

The role of psychological resilience, severity of disease and treatment adherence in the prediction of health-related quality of life in patients with multiple sclerosis

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Abstract

Objective: This cross-sectional study aims to evaluate the impact of the disability status, psychological resilience, and treatment adherence on health-related quality of life (QOL) in patients with multiple sclerosis (MS). **Methods:** One hundred MS outpatients, 80 women and 20 men, referred to a clinic of Shiraz University of Medical Sciences, were eligible to participate. MS was diagnosed by 2010 revised Mc-Donald criteria. The QOL and resilience were evaluated by the Medical Outcomes Study Short-Form (SF-36) and Connor-Davidson Resilience Scale (CD-RISC) respectively. Medication adherence and severity of disease were assessed by the Morisky Medication Adherence Scale (MMAS) and expanded disability status state (EDSS) scores respectively. **Results:** Stepwise multiple regressions showed that in the first model, the disability status was the best predictor which accounted for 28.1% of the variance in QOL. In the second model, both the disability status and resilience explained 50.6% of the variation in QOL.

Conclusion: The findings showed that the severity of the disease is a strong predictor which has adverse effects on the physical component of health-related QOL in the patients with MS. Both psychological resilience and treatment adherence have positive influence on mental component of QOL in these patients.

INTRODUCTION

Multiple sclerosis (MS) is a common neurological disorder which mostly affects the active adult population.¹ Distribution and severity of demyelinating and degenerative lesions in the brain and spinal cord of these patients are associated with a variety of symptoms which can impact adversely on the health-related quality of life (QOL) in these patients. Both somatic symptoms such as weakness, spasticity, pain and non-somatic ones such as affective and cognitive impairments have a negative influence on different domains of QOL.¹⁻⁴ Discovery and development of several types of disease modifying drugs changes the disabling course of MS by reducing relapses and slowing disease progression.⁵ However, similar to other chronic diseases, treatment adherence is a common problem and it has been shown that cases with good adherence suffer from fewer relapses and have better QOL compared with poor adherence cases.⁶⁻⁸ Psychological resilience is the patients' ability to properly adapt and cope

with her/his disease which has a positive role in QOL of patients.^{9,10}

Treatment adherence problems and disability status have a negative effect on QOL^{1,11}, while psychological resilience has a positive impact on QOL in patients with MS.³ This study aims to assess the impact of adherence to treatment, severity of illness, and psychological resilience on the health-related QOL in the Iranian patients with MS. The hypothesis of this study is that there is a significant correlation between psychological resilience, adherence to treatment, and expanded disability status of patients with MS and their physical and mental components of health-related QOL.

METHODS

We performed a descriptive study, using multiple regressions. Three predictor variables, including resilience, treatment adherence and severity of sickness, were used and QOL was considered

as a dependent variable. Data collection was undertaken between August 2012 and March 2013. The participants were interviewed by a research assistant before completing the questionnaires. All the participants were volunteers who were informed about objectives and method of the study and signed a written consent form. The Research Ethics Committee of Shiraz University of Medical Sciences approved the protocol of this study (approval number: 90-4120). All the stages of the present research were conducted according to Psychology and Counselling Organization of I. R. Iran's ethics codes.

One hundred patients, aged 17 to 64 years, with MS who referred to the clinics affiliated to Shiraz University of Medical Sciences between August 2012 and March 2013 were included in the study. The patients were selected using convenience sampling method. Individuals with a confirmed diagnosis of MS, who were above 16 years old, were included in the study. The patients who had co-morbidities such as cancer, renal failure, other chronic diseases and major psychological problems were excluded from the study. MS was diagnosed by a neurologist according to the neurologic examination and imaging data using 2010 revised Mc-Donald criteria.¹²

Measurement

The patients completed a medical and demographic information form and then they filled out three other research questionnaires.

Medical Outcomes Study Short-Form (SF-36): SF-36 is a commonly used self-reporting tool for assessing health-related QOL.¹³ Questions cover eight domains which can be summarized into two overall subscales, physical component and mental component, which score in each domain ranging from 0 to 100 that the highest scores correspond to a healthier status. We used Persians form of SF-36 whose reliability and validity has been demonstrated.¹⁴

Connor-Davidson Resilience Scale (CD-RISC): CD-RISC was developed to measure stress coping ability. CD-RISC can range in score from 0 to 100 and higher scores reflect better resilience. The authors reported good psychometric properties of the scale.¹⁵ Mohammadi¹⁶ showed that the reliability and validity of the Persian form was good.¹⁷

Morisky Medication Adherence Scale (MMAS): MMAS is one of the most frequently used self-reporting methods to determine medication-taking behavior. The range of adherence can be variable from 0 to 8. The higher test scores reflect the better medical adherence. Previous investigators have reported a good reliability ($\alpha=0.83$) for the scale, they also showed acceptable concurrent and predictive validity.¹⁸ The investigator of Persian form also found sufficient internal consistency (Cronbach's $\alpha = 0.89$); the Persian version of the scale is reliable and valid.¹⁹

Expanded Disability Status Scale (EDSS): Kurtzke's EDSS²⁰ is a standard method of evaluating the degree of progressive physical disability in MS. It converts the disease severity to an ordinal scale which has 20 steps ranging from 0 (normal neurological exam) to 10 (death due to MS).²⁰ In the present study, EDSS was assessed for all the patients by a single neurologist.

After entering the data into SPSS software, descriptive methods and multivariate regression were applied to test the hypothesis. The ANOVA and independent *t* test were used to analyse the differences between the groups. All *P* values less than 0.05 were considered statistically significant.

RESULTS

One hundred patients, 80 women and 20 men, were enrolled for participation in this study according to the inclusion criteria. The patients' mean age was 35.15 ± 9.56 year. The demographic characteristics of the patients are shown in Table 1. The means and (standard deviations) for resilience, disability status and medication adherence scales are shown in Table 2. Men experienced significantly more severe disability status than women. Descriptive statistics for the total score, physical component and mental component of the SF-36 are shown in Table 2. The scores of women were slightly and non-significantly higher than that of men so it was not entered as a predictor in multivariate analyses.

Using a one-way analysis of variance on the SF-36 total score showed that there was no statistically significant difference between marital status ($P>0.05$). Therefore, we did not enter marital status as predictors in stepwise regression. The results revealed that the resilience ($r=.515$, $P=.000$) and medication adherence ($r=.316$, $P=.001$) were positively correlated with QOL, however, the disability status ($r=-.53$, $P=.000$) was negatively correlated with QOL.

Table 1: Demographic characteristics of the patients

Total subjects		n=100
Gender (%)	Man	20
	Woman	80
Age (%)	<20	1
	20 to 30	40
	31 to 40	26
	41 to 50	28
	>50	5
Education (%)	Primary school	30
	High school	38
	Undergraduate	31
	Postgraduate	1
Marriage status (%)	Single	27
	Married	69
	Divorced	4
Job status (%)	Employed	30
	Unemployed	70

A stepwise linear regression was used to test the main hypothesis. Scores of resilience, medication adherence and EDSS were used as candidate variables in the stepwise to predict SF-36 total scores (QOL). Stepwise regression showed that in the first model, disability status was the best predictor for the dependent variable. As Table 3 shows, disability status accounted for 28.1% of

the variance in QOL. In the second model, the disability status and resilience together explained 50.6% of the variation in QOL.

Our results revealed that, out of all three predictors, only two of them significantly predicted QOL. Medication adherence was not a good predictor after including disability status and resilience in the regression. A stepwise linear

Table 2: The means and standard deviations of independent variables

Variables	Women	Men	All respondents	t value	P value
Resilience Scale	65.13 (20.20)	66.55 (14.32)	65.41 (19.10)	0.29	NS
Medication Adherence Scale	5.46 (2.09)	5.75 (1.38)	5.52 (2.04)	0.56	NS
Disability Status Scale	2.27 (1.79)	2.97 (2.31)	2.41 (1.97)	1.47	.02
Total score of SF36	59.080 (22.16)	57.144 (27.87)	57.531 (23.27)	0.331	NS
Physical component	60.716 (24.05)	59.175 (27.47)	59.484 (24.63)	0.249	NS
Mental component	52.354 (22.00)	48.491 (27.70)	49.263 (23.15)	0.665	NS

NS, Not significant

regression analysis was conducted to evaluate the first sub-hypothesis and to determine whether resilience, medication adherence and EDSS would predict the physical component of QOL. Table 3 indicates that the disability status predicted 30.2% of the variance of the physical component of QOL. In the second step, the disability status and resilience simultaneously explained 47% of the variation in QOL.

The beta coefficients showed that the correlation between disability status and physical component was stronger than other predictors. Once more, a stepwise linear regression analysis was applied to test the second sub-hypothesis and to ascertain which independent variables predict the mental component of QOL. As shown in Table 3, resilience was the best predictor of mental component and it predicted 25.9% of variation in the dependent variable. In the second model, a combination of resilience and disability status mutually predicted 34% of the mental component variation. Medication adherence was the weakest independent variable that was excluded for prediction of mental components. The result indicated that the predicted mental components were associated with increased resilience (positive beta coefficient). Disability status was associated with decreased mental components (negative beta coefficient).

DISCUSSION

The results of the regression analysis indicated that disability status was negatively associated

with QOL. Disability status was a stronger predictor of QOL than the resilience and medical adherence. Disability status displayed strong and statistically significant negative associations with both QOL and physical component of QOL. Several studies in the area of health-related QOL have shown that physical disability has an important role in determining QOL. Murphy *et al.*² evaluated 90 patients with MS from France, Germany and United Kingdom using EDSS and reported that there was a significant correlation between severity of MS and both physical and social function of their patients. However, they did not find a correlation between disease severity and psychological function. Their finding and our result are largely due to the nature of EDSS scores which mostly measure the physical ability rather than mental function. There are other studies that support the negative effect of the disability status on QOL of patients with MS.^{4,21}

On psychosocial factors, psychological resilience had an important role in coping with chronic health conditions. Resilience is an ability that influenced by various factors, such as internal personality and external environments which determine an adjustment to health problem conditions²² and may play a significant role in functional outcomes.²³ The findings of our study showed that the patients' resilience was associated positively with QOL and its mental health component. In our study, the high resilience as a personality trait helped MS patients to reconstruct their cognition in order not to dramatize their disability and fatigability.

Table 3: Results of the stepwise linear regression for predicting the quality of life and the coefficient of physical and mental components

Model	Predictors in the Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	P value
1	(Constant), Disability status						
	Quality of life	.530	.281	.274	19.90045	37.559	<0.001
	Physical component	.550	.302	.295	20.78538	41.588	<0.001
2	(Constant), Disability status, Resilience						
	Quality of life	.712	.506	.496	16.57730	48.737	<0.001
	Physical component	.685	.470	.459	18.21586	42.071	<0.001
3	(Constant), Resilience status						
	Mental components	.509	.259	.251	20.20872	33.530	<0.001
	(Constant), Resilience, Disability Status						
	Mental components	.585	.342	.328	19.14617	24.653	<0.001

The same result reported in other researches showed high psychological resilience negatively correlated with progressive of chronic illness.²⁴ On the one hand, cognitive reconstruction in a chain order may help MS patients not to give up easily in social and career challenges such as job performance and family relationships.³ On the other hand, the patients with low resilience expected a threatening and less controllable life, making them feeling more depressed and helpless, resulting in inadequate response to their personal and social problems.²⁴

Although adherence to treatment have been associated with better outcome and lower mortality and morbidity in the patients with MS^{7,11}, in our study adherence to treatment was a weaker predictor of mental component of QOL compared to psychological resilience. This might be explained by the hypothesis that patients who had high psychological resilience had better adherence and these two variables are closely related.

In conclusion, the severity of the disease, measured by EDSS, is a strong predictor in the patients with MS and has a negative effect on the physical component of the health-related QOL. Both psychological resilience and treatment adherence have a positive influence on the mental component of QOL in the patients with MS. Treatment strategies for reducing disability and an appropriate management for enhancing the psychological resilience can lead to treatment adherence and as a result to a better QOL.

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DISCLOSURE

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REFERENCES

1. Motl RW, McAuley E. Symptom cluster and quality of life: preliminary evidence in multiple sclerosis. *J Neurosci Nurs* 2010; 42:212-6.
2. Murphy N, Confavreux C, Haas J, et al. Quality of life in multiple sclerosis in France, Germany, and the United Kingdom. Cost of Multiple Sclerosis Study Group. *J Neurol Neurosurg Psychiatry* 1998; 65:460-6.
3. Rao SM, Leo GJ, Ellington L, Nauertz T, Bernardin

- L, Unverzagt F. Cognitive dysfunction in multiple sclerosis. II. Impact on employment and social functioning. *Neurology* 1991; 41:692-6.
4. Rudick RA, Miller D, Clough JD, Gragg LA, Farmer RG. Quality of life in multiple sclerosis. Comparison with inflammatory bowel disease and rheumatoid arthritis. *Arch Neurol* 1992; 49:1237-42.
5. Freedman MS, Hughes B, Mikol DD, et al. Efficacy of disease-modifying therapies in relapsing remitting multiple sclerosis: a systematic comparison. *Eur Neurol* 2008; 60:1-11.
6. Devonshire V, Lapierre Y, Macdonell R, et al. The Global Adherence Project (GAP): a multicenter observational study on adherence to disease-modifying therapies in patients with relapsing-remitting multiple sclerosis. *Eur J Neurol* 2011; 18:69-77.
7. Steinberg SC, Faris RJ, Chang CF, Chan A, Tankersley MA. Impact of adherence to interferons in the treatment of multiple sclerosis: a non-experimental, retrospective, cohort study. *Clin Drug Investig* 2010;30:89-100.
8. Treadaway K, Cutter G, Salter A, et al. Factors that influence adherence with disease-modifying therapy in MS. *J Neurol* 2009; 256:568-76.
9. Falk-Kessler J, Kalina JT, Miller P. Influence of occupational therapy on resilience in individuals with multiple sclerosis. *Int J MS Care* 2012; 14:160-8.
10. Janardhan V, Bakshi R. Quality of life in patients with multiple sclerosis: the impact of fatigue and depression. *J Neurol Sci* 2002; 205:51-8.
11. Halpern R, Agarwal S, Dembek C, Borton L, Lopez-Bresnahan M. Comparison of adherence and persistence among multiple sclerosis patients treated with disease-modifying therapies: a retrospective administrative claims analysis. *Patient Prefer Adherence* 2011; 5:73-84.
12. Polman CH, Reingold SC, Banwell B, et al. Diagnostic criteria for multiple sclerosis: 2010 revisions to the McDonald criteria. *Ann Neurol* 2011; 69:292-302.
13. Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care* 1992; 30:473-83.
14. Montazeri A, Goshtasebi A, Vahdaninia M, Gandek B. The Short Form Health Survey (SF-36): translation and validation study of the Iranian version. *Qual Life Res* 2005; 14:875-82.
15. Connor KM, Davidson JR. Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC). *Depress Anxiety* 2003; 18:76-82.
16. Mohammadi M. Understanding factors affecting resilience on individuals exposed to drug abuse. Tehran, Iran; University of Social Welfare and Rehabilitation Sciences, 2005. Dissertation.
17. Samani S, Jokar B, Sahragard N. Resiliency, psychological health and life satisfaction. *Iran's Psychiatric and Clinical Psychology Magazine (in Persian)* 2007; 13th year: 290-5.
18. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens (Greenwich)* 2008; 10:348-54.
19. Bakaeian M. Study of personality characteristics,

- memory performance, demographic characteristics as predictive of adherence to treatment in heart patients. Shiraz, Iran; Shiraz University, 2012. Dissertation.
20. Kurtzke JF. Rating neurologic impairment in multiple sclerosis: an expanded disability status scale (EDSS). *Neurology* 1983; 33:1444-52.
 21. Freeman JA, Langdon DW, Hobart JC, Thompson AJ. Health-Related Quality of Life in people with multiple sclerosis undergoing inpatient rehabilitation. *Neurorehabil Neural Repair* 1996; 10:185-94.
 22. Tusaie K, Dyer J. Resilience: a historical review of the construct. *Holist Nurs Pract* 2004; 18:3-8.
 23. Fine SB. Resilience and human adaptability: who rises above adversity? 1990 Eleanor Clarke Slagle Lecture. *Am J Occup Ther* 1991; 45:493-503.
 24. Cal SF, De Sá LR, Glustak ME, Santiago MB. Resilience in chronic diseases: A systematic review. *Cogent Psychology* 2015; 2:1024928.