

Cognition and Health-related Quality of Life in Multiple Sclerosis

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Background: Cognitive dysfunctions are considered as a poor prognostic factor that influence health-related quality of life in multiple sclerosis. **Objective:** The aim of the study was to evaluate the impact of cognitive impairment on the quality of life in multiple sclerosis patients. **Methods:** This study included 60 MS patients treated at the Department of Neurology, Clinical Center University of Sarajevo. Inclusion criteria were clinically definite diagnosis of multiple sclerosis, 18 years of age or older and were able to give written informed consent. Cognitive function was evaluated by the Montreal Cognitive Assessment (MoCa) screening test. Quality of life was evaluated by SF36 questionnaire. **Results:** 88.33% of patients had cognitive impairment with 68.33% with mild cognitive impairment. Abstraction (60,83%), language (56,66%), executive functions (53,66%) and delayed recall (28,33%) were rated the worst. The median value of SF-36 score was 54.1 (27.7-70.01). The lowest results were achieved in the QOL domains of psychical limitation with a median value of 12.5 (0-75) and emotional limitation 33.3 (0-100). It is found statistically significant correlation of the MoCa score with social functioning, energy, vitality and general health ($p < 0.05$) and physical functioning ($p < 0.001$) domains of quality of life, as well as with SF-36 total scores ($p < 0.05$). Among group of patients with cognitive impairment, statistically significant positive correlation between cognitive status mental health HRQOL domain ($\rho = 0.427$; $p < 0.001$) was found. **Conclusion:** Cognitive impairment is very often presented in patients with multiple sclerosis with significant contribution to a poorer quality of life. It is associated with physical and emotional limitations, as well as poorer mental health. Further studies are needed, especially when we take into account very important clinical and prognostic role of cognition in multiple sclerosis.

Keywords: Cognition, quality of life, multiple sclerosis.

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1. BACKGROUND

Multiple sclerosis is a chronic, autoimmune disease of the central nervous system, with signs of demyelination and axonal transection responsible for the heterogeneous clinical picture, course and outcome of the disease. It is a complex disease that may be presented by different neurological symptoms causing impairment of physical, psychological and cognitive functions (1, 2). Cognitive dysfunction occurs in 40-65% of multiple sclerosis (MS) patients (3). Sustained attention, speed of information processing, abstract reasoning, executive functions, and long-term verbal and visual memory are the most frequently affected cognitive functions in MS patients (4). Cognitive impairment can be the first sign of the disease and is considered a poor prognostic factor (5). Outbreaks can vary from very mild to those that affect daily functioning, employment, driving, learning and contribute to a worse quality of life (6).

Studies showed that unemployment, withdrawal from work, work absence and lower quality of life are more influenced by the presence of cognitive and psychological difficulties than physical disability in persons with MS (7). The World Health Organization defines quality of life as an individual's perception of the life role in the context of the culture and value system in which they live, as well as in relation to their goals, expectations, standards and concerns (8). Many studies have established the connection between fatigue, depression, disability, and cognitive impairment and loneliness with a worse quality of life (9, 10). Also, in many studies, older age correlates with worse cognitive status and quality of life (9, 11). Research results related to the impact of cognitive impairment on quality of life are quite contradictory. Existing studies have revealed contradictory results, highlighting either negligible impact (12, 13-16) or a strong impact (17-19) of cognitive impairment

on QoL. The reason for this may be that patients cannot adequately report on their condition, as well as the use of different measuring instruments for the evaluation of cognition and quality of life (20, 21). The results of this study are expected to contribute to a better understanding of the connection and impact of cognitive functioning on quality of life in order to improve the evaluation and treatment of MS patients.

2. OBJECTIVE

The aim of the study is to evaluate the impact of cognitive impairment on the quality of life in multiple sclerosis patients.

3. PATIENTS AND METHODS

Participants

This study included 60 patients with multiple sclerosis treated in the hospital and through the multiple sclerosis counseling center at the Department of Neurology, Clinical Center University of Sarajevo. Patients included in the study satisfied the following criteria: clinically definite diagnosis of multiple sclerosis, 18 years of age or older and were able to give written informed consent. Exclusion criteria were age younger than 18, patients with an unconfirmed diagnosis of multiple sclerosis, and those who provided incomplete data or refused to cooperate. This was an independent, observational, cross-sectional study.

Procedure and ethical considerations

Discipline for Science and Teaching, Organizational Unit for Science, Teaching and Clinical Trials of the Clinical Center of the University of Sarajevo gave consent to conduct research. Each patient gave informed written consent to use the results obtained for publication before enrollment.

Methods

Each respondent was asked to fill out a questionnaire which includes sociodemographic data and clinical data. For evaluation of cognitive functions, we used the Bosnian version of Montreal Cognitive Assessment (MoCa) screening test (22). MoCa is a rapid screening instrument for mild cognitive dysfunction based on testing eight cognitive functions (visuospatial/executive skills, naming, memory, attention, language, abstract thinking, delayed recall/MIS and orientation). The maximum score is 30, and based on the score, patients are divided into the following groups: 26-30 normal cognitive status, 18-25 mild cognitive impairment, 10-17 moderate cognitive impairment, < 9 severe cognitive impairment. For evaluate of the health-related (HRQOL) quality of life we used SF-36 (English Short Form 36 health survey questionnaire), translated into Bosnian (23). The purpose of the questionnaire is

SF-36 *	MoCA scores ** (25 th -75 th percentile)		p
	< 26	>= 26	
General health	45 (25-60)	70 (57,5-80)	< 0,05
Physical functioning	40 (20-70)	100 (92,5-100)	< 0,001
Physical limitation	0 (0-75)	50 (25-87,5)	0,123
Emotional limitation	100 (0-100)	100 (83,33-100)	0,248
Social functioning	50 (12,5-100)	100 (75-100)	< 0,05
Bodily pain	45 (22,5-100)	100 (28,75-100)	0,181
Energy and vitality	40 (20-60)	60 (55-70)	< 0,05
Mental health	60 (44-80)	68 (40-76)	0,947
SF-36 scor	45,12 (27-68,13)	76,62 (67,45-81,06)	< 0,05

Table 1. SF-36 domains scores according to MoCa scores. * Short Form 36 health survey questionnaire; ** Montreal Cognitive Assessment

SF-36 *	MoCA score ** (< 26 – cognitiv impairment)	
	Rho	p
General health	0,124	0,375
Physical functioning	0,219	0,115
Physical limitation	0,147	0,292
Emotional limitation	0,268	0,052
Social functioning	0,231	0,096
Bodily pain	- 0,127	0,366
Energy and vitality	0,172	0,218
Mental health	0,472	< 0,001
SF-36 scor	0,263	0,058

Table 1. SF-36 domains scores according to MoCa scores. * Short Form 36 health survey questionnaire; ** Montreal Cognitive Assessment

to gives us information on how the patient feels and how well he is able to perform usual activities. It consists of 36 questions classified into 8 categories: general health, physical functioning, physical limitation, emotional limitation, social activities, bodily pain, energy and vitality and mental health. Each category is scored from 0% to 100%, where a higher percentage means better functioning and less limitation.

Statistical analyses

Statistical data processing was done using the computer program Excel (Microsoft Office Excel 2010) and the SPSS computer program for statistical analysis (SPSS-Statistical Package for the Social Sciences), version 22.0. The data were processed using standard statistical methods and presented in the form of tables and charts. Mann-Witney and Kruskal Wallis tests were

used for comparisons.

4. RESULTS

Out of 76.66% of participants were women. The average age was 44.5 years. 80% had a relapsing-remitting type of the disease, and 63.33% of subjects were independently mobile (EDSS score \leq 4.5). The results showed that 88.33% of patients had cognitive impairment and that 68.33% had mild cognitive impairment. Abstraction (60,83%), language (56,66%), executive functions (53.66%) and delayed recall (28.33%) were rated the worst. The median value of SF-36 score was 54.1 (27.7-70.01). The lowest results were achieved in the HRQOL domains of psycial limitation with a median value of 12.5 (0-75) and emotional limitation 33.3 (0-100), while the highest median value of 60 (44-79) was in the mental health HRQOL doamin. It is found statistically significant correlation of the MoCa score with general health, social functioning, energy and vitality ($p < 0.05$) and physical functioning ($p < 0.001$) domains of quality of life, as well as with SF -36 total scores ($p < 0.05$) (Table 1). Among group of patients with cognitive impairment, statistically significant positive correlation between cognitive status mental health HRQOL domain ($\rho = 0.427$; $p < 0.001$) was found, while other domains of health-related uality of life did not show a statistically significant connection (Table 2).

5. DISCUSSION

High percentage of patients in our study had cognitive impairment, which correlates with the results of other studies (24-27). Our study also showed significant low scores of quality of life with the lowest QOL scores found in physical and emotional limitation domains. Many other studies also showed that MS has a negative impact on quality of life which is easy to explain by unpredictability and variability of disease course (28, 29, 30). Another factors, in addition to physical symptoms, also play an important role in overall HRQOL in MS patients with influence on both physical and emotional domains (31, 32). The results of this study showed that, among cognitive functions, abstraction, language, executive functions and delayed recall were rated the worst. The results of other studies showed impairment of different cognitions domains with information processing speed, learning and memory, visuospatial abilities, and executive functions more frequently involved (26,27). This study showed significant impact of cognition on the experience of general health, physical and social functioning, energy, mental health and overall quality of life. Another study using different cognition tests also showed that cognitive impairment in MS is associated with lower quality of life scores (33). A study that examined the impact of cognitive functions included fatigue, depression and physical disability on the quality of life showed that cognitive impairment negatively affects the overall quality of life, without highlighting any individual domain (21). It is showed

that cognition is significantly associated with poorer quality of life, especially in the domains of physical functioning and mental health in a study that analyzed the impact of cognitive functions on quality of life in multiple sclerosis over a period of 3 years, which correlates with the results of our study (34). Another study that was conducted on patients with a progressive form of multiple sclerosis found that cognitive impairment correlates more with quality of life than physical impairment (20). Still, some studies did not find a significant impact of cognitive impairment on quality of life (35-37). Among group of patients with cognitive impairment, the results of this study showed significant positive correlation only between cognitive status and mental health HRQOL domain implicating importance of mental health components of patients life.

6. CONCLUSION

Cognitive impairment is very often presented in patients with multiple sclerosis. It significantly contributes to a poorer health related quality of life, and is associated with physical and emotional limitations, as well as poorer mental health. Further studies are needed, especially when we take into account very important clinical and prognostic role of cognition in multiple sclerosis.

- **Patient Consent Form:** *All participants were informed about subject of the study.*
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- **Conflicts of interest:** *There are no conflicts of interest.*
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