found between the dimensions of quality of life "Well-being" and "Transcendent" and between "Interpersonal" and Pain Self-Efficacy. The total score of fatigue was strongly correlated with Physical Fatigue and very strongly correlated with Mental Fatigue. **Conclusion:** Fatigue and Pain Self-Efficacy are important predictors of the dimensions of quality of life among patients with MS. Pain in MS has to be taken into serious consideration in every patient with MS.

Keywords: fatigue, pain self-efficacy, multiple sclerosis, quality of life.

1. INTRODUCTION

Multiple sclerosis (MS) is a chronic neurological condition with many and different symptoms. MS symptoms are variable and unpredictable such as fatigue which occurs in about 80% of people, pain, spasms, weakness (which results from deconditioning of unused muscles or damage to nerves that stimulate muscles), depression and cognitive problems (1).

The symptom of pain is also a common feature of well-established MS and has been documented as a significant symptom experienced by patients with MS (2). Chronic pain is usually associated with myelopathy and is common in women and in older individuals with duration of disease greater than 5 years. The major chronic pain syndromes are back pain, and painful leg spasms (3). Pain is present in more than half of the cases and it adopts many aspects which most of the times ruin the patients' quality of life. The ability to develop patients' pain self-efficacy in order to rely on them contributes positively to their Quality of life (QoL). When patients manage the various symptoms of the disease and meet their daily needs, they are able to prioritize and cope well with everyday life, thus improving their QoL (4).

Fatigue is the most prevalent issue for MS patients. It presents in 75-95% of patients with MS and it is reported as the worst symptom of the disease, which is associated with various health problems. Fatigue is defined as a feeling of lack of energy, weakness, and aversion to effort. Fatigue can occur at all stages of the disease and can affect QoL, depression, anxiety, motor function, and sleep patterns (5, 6).

Studies have shown that fatigue has a substantial impact on QoL in persons with MS by reducing physical stamina, interfering with the performance of responsibilities at home and work, and limiting social duties. Apart from their daily activities which are restricted, patients' social relationships are limited, as well. This happens because many of these patients

confine their activities at home because of their symptoms, the fatigue or the pain that may feel or because they have to take their medications (interferon or cortisone injections) (7). In addition, fatigue has been inversely correlated with aspects of QoL in cross-sectional studies of MS patients (8, 9). Fatigue is accused of the poor QoL more than weakness, spasticity, motor problems or urinary disorders.

2. AIM

The aim of the study was to explore the effect of fatigue and pain self- efficacy on health-related QoL among patients with multiple sclerosis (MS).

3. METHODS

Patients

In this cross-sectional study, 114 participants from "Agioi Anargyroi" Hospital of Kifissia were recruited. "Agioi Anargyroi" Hospital of Kifissia is one of the largest hospitals for patients with variable neurological health issues. The inclusion criteria were: ≥18 years old, be Greeks, able to understand and speak fluently the Greek language and have the cognitive ability to answer the questionnaires. The participants who were not Greek, couldn't write or had problems with their verbal speech were excluded from the study. The final sample consisted of 85 patients (response rate 74, 5%) (Figure 1). The study took place between March-May 2018.

Measures

Missoula-VITAS Quality of Life Index-15 (MVQoLI-15)

The first instrument was the Greek version of Missoula-VITAS Quality of Life Index-15 (MVQoLI-15) in order to measure HRQoL (10) and includes information about a chronic illness (11). The tool seeks to describe the qualitative and subjective experience of QoL in a way that can be quickly interpreted by professional caregivers (12, 13). The five dimensions of QoL that are examined in the MVQoLI-15 are Symptoms, Function, Interpersonal, Well-Being and Transcendence. The total score of each dimension reflects the extent that this dimension affects the QoL of patients. Higher scores indicate better QoL. The average score of total QoL ranges from 0 to 30. This scale has been translated and culturally adapted to the Greek data (10). Psychometric properties of the Greek version have been studied (14, 15).

Fatigue Assessment Scale (FAS)

The second instrument was the Fatigue Assessment Scale (FAS). The original form of FAS was constructed in 2003 and it consists of 10 questions (16) which collect information related to the perceived fatigue. Five questions are related to Physical Fatigue and the other five to Mental Fatigue. The responses rate on a 7 Likert point scale (1=never to 5=always). Consequently, the score varies between 10-50. The patient's responses to 10 questions are summed in order to construct the score. There are cutoff points which assist in recognizing who are fatigued, not- fatigued and extremely fatigued (17). Patients are categorized as "non-fatigued" if the FAS score is below 22, "fatigued" if the FAS score is higher or equal to 22 and "extremely fatigued" if the FAS score is higher or equal to 35 (17). The FAS has been, also, used in patients with sarcoidosis (18), and under hemodialysis (19). Psychometric properties of the Greek version

have been studied among patients with chronic illness (19).

Pain Self-Efficacy Questionnaire (PSEQ)

The third instrument was the Pain Self-Efficacy Questionnaire (PSEQ). The PSEQ is a self-reported instrument which evaluates pain self-efficacy beliefs in patients with chronic pain. Each item is rated by selecting a number on a 7 Likert point scale (0 = not at all confident to 6 = completely confident). A total score is calculated by summing the scores for each of the 10 items, yielding a maximum total score of 60. Higher scores reflect stronger pain self-efficacy beliefs. The PSEQ has been used in patients undergoing hemodialysis (20) in order to examine the psychometric properties of the Greek version (Cronbach's Alpha 0,98) while in another study (21) QoL and pain self-efficacy were explored, also, among hemodialysis patients.

Sociodemographic elements (gender, age, marital status, education, working environment, years under therapy and years of having MS) were recorded.

Statistical analysis

In this study, a statistical analysis was made in order to measure the variables. Concerning the descriptive statistics, frequencies were made in each variable. Spearman rho test was performed in order to explore patterns of correlations between the dimensions of QoL, Fatigue, and Pain Self-Efficacy. In addition, simple and multiple linear regression models were performed in order to investigate if fatigue and pain self-efficacy could predict each dimension of QoL. Kruskal- Wallis test was performed in order to evaluate the dimensions of the variables with sociodemographic characteristics and examine if there are statistical differences. The IBM SPSS Statistics 21 was used to analyze the data and the level of significance was set up to .001.

Ethical considerations

The study was conducted according to the ethical standards of the Helsinki Declaration of 1975, as revised in 2000. After having received the Ethical approval from the Scientific Council of the "Agioi Anargyroi" Hospital of Kifissia (10/02/2018), individuals were informed by the researchers about the study, the voluntary participation, the anonymity, the withdraw rights and, also, that the approval has been given for this study. The anonymity of the participants was protected and the results obtained were used solely for scientific purposes. Signed informed consent was obtained from all individuals.

4. RESULTS

Descriptive statistics showed that 77.6% of the individuals participated in the study were females (n=66) and 22.4% were males (n=19). The mean age of the patients was 40.02 years (Table 1).

The mean score of MVQoLI-15 was 45.65 (SD ±34.11), the mean score of PSEQ was 41,34 (SD±11.21) while the mean FAS score was 24.27 (SD±3.54) (Table 2). A percent of 12.9% (n=11) of patients were not-fatigued, 84.7% (n=72) were fatigued and 2.35% (n=2) were extremely fatigued.

A series of Spearman's rho correlations were conducted in order to evaluate the differences between the research's variables. As the below table reports (Table 3), strong positive correlations were found between Total Fatigue and Physical Fatigue ($\rho(85)=$ 0.87, p<0.01), Total Fatigue and Mental Fatigue ($\rho(85)=$ 0.76,

		N	%
Age, Mean (SD)[1]		40.02 (8.8)	
Gender	Male	19	22,4
	Female	66	77.6
Marital Status	Unmarried (live alone)	11	12.9
	Unmarried (live with a partner)	16	18.8
	Unmarried (live with parents)	11	12.9
	Married (no children)	8	9.4
	Married (with children)	39	45.9
Educational level	Primary & Secondary School	8	9.4
	High School	28	33
	University Graduate	45	53
	MSc-PhD	4	4.7
Occupational Status	Unemployed	16	18.8
	Part-time	6	7.1
	Full-time	42	49.4
	Retired	21	24.7

Table 1. Demographic characteristics of patients (N=85 SD=Standard Deviation

	M	SD	Minimum	Maximum
Total MVQoLI-15	45,65	34.11	-33	104
Symptom	9.49	4.01	4	18
Function	-0.26	10.99	-24	20
Interpersonal	14.21	13.31	-16	30
Well-being	5.42	14.45	-20	30
Transcendent	17.93	10.38	-4	30
Fatigue	24.27	3.54	17	31
Physical fatigue	13.11	2.51	8	18
Mental Fatigue	1.79	1,79	7	15
Pain Self- Efficacy	41.34	11.21	9	60

M= Mean, SD= Standard Deviation

Table 2. Means and Standard Deviations on the dimensions of Quality of life, Fatigue and Pain self- efficacy in MS patients (N=85)

p<0.01), Interpersonal and Pain (ρ(85)= 0.67, p<0.01).

A standard simple linear regression was employed to determine if fatigue scores significantly predict the domains of MVQoLI-15. The overall model was significant (F [1, 83] = 4.18, p=0.044) at function, explaining the 4% (R2 =0.04) of the variance (or 0.04 adjusted R2) in Fatigue scores. Fatigue is a negative weak significant predictor of Function (Beta = -0.22, t = -2.05, p=0.044), suggesting that patients who experience low levels of fatigue have better functioning.

Multiple linear regressions were run to determine if pain self-efficacy scores significantly predict the domains of QoL. The overall model was significant (F [3, 81] = 29.89, p ≤0.001) at Transcendent, Interpersonal, and Well-being, explaining the 53% (R2 =0.53) of the variance (or 0.51 adjusted R2) in Pain Self- Efficacy scores. Of the three predictors, only the domain of Interpersonal was a significant moderate positive predictor of Pain Self-Efficacy (Beta =0.51, t = 5.19, p≤ 0.001), suggesting that patients with high levels of Pain Self- Efficacy scores have also, better interpersonal relationships. Transcendent (Beta = 0.21, t = 1.65, p=0.102) and Well-being (Beta = 0.09, t = 0.72, p= 0.475) were positive weak non-significant predictors of pain.

According to the Kruskal-Wallis test there was a statistically significant difference in Interpersonal score between the different family status (H(4)= 13.25, p=0.01) with a mean rank Interpersonal score of 29.95 for unmarried who live alone, 49.75 for married with no kids, 45.73 for unmarried who live with their parents, 37.78 for married with kids and 59.44 for unmarried who live with their partner. In addition, a statistically significant difference was also observed in the Transcendent score between the different family status (H(4)= 16.32, p=0.00) with a mean rank Transcendent score of 31.18 for unmarried who live alone, 48.94 for married with no kids, 45.09 for unmarried who live with their parents, 36.51 for married with kids and 62.53 for unmarried who live with their partner. There was not found any other statistically difference for the rest dimensions of QoL, such as the Symptom, the Function and the Well- being.

5. DISCUSSION

The purpose of the present study was to explore the relationship between fatigue, pain self-efficacy and QoL among patients with MS. Previous research evidence shows that fatigue associated with MS is related to a decrease in the QoL of these patients. The findings of this research are in accordance with the results of previous studies as there is a significant relationship with the aspects of QoL and the factor of fatigue. This study shows that fatigue has a considerable impact on the QoL in MS patients, their physical and mental health. Previous studies that explored the

Variables	1	2	3	4	5	6	7	8	9
1. Symptom	-								
2. Function	0.08	-							
3.Interpersonal	0.11	0.04	-						
4. Well-being	-0.07	-0.05	0.60[b]	-					
5.Transcendent	0.03	-0.03	0.64[b]	0.76[b]	-				
6. Pain Self- Efficacy	0.06	-0.00	0.67[b]	0.50[b]	0.51[b]	-			
7. Fatigue (Total Score)	0.04	-0.27[a]	0.03	0.05	0.06	0.02	-		
8. Mental Fatigue	-0.010	-0.29[b]	-0.14	-0.08	-0.05	-0.01	0.76[b]	-	
9. Physical Fatigue	0.07	-0.19	0.06	0.11	0.04	-0.00	0.87[b]	0.44[b]	-

Table 3. Intercorrelations for all variables- Spearman's rho. ap<0.05, bp<0.01

QoL of MS patients indicated that patients with secondary progressive MS had a lower score on the scales of QoL in comparison to those with the relapsing-remitting form of MS (22). Published studies (23) showed that patients with fatigue had a considerably poorer QoL, regardless of physical disability and clinical course of the disease. The main interpretation of this finding is that fatigue can strongly influence performing the daily activities and as a result become a major reason for unemployment (24). As the findings of Mc Cabew and De Judicibus (25) indicated that the pressures lead to changes in the economic situation, dealing with this pressure is momentous for QoL for MS patients.

In our study, there is a negative significant correlation between Mental Fatigue and the dimension of the QoL Function. Individuals with MS show reductions on measures of verbal memory (26). Mental fatigue can affect function in all its cases whether is about cerebral function or bodily function. In addition, MS patients report increased mental and physical fatigue (26). In a similar study, researchers found that the more physically active a patient is the lower levels of fatigue can be presented (27). The researchers support that those who reported low levels of fatigue, reported higher levels of QoL and function and as a result, the low levels of fatigue can predict better function in everyday life (28). According to the findings of this study, fatigue in MS is strongly correlated with Mental and Physical Fatigue. Most of MS patients report fatigue as the worst symptoms indicating, also, that fatigue has a significant effect on the mental health and general health status of MS patients (29).

Regarding the effect of pain self-efficacy on QoL, it was found that pain self-efficacy may predict the dimension of QoL Interpersonal. This is a very satisfactory finding based on common sense. When an individual tries and deals with the pain that effort leads to be more active, more friendly and companionable as a result build more meaningful and purposeful interpersonal relationships. Previous findings support that high levels of pain self-efficacy can lead to high levels of social support and, as a result, high levels of interpersonal relationships (28). Our results may be linked with previous findings which support that good and healthy relationships release endorphins which relieve pain and as a result, there is more pain tolerance and more pain self- efficacy (29).

Our study revealed that people who were married with children experience more fatigue than the others who either are unmarried and live with their partners or live alone. That is quite reasonable if we think that when married parents have kids, at the same time they have more responsibilities and more worries than the others who don't have kids or are singles. In a study (30) focused on the characteristics of chronic fatigue and the difference between the duration of fatigue and the characteristics of chronic fatigue, participants in the younger age group were more energetic than the women and those in other age groups (30). In addition, married people experienced more fatigue than people who were single, divorced or separated (30). Our finding is supported by Mollaoğlu and Üstün (30) who in their research emphasize that fatigue is affected by factors such as age, gender, education, and marital status.

The current study has acquired several strengths through its completion. The most important contribution of the present study is the fact that in the international literature there is only one study (40) examining the correlation of these variables (fatigue, pain self-efficacy, and QoL) among MS patients. On the other hand, the results cannot be generalized as the sample of the study come from one hospital even "Ag. Anargyroi" Hospital is one of the largest hospitals in Athens region. In addition, participants were being hospitalized patients and, therefore, the presence of other persons, employees and the burden of hospitalization may have influenced the answers.

6. CONCLUSION

Fatigue is a symptom that has a significant effect on the daily lives of patients suffering from MS. Additional research in the direction of measurement and pathogenesis of fatigue will hopefully lead to improved therapies. Pain in MS has to be taken into serious consideration in every MS patient and adapted treatments strategies must be prescribed. Health professionals should point to increasing the patient's perceived social support and QoL, advising the patient's family and, also, increase the patient's self- efficacy levels. This communication leads to a strong health professional-patient relationship with better QoL and better health outcomes.

REFERENCES

1. Gelfand JM. Multiple sclerosis: diagnosis, differential diagnosis, and clinical presentation. Handb Clin Neurol. 2014; 122: 269-290. doi: 10.1016/B978-0-444-52001-2.00011-X.
2. Ghajarzadeh M, Jalilian R, Sahraian MA, Moghadasi AN, Azimi A, Mohammadifar M, et al. Pain in patients with multiple sclerosis. Maedica. 2018;13(2):125-130. doi:10.26574/maedica.2018.13.2.125.
3. Todd AG. Cervical spine: degenerative conditions. Cur Rev Musculoskelet Med. 2011;4(4):168-174. http://doi.org/10.1007/s12178-011-9099-2.
4. Lee Mortensen G, Rasmussen PV. The impact of quality of life on treatment preferences in multiple sclerosis patients. Patient Prefer Adherence. 2017; 11: 1789-1796. http://doi.org/10.2147/PPA.S142373.
5. Friedman JH, Beck JC, Chou KL, et al. Fatigue in Parkinson's disease: report from a multidisciplinary symposium. NPJ Parkinson's Disease. 2016; 2. 15025. doi.org/10.1038/npjparkd.2015.25.
6. Patejdl R, Penner IK, Noack TK, Zettl UK. Fatigue in patients with multiple sclerosis - pathogenesis, clinical picture, diagnosis and treatment. Fortschr Neurol Psychiatr. 2015; 83(4): 211-220. doi: 10.1055/s-0034-1399353.
7. Khan F, Amatya B, Galea M. Management of fatigue in persons

with multiple sclerosis. Front Neurol. 2014; 5: 177. http://doi.org/10.3389/fneur.2014.00177.

8. Berrigan LI, Fisk JD, Patten SB, et al. For the CIHR team in the epidemiology and impact of comorbidity on multiple sclerosis (ECoMS). Health-related quality of life in multiple sclerosis: Direct and indirect effects of comorbidity. Neurology. 2016; 86(15): 1417-1424. http://doi.org/10.1212/WNL.0000000000002564.

9. Tacchino A, Brichetto G, Zaratin P, Battaglia MA, Ponzio M. Self-assessment reliability in multiple sclerosis: the role of socio-demographic, clinical, and quality of life aspects. Neurol Sci. 2018; doi: 10.1007/s10072-018-3589-6.

10. Theofilou P, Kapsalis F, Panagiotaki H. Greek version of MVQOLI–15: Translation and cultural adaptation. International Journal of Caring Sciences. 2012; 5(3): 289-294.

11. Byock IR, Merriman MP. Measuring quality of life for patients with terminal illness: the Missoula-VITAS quality of life index. Palliat Med. 1998; 12(4): 231-44. doi: 10.1191/026921698670234618.

12. Theofilou P. Assessing health-related quality of life using the Missoula-Vitas Quality of Life Index (MVQOLI). Journal of Clinical Trials. 2012; 2: 1-2.

13. Theofilou P, Togas C, Vasilopoulou C, Minos C, Zyga S, Tzitzikos G. The impact of Kt/V urea-based dialysis adequacy on quality of life and adherence in haemodialysis patients: a cross-sectional study in Greece. Health Psychol Res. 2015; 3(1): 1060. doi: 10.4081/hpr.2015.1060.

14. Theofilou P, Aroni A, Ralli M, Gouzou M, Zyga S. Measuring health: related quality of life in hemodialysis patients. Psychometric properties of the Missoula-VITAS Quality of Life Index (MVQOLI-15) in Greece. Health Psychol Res. 2013; 1(2)e 17. doi: 10.4081/hpr.2013.e17.

15. Theofilou P, Zyga S. Psychometric properties of the Missoula–VITAS quality of life index in Greek patients undergoing chronic periodical haemodialysis. Hellenic Journal of Nursing. 2014; 53(2): 166-174 (in Greek Language).

16. Michielsen HJ, De Vries J, Van Heck GL. Psychometric qualities of a brief self-rated fatigue measure: The Fatigue Assessment Scale. J Psychosom Res. 2003; 54(4): 345-352. doi: https://doi.org/10.1016/S0022-3999(02)00392-6.

17. Zyga S, Alikari V, Sachlas A, et al. Assessment of fatigue in end stage renal disease patients undergoing hemodialysis: prevalence and associated factors. Med Arch. 2015; 69(6): 376-380. doi: 10.5455/medarh.2015.69.376-380.

18. De Vries J, Michielsen H, Van Heck GL, Drent M. Measuring fatigue in sarcoidosis: the Fatigue Assessment Scale (FAS). Br J Health Psychol. 2004; 9: 279-291. doi:

10.1348/1359107041557048

19. Alikari V, Fradelos E, Sachlas A, et al. Reliability and validity of the Greek version of The Fatigue Assessment Scale. Archives of Hellenic Medicine. 2016; 33(2): 231-238 (In Greek Language).

20. Theofilou P, Aroni A, Tsironi M, et al. Reliability of the Greek version of "Pain Self-Efficacy Questionnaire" in patients with chronic kidney disease. Hellenic Journal of Nursing. 2014; 53(2): 175-184. (In Greek language).

21. Zyga S, Alikari V, Sachlas A, et al. Management of pain and quality of life in patients with chronic kidney disease undergoing hemodialysis. Pain Manag Nurs. 2015; 16(5): 712-720. doi: 10.1016/j.pmn.2015.03.004.

22. Rosiak K, Zagożdżon P. Quality of life and social support in patients with multiple sclerosis. Psychiatr Pol. 2017; 51(5): 923-935. doi: 10.12740/PP/64709.

23. Nagaraj K, Taly AB, Gupta A, Prasad C, Christopher R. Prevalence of fatigue in patients with multiple sclerosis and its effect on the quality of life. J Neurosci Rural Pract. 2013; 4(3): 278-282. http://doi.org/10.4103/0976-3147.118774.

24. Bol Y, Duits AA, Hupperts RM, Vlaeyen JW, Verhey FR. The psychology of fatigue in patients with multiple sclerosis: A review. J Psychosom Res. 2009; 66(1): 3-11. doi: 10.1016/j.jpsychores.2008.05.003.

25. McCabew MP, De Judicibus M. The effects of economic disadvantage on psychological well-being and quality of life among people with multiple sclerosis. J Health Psychol. 2005; 10(1): 163-173. doi: 10.1177/1359105305048562.

26. Newland P, Starkweather A, Sorenson M. Central fatigue in multiple sclerosis: a review of the literature. J Spinal Cord Med. 2016; 39(4): 386-399. http://doi.org/10.1080/10790268.2016.1168587.

27. Motl RW, McAuley E, Snook EM, Gliottoni RC. Physical activity and quality of life in multiple sclerosis: intermediary roles of disability, fatigue, mood, pain, self-efficacy and social support. Psychol Health Med. 2009; 14(1): 111-124. doi: 10.1080/13548500802241902.

28. Johnson KVA, Dunbar RIM. Pain tolerance predicts human social network size. Sci Rep. 2016; 6: 25267. http://doi.org/10.1038/srep25267.

29. Gramigna S, Schluepm M, Staubm F, et al. Fatigue in neurological disease: different patterns in stroke and multiple sclerosis. Rev Neurol. 2007; 163(3): 341-348. doi: 10.1016/S0035-3787(07)90406-3.

30. Mollaoğlu M, Üstün, E. Fatigue in multiple sclerosis patients. J Clin Nurs. 2009; 18(9): 1231-1238. doi: 10.1111/j.1365-2702.2008.02733.x