

Relationship Between Depression and Cognitive Impairment in Patients with Multiple Sclerosis

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Introduction

Multiple Sclerosis (MS) is an autoimmune, neurodegenerative disease characterized by chronic inflammation and demyelination of the brain and spinal cord. This deterioration of the central nervous system leads to a wide range of motor, cognitive, and neuropsychiatric symptoms. Each patient varies in symptom profile and disease course. However, cognitive impairment has been found in roughly half of all people with MS, regardless of MS subtype. This may present as deficits in attention, information processing speed, executive function, and visuospatial perception. This impairment may interfere with basic and instrumental activities of daily living, vocational status, and social functioning; all of which may impact overall quality of life. Likewise, depression can also alter cognitive function, notably executive function. As MS progresses, the development of depressive symptoms in patients becomes more common. The objective of the study was to determine if there was a correlation between cognitive impairment and severity of depression in patients with MS.

Methods

Participants with MS were administered tests for cognitive function, including the Montreal Cognitive Assessment (MoCA), a measure of cognitive impairment; the Symbol Digit Modalities Test (SDMT), a measure of information processing speed, attention, and working memory; and the King-Devick Test, which measures saccadic dysfunction and attention. In addition, participants completed various questionnaires including: the Perceived Stress Scale (PSS), which assesses stress levels; the Center for Epidemiological Studies Depression Scale (CES-D), a measure of depressive symptoms; the Perceived Deficits Questionnaire (PDQ), a measure of cognitive dysfunction; and the Fatigue Severity Scale (FSS), which evaluates perceived fatigue and its impacts on daily functioning.

The research cohort was broken into 2 groups (cognitive impairment or no cognitive impairment) based on SDMT T-scores, which were calculated using published norms that account for age and education. The SDMT has been well validated as a measure of cognitive decline in people with MS. The groups were compared using ANOVA to determine if they differed based on depression scores. A correlation analysis also measured the relationship between cognitive performance and depression symptomatology.

Participant Demographics

Comparison of Impaired and Non-Impaired Groups on demographics

	Impaired	Non-impaired	F	p
Sex	23 Females, 6 Males	21 Females, 4 Males		
Age	43 ± 14.0	50 ± 12.4	3.57	0.06
Highest Level of Education	14 ± 2.7	16 ± 2.6	10.86	0.002

Results – Self Report Measures

Comparison of Impaired and Non-Impaired Groups on self-report measures

	Impaired	Non-Impaired	F	p
PSS	18.45 ± 7.6	15.6 ± 6.7	2.00	0.16
CES-D	18.5 ± 11.2	13.8 ± 13.1	2.07	0.16
PDQ	32.8 ± 12.4	28.0 ± 16.1	1.53	0.22
FSS	39.4 ± 18.0	40.6 ± 16.1	0.06	0.80

Correlational Results

Correlation between SDMT score and self-report measures

	Impaired	Non-Impaired
PSS	r = -0.35 p = 0.08	r = 0.21 p = 0.32
CES-D	r = -0.08 p = 0.70	r = 0.07 p = 0.73
PDQ	r = 0.16 p = 0.42	r = 0.30 p = 0.15
FSS	r = 0.01 p = 0.10	r = 0.01 p = 0.64

SDMT

≥	±	◀	π	ж	ω	Δ	0	↑
1	2	3	4	5	6	7	8	9

±	π	ω	±	0	≥	Δ	↑	ж	±	◀	±	≥
2	4											
Δ	↑	0	π	◀	Δ	↑	ж	±	◀	◀	◀	ж
±	◀	π	ж	ω	≥	0	±	≥	±	◀	◀	ω
π	◀	ω	ж	±	Δ	0	↑	0	±	◀	π	ж
±	◀	π	ж	ω	0	±	0	≥	±	◀	π	0
π	◀	Δ	◀	π	Δ	0	↑	Δ	◀	◀	Δ	ж
±	◀	±	ж	◀	±	0	◀	≥	±	±	π	Δ

With the Symbol Digit Modalities Test (SDMT), participants are given 90 seconds to correctly pair as many symbols with their corresponding digit as they can.

Conclusion

When comparing patient demographics between the impaired and non-impaired groups, no significant differences were found between the two groups with respect to age. However, the results indicated that the two groups differed significantly in terms of education. The impaired group had fewer years of education than the non-impaired group. This aligns with the theory of cognitive reserve, the concept that certain factors, such as education, may be attenuate the effect of disease burden on cognition.

The results showed that there was no significant differences between the impaired and non-impaired groups when comparing self-reported measures of depression symptomatology. Likewise, the results of the correlational studies demonstrated no significant relationships between cognitive performance and self-reported measures of depression. However, this experiment was limited by the small sample size and is currently an ongoing study. Thus, further research and replication of this study with a larger sample may be necessary before coming to a definitive conclusion.

References

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