

Association between Cognitive Impairment and Motor Dysfunction among Patients with Multiple Sclerosis: A Cross-Sectional Study

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Introduction

Multiple sclerosis (MS) is an inflammatory immune-mediated disease of the central nervous system (CNS)^{1,2,3}.

The neurodegenerative nature of the disease contributes to various signs and symptoms that result from sensory, motor, and autonomic dysfunctions⁴. Motor and cognitive problems are the most common primary symptoms in patients with MS that negatively impact their quality of life (QOL)⁵. Motor actions implicitly involve various integrated cognitive functions that allow successful motor performance⁶. While most studies focus on cognitive impairment as a predictor of the risk of fall, walking speed⁷, gait variability⁸, and postural control⁹, it remains unclear whether the muscle strength, motor coordination, balance, gait, and/or risk of fall can be considered as predictors of CI in adults with MS.

Objectives

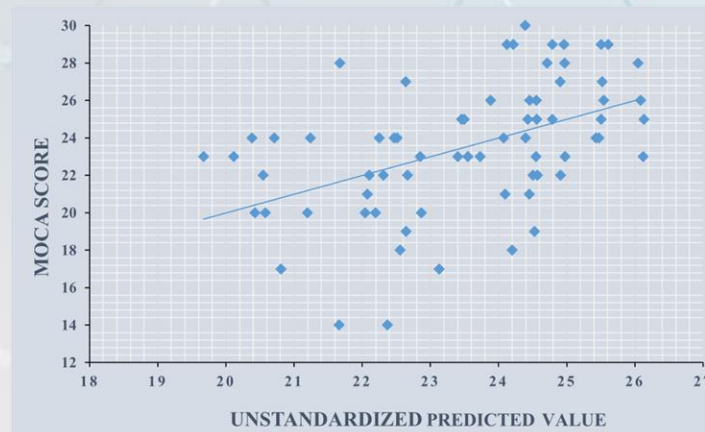
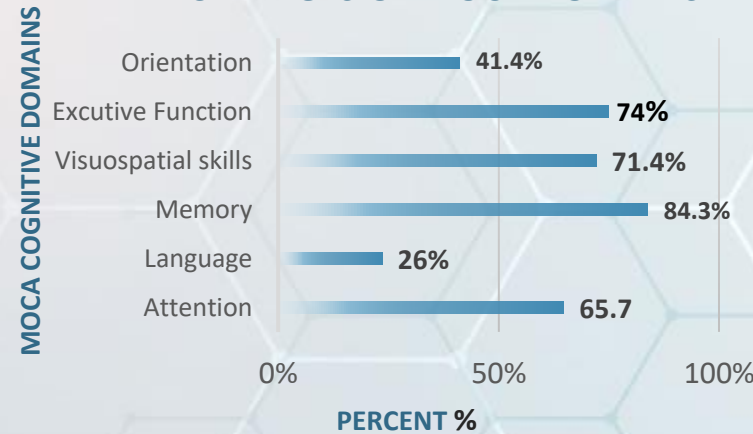
- (1) Investigate the association between CI and muscle weakness, motor incoordination, poor balance, gait abnormality, and high fall risk in patients with MS.
- (2) Examine if muscle weakness, motor incoordination, poor balance, gait abnormalities, and/or increased fall risk can be adopted as the best indicator of CI in patients with MS.

Methods

Seventy patients with MS were included in this study. Patients were assessed in the Rehabilitation Department of King Khalid University Hospital, Physical Therapy Clinics of King Saud University and Sultan Bin Abdulaziz Humanitarian City.

Cognitive impairment was assessed using the Montreal Cognitive Assessment Scale (MoCA), muscle strength using a hand-held dynamometer, and balance, gait, and fall risk assessment using the Tinetti scale. Motor coordination was assessed using the timed rapid alternating movement test for the upper extremity and the timed alternate heel-to-knee test for the lower extremity.

PERCENTAGES OF MOCA DOMAINS



Results

There was a significant association between CI and motor coordination, balance, gait, and risk of fall ($p < 0.005$) but not muscle strength. Stepwise multiple linear regression showed that 22.7% of the variance in the MoCA was predicted by the fall risk and incoordination of the upper extremities in the MS population.

Conclusions

CI is significantly associated with motor incoordination, poor balance, gait abnormalities, and increased fall risk. The fall risk and upper extremity incoordination were the best indicators of CI in patients with MS.

Thus, motor assessment can provide physical therapists with clues about the presence of CI in patients with MS. In addition, incorporating coordination and balance training into the rehabilitation program may enhance cognitive functions in patients with MS, although this requires empirical testing.

References

