Assessing Multiple Sclerosis-Related Quality of Life among Iranian Patients Using the MSQOL-54 Tool: A cross-sectional study

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Abstract

Background

The main objectives of this study were to assess quality of life (QoL), consumption patterns of dietary supplements, as well as physical/mental health status in patients with multiple sclerosis (MS). The present study also aimed to determine the association between demographic characteristics and physical as well as mental health composite (PHC and MHC) scores using the Multiple Sclerosis Quality of Life-54 (MSQoL-54) questionnaire.

Methods

This cross-sectional study was conducted on a group of patients with MS (n=382) referring to Shahid Kazemi Pharmacy, based in the city of Tehran, Iran, as a national pharmacy providing specialized pharmaceutical care to these individuals from February 2019 to March 2020 via the implementation of the MSQoL-54 questionnaire.

Results

A total number of 382 patients with MS participated in this study, including 89 (23.3%) men and 293 (76.7%) women, aged 40 ± 10.9 years old (range: 18-84 years old). The overall score of the MSQoL-54 questionnaire was also by 41.58, and that was 69.60 and 62.99 from 100 for PHC and MHC, respectively.

Conclusions

The study results demonstrated that advanced age, longer disease duration, and lower levels of education were significantly associated with lower QoL.

Trial registration

IR.SBMU.PHARMACY.REC.1398.240.

Background

Multiple Sclerosis (MS) is known as the major autoimmune demyelinating disease of the central nervous system (CNS) and even one of the main causes of disabilities, high healthcare costs, and mortality in young adults [1-3]. This condition can correspondingly occur at any age but it usually begins between the ages of 20 and 40 years [4]. A global rising trend in the prevalence rate of MS has been further observed in recent years specifically in females, two times more often than males [5]. The reported cases of MS in 2016 have so far shown 2,221,188 patients living with MS across the world [6].

Iran is also a country with high prevalence rate of MS in the Middle East. With reference to the reports by the Iranian MS Society, the total prevalence rate of MS has been 115.94 per 100,000 cases in 2015 compared with the healthy population [7]. In 2019, the incidence of MS among Iranians has been similarly reported to range from 7 to 148.1/100,000 [8]. This condition can even cause a wide variety of symptoms, including vision loss, paresis, urinary and/or fecal sphincter dysfunction, vertigo, ataxia, and tremor [9]. Besides, MS negatively impacts cognitive and psychological functions [10, 11]. Other psychiatric symptoms similarly include anxiety, sleep disorders, somatization, obsession, and agitation [12].

In this respect, quality of life (QoL) also refers to a broad concept related to individuals' perceptions of their complete physical, mental, and social well-being as well as both positive and negative aspects of life [13], whose assessment from patients' perspectives as an outcome measure can be considered important for those living with MS. In previous studies, QoL has represented judgments about mental and physical health status, disease symptoms, mobility, emotional life, social interactions, along with environmental, economic, psychological, and spiritual dimensions, and health satisfaction by patients affected with MS [14, 15].

Research have further confirmed some factors, potentially affecting QoL in patients with MS such as depression, physical disabilities, and fatigue as the most important variables associated with QoL [16, 17]. Correspondingly, it has been established that patients with MS have lower health-related QoL than the general population and suffer from some other neurological disorders like Parkinson's disease and epilepsy [18]. Therefore, the overall goals of medication management services for MS have been towards reduction of disease complications and improvement of QoL [19, 20]. However, assessment of QoL as a significant clinical outcome can be a good definition of successful treatment [21, 22].

In addition, QoL measures can be divided into disease-specific and generic instruments [23]. Accordingly, there are numerous QoL scales e.g., the McGill Quality of Life Questionnaire (MGQoL), the Health-Related Quality of Life (HRQoL), the World Health Organization Quality of Life (WHOQoL-BREF), the Nottingham Health Profile (NHP), the Short Form-36 Questionnaire (SF-36), and the Multiple Sclerosis Quality of Life-54 (MSQoL-54) questionnaire, which have been typically practiced in clinical studies in recent years [24, 25]. In this sense, the MSQoL-54 is a disease-specific questionnaire used to assess QoL in patients with MS, which also provides the opportunity to compare them with the general population [26]. Therefore, the present study was to assess QoL in patients living with MS and to reflect on differences in patients with diverse demographic characteristics. In addition, there was an attempt to find if the type of medicines and supplements used could affect QoL or not.

Methods

Study Design

This cross-sectional study was conducted from February 2019 to March 2020 at Shahid Kazemi Pharmacy in the city of Tehran Iran, as a national pharmacy providing specialized pharmaceutical care to patients with MS. This study was also approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences, Tehran, Iran, with the registry code of IR.SBMU.PHARMACY.REC.1398.240.

Study population

The patients affected with MS referring to the pharmacy concerned were invited to participate in this study. After scrutinizing their prescriptions, additional questions were further raised to make sure that the patients had been diagnosed with MS. To be included in the study, the cases needed to be older than 18 years and with at least six months of MS diagnosis. A written informed consent was also given to the patients prior to their inclusion, and they were allowed to withdraw from the study whenever they desired.

The sample size was calculated using the Cochran's formula. According to the statistics released by the Iranian MS Society, the number of patients with MS in Iran was 68,192 cases. In this formula, the confidence interval (CI) of 1.96 Z-score was defined as 95% and the p-value, as the ratio of the attribute in the society, was equal to 0.5. In addition, the margin of error (D) in this study was 0.05. The sample size was further estimated to be 382 individuals.

Questionnaire Development

The validated Persian version of the MSQoL-54 questionnaire was applied to collect the required data, whose acceptable reliability and construct validity had been already confirmed [27]. Notably, the MSQoL-54 is known as a health-related self-report questionnaire containing 54 items, categorized into 12 sub-scales: physical health (10 items), role limitations-physical (4 items), emotional well-being (8 items), pain (3 items), energy (5 items), health perceptions (5 items), social function (3 items), cognitive function (4 items), health distress (4 items), sexual function (5 items), change in health (1 item), and overall QoL (2 items). There was also one item under the theme of overall QoL, related to patients' views about overall assessment of their own QoL, labeled as "self-score" in this study.

Additionally, there are two composite scores, namely, physical health composite (PHC) and mental health composite (MHC), measured by adding some sub-scales accordingly. The PHC includes eight sub-scales of physical function, health perceptions, energy/fatigue, role limitations-physical, pain, sexual function, social function, and health distress and the MHC is made up of

five sub-scales: health distress, overall QoL, emotional well-being, role limitations-emotional, and cognitive function. More specifically, the composite scores can be calculated by transforming the item scores to zero to 100 scales, with zero representing the worst health status and 100 indicating the best health status.

With respect to demographic data, characteristics such as age, gender, levels of education, marital status, occupation, level of income, disease duration, and comorbidity are shown in Table 1. As well, the patients' use of dietary supplements and levels of physical activity were recorded.

Alongside the implementation of the MSQoL-54 questionnaire, the participants were asked to complete two types of questions related to consumption patterns of dietary and herbal supplements and the Short Questionnaire to Assess Health-Enhancing Physical Activity (SQUASH). The structured questionnaire about the consumption patterns of dietary and herbal supplements included detailed questions to assess the use of supplements such as multivitamins and individual vitamins as well as minerals directly. The participants were accordingly instructed to write any products they were using. This questionnaire contained a total number of seven items on specific supplements used, dosage form, frequency of use, onset date, prescribing physician's specialty, and reason for use.

The SQUASH was also comprised of items on commuting activities, leisure-time and sports activities, household activities, and activities at work and school. Based on the reported efforts in the SQUASH questionnaire, this tool could classify individuals into three different intensity scores, i.e., light, moderate, or vigorous [28].

Results

Over a period of 15 months, a total number of 382 MS patients agreed to participate in the study, including 89 (23.3%) men and 293 (76.7%) women with the age range of 18-84 years. The median of disease duration was also 96.00 months ranged from 6 to 480 months. All other demographic characteristics of the participants are depicted in Table 1.

As well, the frequency of MS medications taken by the patients indicates in (Fig. 1).

The most commonly used dietary and herbal supplements were shown in (Fig. 2).

In addition, Table 2 presents that the overall score of the MSQoL-54 questionnaire among the patients with MS was 41.58 ± 12.69 , and that was 69.60 ± 18.38 and 62.99 ± 22.74 respectively for the PHC and MHC.

The correlation test was also fulfilled to determine the association between age and the PHC as well as MHC scores. As indicated in Table 3, there was a significant reverse relationship between age and both the PHC and MHC scores (-0.257 and -0.237, respectively). Similarly, the PHC and MHC scores were significantly associated with disease duration in patients living with MS. It meant that both the PHC and MHC scores had significantly reduced as the disease duration had lengthened (-0.232 and -0.234, respectively).

According to Table 4, the analysis of variance (ANOVA) results correspondingly established that the PHC and MHC scores were significantly associated with levels of education among the patients. Therefore, individuals with higher levels of education obtained higher PHC and MHC scores. In contrast, no significant relationship was found between patients' levels of physical activity and the PHC and MHC scores.

Table 5 shows the relationship between medicines for MS and the mean scores of MSQoL-54 sub-scales (i.e., self-score, PHC, MHC, and overall QoL). There was accordingly a significant difference between self-score and patients receiving Interferon beta-1a (p-value=0.04). Patients taking Fingolimod further manifested higher overall QoL in comparison with those who had not received this medicine (p-value= 0.02). It is noteworthy that once age was added as the control variable, the p-value was increased to 0.054. As well, patients receiving Rituximab had lower QoL in all domains including self-score, PHC, MHC, and overall QoL.

In this study, prescriptions and use of antidepressant and anxiolytic drugs in patients with MS were not common. The results of this study revealed that vitamin D was the most widely used supplement, followed by calcium while vitamin C was the least consumed one. Moreover, patients taking calcium had less energy and poor physical/mental health status, whereas those receiving vitamin D or any other supplements were associated with better social function.

Consumption of dietary supplements or increase in the number of supplements used had no effects on overall QoL, PHC, or MHC. Regarding the supplement use duration, no correlation was further observed in terms of overall QoL, PHC, or MHC (p -value>0.05). Besides, there was a significant inverse relationship between the consumption of herbal supplements and patients' overall QoL.

Discussion

MS can significantly affect QoL by interfering with patients' ability to work, to do leisure-time activities, and to assume typical life roles. Accordingly, assessment of patients' QoL is an important aspect of outcome endpoints in clinical practice of MS. Thus, great efforts were made to discover QoL in patients with MS using the MSQoL-54 questionnaire in this study. Based on the results, the patients generally achieved low-to-moderate scores in the dimensions of overall QoL, PHC, and MHC.

The findings were also consistent with the results of earlier studies reporting that QoL was poor in patients living with MS [29, 30]. As mentioned by Ruth Ann Marrie et al., underdiagnosed and undertreated depression had been one of the fundamental reasons for reduced QoL in MS. This study had also reported only few patients using antidepressant or anxiolytic drugs to keep their QoL at higher levels. It seems that, patients should be continuously evaluated and appropriate pharmacotherapy is given if needed due to the progressive and disabling nature of MS and the negative effects of depression on QoL. Moreover, the results of this study underlined a negative correlation between age, disease duration, and both PHC and MHC scores. It meant that those with older age and longer disease duration were associated with lower PHC and MHC scores. It can be concluded that patients with advanced age or those who are diagnosed a relatively long time ago, due to limited physical and mental abilities, may need more occupational therapy to improve their QoL. In contrast, as stated by Kamran et al., age does not always affect PHC and MHC [31], and it had been argued that older patients had just lower MHC scores than younger ones [32]. The statistics in the present study had reflected that most patients had low levels of physical activity because of disease severity. In a study conducted by Robert et al., patients' levels of physical activity had been measured using a questionnaire and an accelerometer as valid measurement criteria, and the results had indicated an indirect relationship between physical activity and QoL [14]. Accordingly, patients need to be well engaged in ways to reduce the disease complications such as continuing to have minimal physical activities.

The study findings similarly highlighted that the patients' levels of education were significantly associated with higher PHC and MHC scores, which were controversially in conflict with the research findings reported by Rezapour et al. on 177 Iranian MS patients, suggesting no relationship between these parameters and patients' levels of education [33]. On the other hand, the results reported by Karatepe et al. were in line with the findings of the present study [34]. It seems that having a higher level of education can afford an individual a better level of awareness, insight, and attention to MS disease in question, also enabling one to adjust for better performance and deal with tough life situations, which can indirectly speed up the progression of this condition.

The results of this study also showed that patients taking supplements did not have a higher overall QoL, PHC, and MHC than those using no supplements, and there was not even a correlation between the duration of supplement use and overall QoL, PHC, and MHC in patients receiving these products. On the other hand, the study findings by Nozari et al. with a smaller sample size had underlined the positive effects of dietary supplements on improved QoL [35]. For example, previous studies had demonstrated a decrease in serological and metabolic responsiveness to vitamin D supplementation by patients living with MS [36, 37], so higher doses of supplements might be needed to have clinically relevant effects in this study population.

In this study, 29 patients (7.6%) received herbal supplements and the results indicated that those taking such supplements had shown lower QoL compared with the ones using no supplements. In contrast, Etemadifar et al. had observed that herbal

medicines such as ginseng could be an appropriate anti-fatigue product to boost QoL [38]. As well, ginseng administration in MS for such a purpose had been evaluated just for patients with relapsing-remitting MS within 12 weeks in this study. It could be argued that patients with lower QoL had felt disappointed with conventional therapies to control MS and they might show higher willingness to use herbal supplements as complementary and alternative medicines.

Conclusion

Given the findings of this study, it could be concluded that patients with MS having advanced age, longer disease duration, and lower levels of education were significantly associated with lower PHC and MHC scores. Besides, there was not a significant relationship between levels of physical activity and PHC as well as MHC scores. The study results additionally suggested that supplementation and its long-term use in patients with MS was not associated with higher QoL. Similarly, addition of herbal medicines had failed to improve QoL.

It is recommended to perform further studies to evaluate the effectiveness of dietary and herbal supplements in enhancing MS-related QoL. This study had some limitations that should be taken into account. It was just a single-center study, so it would be better to include as many patients with MS as possible in other cities in Iran, and even in other countries to get a clear picture of supplement use efficacy and possible factors affecting QoL in such patients. Thus, this study sample was representative of the general population of patients living with MS.

Among the strengths of this study were practicing a comprehensive assessment of QoL, utilizing a validated scale, as well as employing the most commonly criteria for the MS diagnosis and ideal sample size. However, further studies on health-related and patients' subjective well-being in relation to QoL are needed to assess all the dimensions in MS and to clarify the independent relationship of stronger variables. The present study was thus underpowered to evaluate the effect of supplements on MS-related QoL, and larger scale trials and meta-analysis of available data are required to elucidate the role of supplements on MS-related QoL.

Abbreviations

MS: multiple sclerosis; MHC: Mental Health Composite; MSQOL-54: multiple sclerosis quality of life-54 questionnaire; PHC: Physical Health Composite; QOL: quality of life

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki; hence the process of the survey was explained to the patients and, written informed consent was provided prior to enrollment. The protocol of study was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences, Tehran, Iran with the registry code of IR.SBMU.PHARMACY.REC.1398.240.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

NN: The first author, collected the cases. AG: The second author, (AG) has analyzed, drafted and revised the work. EH, ZSH and BS participated in the design of the study and developed the research question. MR and MM analyzed the data using SPSS software program

MGH: coordinated the study, participated in its conception and its design, and reviewed the manuscript. All authors contributed to and have approved the final manuscript.

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Tables

Table 1. Demographic of participants (n = 382).

Variable	Mean (standard deviation) or n (frequency)
Age (n=382):	
<i>Year</i>	40 (10.9), range: 18-84
Sex:	
<i>Male</i>	89 (23.3)
<i>Female</i>	293 (76.7)
Education:	
<i>Undergraduate</i>	27(7.1%)
<i>Diploma</i>	102(26.7)
<i>Associate degree</i>	15(3.9%)
<i>Bachelor</i>	152(39.8%)
<i>Master</i>	64(16.8%)
<i>PhD*</i>	22(5.8%)
Marital status:	
<i>Single</i>	154 (40.3%)
<i>Married</i>	228 (59.7%)
Habit:	
<i>Cigarette</i>	34 (8.9%)
<i>Alcohol</i>	14 (3.7%)
<i>Both</i>	20 (5.2%)
<i>None</i>	314 (82.2%)
Job:	
<i>Unemployed</i>	28 (7.3%)
<i>Freelance</i>	134 (35.1%)
<i>Government</i>	16 (4.2%)
<i>Housewife</i>	168 (44%)
<i>Student</i>	13 (3.4%)
<i>Retired</i>	23 (6%)
Income:	
<i>1-5 million toman/month</i>	214 (56%)
<i>5-10 million toman/month</i>	81 (21.2%)
<i>>10 million toman/month</i>	25 (6.5%)
MS* duration (n=382):	
<i>Month</i>	111.96 (78.29), range 6-480
Comorbidity:	

<i>Yes</i>	78 (20.4%)
<i>No</i>	304 (79.6%)
Physician:	
<i>Neurologist</i>	306 (80.1%)
<i>MS fellowship</i>	76 (19.9%)

Table 2. The mean and standard deviation of MSQoL-54 subsets among multiple sclerosis patients

	Mean	SD
Physical Health Composite	69.60	18.38
Mental Health Composite	62.99	22.74
Overall QoL score	41.58	12.69

QoL: quality of life; SD: standard deviation

Table 3. The comparison between MSQoL-54 subsets in MS patients regarding to the age and disease duration

Quality of life	Age		Disease duration	
	R**	Sig*	R**	Sig*
Physical Health Composite	-0.257	0.00	-0.232	0.00
Mental Health Composite	-0.237	0.00	-0.234	0.00

*P < 0.05 indicates significant difference, R**; correlation is significant at the 0.01 level

Table 4. Relationship between MSQoL-54 subsets and physical activity and educational levels

Variable	Physical Health Composite Mean (SD)	Mental Health Composite Mean (SD)
Physical activity levels		
<i>Light</i>	109.28±58.48	61.75±22.77
<i>Moderate</i>	120.96±58.24	66.23±21.76
<i>Intense</i>	117.83±60.10	63.39±24.17
<i>P value</i>	0.23	0.28
Educational levels		
<i>Undergraduate</i>	110.81±63.18	61.25±25.73
<i>Diploma</i>	95.53±57.16	55.69±22.88
<i>Bachelor</i>	114.47±57.63	64.25±21.58
<i>Master</i>	125.73±56.61	68.29±20.81
<i>PhD</i>	129.40±60.38	70.31±23.38
<i>P value*</i>	0.03	0.02

Table 5. Relationship between the mean score of MSQoL-54 subsets and multiple sclerosis drugs

Treatment	Frequency (%)	Self-score (Mean±SD)	PV*	Physical health (Mean±SD)	PV*	Mental health (Mean±SD)	PV*	Overall QoL (Mean± SD)	PV*
Interferon beta	191 (50%)	Yes: 7.69±1.96 No: 7.27±2.23	0.04	Yes: 115.72±58.19 No: 110.38±59.24	0.37	Yes: 63.96±21.99 No: 62.02±23.47	0.40	Yes: 42.61±12.07 No: 40.55±13.23	0.11
Fingolimod	74 (20%)	Yes: 7.68±1.97 No: 7.43±2.14	0.35	Yes: 118.58±57.57 No: 111.72±58.98	0.36	Yes: 65.44±21.57 No: 62.40±23.00	0.30	Yes: 44.54±11.43 No: 40.87±12.89	0.02
Dimethyl fumarate	43 (11%)	Yes: 7.53±1.96 No: 7.47±2.13	0.86	Yes: 120.18±58.16 No: 112.14±58.79	0.39	Yes: 65.76±21.96 No: 62.64±22.84	0.39	Yes: 41.27±11.74 No: 41.62±12.82	0.86
Glatiramer acetate	23 (6%)	Yes: 7.86±2.02 No: 7.45±2.11	0.36	Yes: 134.86±58.92 No: 111.65±58.49	0.06	Yes: 68.86±25.53 No: 62.61±22.53	0.20	Yes: 43.21±11.87 No: 41.48±12.75	0.52
Rituximab	18 (5%)	Yes: 5.66±2.19 No: 7.57±2.06	0.00	Yes: 65.05±46.46 No: 115.42±58.27	0.00	Yes: 42.66±21.98 No: 64.00±22.33	0.00	Yes: 29.38±12.43 No: 42.18±12.41	0.00
No treatment	12 (3%)	Not applicable		Not applicable		Not applicable		Not applicable	
Teriflunomide	11 (3%)	Yes: 8.00±1.94 No: 7.46±2.11	0.41	Yes: 108.27±57.66 No: 113.19±58.80	0.78	Yes: 61.45±20.00 No: 63.04±22.83	0.82	Yes: 41.36±11.18 No: 41.59±12.74	0.95
Natalizumab	8 (2%)	Yes: 7.62±3.15 No: 7.48±2.08	0.84	Yes: 126.00±50.04 No: 112.77±58.90	0.52	Yes: 68.87±18.31 No: 62.86±22.83	0.46	Yes: 40.50±15.56 No: 41.60±12.64	0.80
Mitoxantrone	1 (0%)	Not applicable		Not applicable		Not applicable		Not applicable	
Ocrelizumab	1 (0%)	Not applicable		Not applicable		Not applicable		Not applicable	

PV: P value is significant (< 0.05), QoL: quality of life; SD: standard deviation

Figures

Figure 1

Frequency distribution of medication among 382 patients with multiple sclerosis

Figure 1

Frequency distribution of medication among 382 patients with multiple sclerosis

Figure 2

Supplement frequencies usage of the 382 patients with multiple sclerosis

Figure 2

Supplement frequencies usage of the 382 patients with multiple sclerosis