

Vitamin B 12 plasma concentrations in Alzheimer disease

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Summary

In this contribution we investigated the correlation between plasma vitamin B12 levels and cognitive impairment in Alzheimer's disease. We could demonstrate a significant inverse correlation when the MMSE scores of those patients with the lowest 10% Vitamin B12 plasma levels (<184 ng/ml) were compared with the upper 10% Vitamin B12 plasma levels (>598 ng/ml): $p=0.008$, Spearman-Rho = -0.36 . MMSE in the upper percentile of plasma B12 levels was 20.0 ± 4.6 and in the lower percentile 15.7 ± 6.1 , resulting in a difference of 4.3 MMSE points. We conclude, that vitamin B12 deficiency could aggravate or accelerate the course of Alzheimer disease as vitamin B12 possesses neuroprotective and anti-inflammatory properties.

Introduction

Plasma vitamin B12 levels have been previously implicated with cognitive abilities (see Duthie et al. 2002 [1], Nilsson et al. 2000 [2], Levitt et al 1992 [3], Eussen et al. 2002 [4], Malouf et al 2003) [5]. In this contribution we investigated the correlation between plasma vitamin B12 levels and cognitive impairment in Alzheimer's disease (AD), the most common cause of dementia.

Materials, Methods and Patients

Plasma vitamin B12 levels were measured in 241 AD patients diagnosed according to the NINCDS-ADRDA (National Institute of Neurological and Communicative Disorders and Stroke-Alzheimer's Disease and Related Disorders Association) criteria (Ganzer et al. 2003 [6]). Clinical evaluation included detailed medical history, psychiatric, somatic and neurological status, neuropsychological testing, routine blood tests, an electroencephalogram, a computed tomography scan or magnetic resonance imaging. The Mini-Mental-Status examination (MMSE) test was used for staging severity of cognitive impairment and was performed prior to the start of any treatment affecting the central nervous system (e.g. acetylcholine esterase inhibitors, antidepressants or antipsychotic drugs).

Results

Of 241 patients included in the study 132 were female and 109 male. Mean age was 71.8 ± 8.5 (SD) years and mean MMSE score 18.6 ± 6.0 (SD). Plasma vitamin B12 levels were 371 ± 216 ng/ml ranging from 26 to 2000 ng/ml. When all patients were included, no statistically significant correlation between plasma B12 levels and MMSE scores ($n=241$, $p=0.38$, Spearman Rank Correlation) could be inferred. However, a significant inverse correlation became apparent when the MMSE scores of those patients with the lowest 10% B12 plasma levels (<184 ng/ml) were compared with the upper 10% (>598 ng/ml): $p=0.008$, Spearman-Rho = -0.36 . MMSE in the upper percentile of plasma B12 levels was 20.0 ± 4.6 and in the lower percentile 15.7 ± 6.1 , resulting in a difference of 4.3 MMSE points. MMSE was not significantly correlated with age and age was not significantly correlated with plasma B12 levels.

Conclusions

Our findings suggest a possible relationship between plasma B12 levels and the severity of cognitive impairment in patients with AD, which probably reflects cause and effect and not the nutritional state of the more severely demented patients. It is possible that vitamin B12 deficiency aggravates or accelerates the course of the disease as vitamin B12 possesses neuroprotective and anti-inflammatory properties. Routine screening for B12 levels appears to be necessary. The effect of mega-dose vitamin B12 on the course of the disease should be evaluated in controlled and randomized studies.

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