Comparison of cognitive screening tests of MoCA, SDMT and MSNQ in patients with MS

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Background

Multiple Sclerosis (MS) is a disease which can affect cognitive, motor, and neuropsychiatric functioning[1], with an unclear etiology[2]. Cognitive impairment can occur in 43% to 70% of patients with MS, including attention, information processing efficiency, executive functioning, processing speed, and long term memory[3-5]. Specific and subtle cognitive deficits, rather than obvious dementia, are the more common presentations in MS[6]. Quality of life may be impacted due to these deficits [7]; therefore it is important that patients be screened for them early on in order to ensure appropriate therapies are initiated.

Goal

To determine if the MoCA correlates with the SDMT and MSNQ in screening for mild cognitive impairment in patients with multiple sclerosis. The aim is to provide evidence for supporting the use of MoCA regularly in screening for cognitive impairment in MS clinics and primary care providers' offices.

Methods

Patients' cognitive status was assessed using the Montreal Cognitive Assessment, Symbol Digit Modalities Test, and the MS Neuropsychological Screening Questionnaire. Patients were included if they were between the ages of 18 and 65 and had an EDSS score less than or equal to 5.5. The results of the MoCA were then be compared against the SDMT and MSNQ to assess correlation. We enrolled and screened 40 patients over 2 months in 2012. Data was analyzed and Pearson Correlation coefficient was calculated between each screening test for dichotomous data, and Spearman's rho coefficient was calculated between each screening test for continuous data using SPSS.

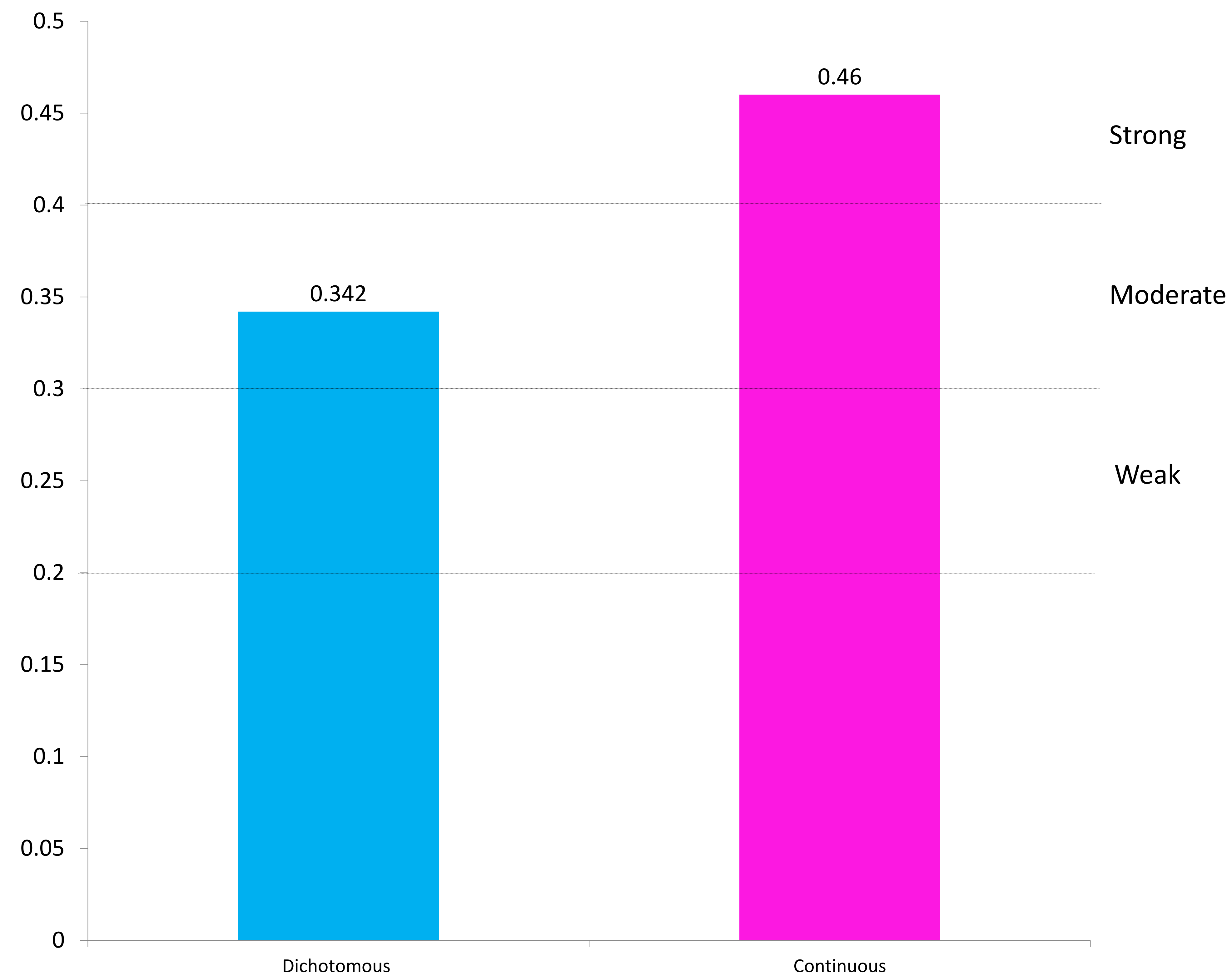**Figure 2:** a) Sample MSNQ, b) sample SDMT, c) Sample MoCA

Figure 1: Highlights of data – Pearson Phi correlation coefficient and Spearman's Rho correlation coefficient for MoCA vs SDMT

	Pearson Correlation Coefficient (phi)	p value	n
MoCA vs. SDMT	0.342	0.03	40
MoCA vs. MSNQ Informant	0.063	0.693	40
MoCA vs. MSNQ Patient	-0.036	0.822	40
MSNQ Patient vs. MSNQ Informant	0.401	0.021	33
SDMT vs. MSNQ Informant	0.210	0.228	33
SDMT vs. MSNQ Patient	0.114	0.470	40

Table 1: Pearson Correlation Coefficient for MoCA, SDMT and MSNQ (patient and informant questionnaires) using dichotomous data – patients either cognitively impaired or not. Significance if p > 0.05.

	SDMT	MSNQ Informant	MSNQ Patient
MoCA	$r_s(37)= 0.460$, p= 0.003	$r_s(30)= -0.096$, p= 0.601	$r_s(37)= 0.010$, p=0.954
SDMT		$r_s(30)= -0.294$, p= 0.102	$r_s(37)= -0.338$, p=0.035
MSNQ Informant			$r_s(30)= 0.609$, p< 0.001

Table 2: Spearman's Rho Correlation Coefficient for MoCA, SDMT and MSNQ (patient and informant questionairres) using continuous data – not taking into account the cutoff scores for each test. Significance if p > 0.05.

Results

All three screening tests were administered to 40 patients, with only 33 returning the MSNQ informant. Correlation data can be found in Tables 1 and 2, with significant results highlighted. A moderate correlation (r(38)= 0.342, p=0.05) was seen between MoCA and SDMT, but no correlation was found between MoCA and MSNQ. The SDMT did not correlate with MSNQ, and the MSNQ informant and patient tests correlated strongly with one another.

Discussion

Comprehensive assessment of cognitive impairment is time consuming and expensive, requiring specialist materials and expertise, and is not suitable for screening[8]. Although widely used, the Mini Mental State Examination and the Expanded Disability Status Scale do not give appropriate measures of cognitive impairment in MS[8].

Two brief tests which have shown reliable information about mental status of MS patients include the Symbol Digit Modalities Test (SDMT) and the MS Neuropsychological Screening Questionnaire (MSNQ) [9]. The SDMT emphasizes processing speed and visual working memory while the MSNQ is a self report questionnaire which shows cognitive impairment and emotional status[9], and by using them together a patient's neuropsychological status can be effectively screened[9].

The SDMT is currently is test of choice for brief cognitive screening[8], yet the Montreal Cognitive assessment (MoCA) has been shown to be a sensitive tool for use in mild cognitive impairment[10]. The MoCA has been shown useful in screening for cognitive impairment in Parkinson's Disease[11], Post-Stroke[12], and Alzheimer's Disease[10]. It has not yet been studied in MS to determine if it correlates with the SDMT or MSNQ. The data in this study shows that MoCA has a moderate positive correlation with SDMT for dichotomous scores (either pass or fail). A strong positive correlation is seen between the two for continuous data, though continuous scores are rarely used in clinical practice for screening, but this data is presented for demonstration only. The MSNQ did not correlate well with either MoCA or SDMT, which could be a result of the subjective nature of this tool. Additionally there was a lack of informant response which affected the strength of significance for this data. Limitations of this study include the sample size, the single time point of screening, and lack of comparison with gold standard. Future studies should validate MoCA for screening cognitive impairment by comparing it against comprehensive diagnostic tools for cognitive impairment.

Conclusion

The MoCA has been shown to correlate with the SDMT and should be included in the screening for cognitive impairment in MS patients.

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