



Vitamin D deficiency as a predictor of Multiple Sclerosis cognitive impairment

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ABSTRACT

Objectives: To test for a possible relationship between MS cognitive impairment and Vitamin D deficiency within a small data set as a pilot for a larger prospective study to be conducted.

Hypotheses: Vitamin D deficient individuals with MS will experience greater cognitive impairment than those that are not deficient.

Methods: Analysis was performed on a subset (n=22) of MS patients from a large database which is part of an ongoing study of MS cognitive function at the Comprehensive MS Center at Holy Name Medical Center in Teaneck, NJ. All patients were given a battery of neurocognitive tests, (MACFIMS battery) and data was analyzed for those patients with available Vitamin D levels measured within 6-months of cognitive testing. To achieve maximally significant results both cognitive function and Vitamin D levels were simplified to discrete binary variables (cognition: impaired/unimpaired based on the Benedict criteria for the MACFIMS; Vitamin D: deficient/not deficient with a level of ≤ 30 ng/ml considered as deficiency). Cognitive impairment was measured both as an overall score and according to discrete functional domains. Spearman Rank Order Correlations (rho) were run to determine correlation.

Results: There were no significant correlations observed between Vitamin D deficiency and cognitive impairment both when considered as a general construct and as discrete functional domains. The strongest correlation observed was that of Vitamin D and executive function (rho=.369) which trended toward significance (p=.110) even in this small sample.

Conclusions: The sample analyzed was too small to determine any relationship between vitamin D deficiency and MS cognitive impairment. Data suggest that when conducting a more complete study attention should be given to discrete domains of cognitive function and particularly to executive functions when determining correlation with Vitamin D deficiency.

BACKGROUND

Vitamin D has become increasingly relevant within the MS literature in recent years as low levels of vitamin D have been shown to predict MS relapses and correlate with overall disease worsening [2]. Vitamin D interacts with disease progression by functions of cell growth suppression and can impact the treatment of a disease through inducing, enhancing, or suppressing an immune response. [1] Cognitive impairment is a common and debilitating MS symptom as well as an important indicator of general disease state. It is not known whether a relationship exists between vitamin D deficiency and MS cognitive impairment.

METHODS

SAMPLE: Data was collected from 22 MS patients referred for neuropsychological testing at the MS Center at Holy Name Medical Center. Individuals were included based on availability of Vitamin D levels measured within 6 months of cognitive testing.

MATERIALS: *Minimal Assessment of Cognitive Function in Multiple Sclerosis (MACFIMS) battery* [1]; administered to determine the presence of cognitive impairment, which was defined according to Benedict's criteria of scoring of the MACFIMS. Data was simplified then analyzed using discrete binary variables: impaired/unimpaired.

Vitamin D Levels [2]: vitamin D measurements were considered deficient at a level of ≤ 30 ng/ml. All measurements above the cutoff were defined as not deficient.

STATISTICAL ANALYSES: Pearson Correlations using SPSS 22 were run to analyze whether vitamin D levels were correlated with cognitive impairment as determined by the MACFIMS battery, which included 11 functional measures of impairment.

RESULTS

Correlations

		Vitamin D Deficiency (below 30)	COWAT z score 1.5 SD below the mean	JOL Percentile below 7	CVLT Score 1.5 SD Below Mean	CVLT delayed recall (long) score below 1.5 SD	BVMT Total Learning T score 1.5 SD Below	BVMT Delayed Recall T score 1.5 SD Below	PASAT 3 second Scores Below -1.5 SD	PASAT 2 Second Score 1.5 SD Below	SDMT z Score below 1.5 SD	DEKEFS Sorting CS scaled score 5 or below	DEKEFS Sorting description scaled score 5 or below	Cognitive Impairment Time 1
Vitamin D Deficiency (below 30)	Pearson Correlation	1	-.097	.158	.261	-.017	-.231	-.069	.122	.113	.083	.369	.369	.059
	Sig. (2-tailed)		.668	.481	.241	.941	.341	.779	.599	.625	.712	.110	.110	.793
	N	22	22	22	22	22	19	19	21	21	22	20	20	22

CONCLUSIONS

- Analyses on this sample did not detect a significant relationship between vitamin D deficiency and MS cognitive impairment.
- There was not sufficient power to detect an effect, however, the analyses showed a trend regarding the relationship between MS vitamin D levels and executive functioning.
- A larger prospective study may yield more significant results, with specific focus on executive functioning as it relates to MS cognitive impairment

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