

PSEUDODEMENCE DUE TO VITAMIN B12 DEFICIENCY – LITERATURE REVIEW

Pedro Luís Nogueira da Silva

Medicine course student- Universidade Federal do Rio de Janeiro, Rio de Janeiro, RJ, Brazil

Samantha Cristina da Silva Chaves

Medicine course student- Universidade Federal de Catalão, Catalão, GO, Brazil

Brenda Carolinne Albuquerque Souza Monteiro

Medicine course student- Faculdade de Ciências Médicas de Jaboatão dos Guararapes, Jaboatão dos Guararapes, PE, Brazil

Luca Albuquerque dos Reis Gomes

Medicine course student- Faculdade de Ciências Médicas de Jaboatão dos Guararapes, Jaboatão dos Guararapes, PE, Brazil

Matheus Bonacin Gammarano

Medicine course student- Instituto Master de Ensino Presidente Antônio Carlos, Araguari, MG, Brazil

Victor Matheus Correia Marinho

Medicine course student- Faculdade de Ciências Médicas de Jaboatão dos Guararapes, Jaboatão dos Guararapes, PE, Brazil

Julia Kaiany de Azevedo Amado Siqueira

Pharmacy course student - Universidade de São Paulo, São Paulo, SP, Brazil

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Tiago Pícolo Fernandes

Doctor by: Universidade Nove de Julho,
Baurú, SP, Brazil

Aline Cíclia Oliveira Dos Santos Guimarães

Medicine course student- Faculdade
de Ciências Médicas de Jaboatão dos
Guararapes, Jaboatão dos Guararapes, PE,
Brazil

Mariana Antunes Cavalcanti de Araújo

Medicine course student- Faculdade
de Ciências Médicas de Jaboatão dos
Guararapes, Jaboatão dos Guararapes, PE,
Brazil

Eduardo de Toledo Souza

Medicine course student- Universidad
Internacional Três Fronteras, Paraguai

Isabella Vieira Portal

Medicine course student- Centro
Universitário Metropolitano da Amazônia,
Belém, PA, Brazil

Jocimara Pinheiro de Lima da Silva

Biomedicine student - Centro Universitário
Leonardo da Vinci, Indaial, SC, Brazil

Thaís Torres Galindo Dantas

Medicine course student- Faculdade
de Ciências Médicas de Jaboatão dos
Guararapes, Jaboatão dos Guararapes, PE,
Brazil

Maria Vitória Lima Camilo

Medicine course student- Centro
Universitário Maurício de Nassau, Recife, PE,
Brazil.

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Abstract: Introduction: Dementia is a syndrome with several causes, characterized by the acquired deterioration of cognitive abilities that impair daily activities, and vitamin B12 may be one of these causes (LEIVAS EFL, 2021). **Objective:** To review the relationship between vitamin B12 deficiency and pseudodementia. **Result:** In addition to its relationship with macrocytic anemia, vitamin B12 is biochemically important in the transmethylation of neuroactive substances such as myelin and neurotransmitters. One of the other mechanisms by which low levels of vitamin B12 can affect cognition is by disrupting the methylation reaction in the central nervous system (CNS). This can lead to an increase in homocysteine levels, which has direct neurotoxic effects (HOLDEN; WOODS, 2005). **Conclusion:** Regular screening would lead to early diagnosis and reduce related shortages. However, long-term studies are needed to assess the importance of treating individuals without symptoms (HOLMBERG, 2007).

Keywords: Pseudodementia; Cognitive impairment; Vitamin B12 deficiency.

INTRODUCTION

There are a series of dementias caused by lack or excess of bodily substances, be they hormones, vitamins, infections, tumors and pathological conditions ((LEIVAS EFL, 2021).

Examples of treatable dementias include hypothyroidism, vitamin B12 deficiency, neurosyphilis, AIDS, brain tumors, normobaric communicating hydrocephalus, etc. ((LEIVAS EFL, 2021).

Every patient with dementia must undergo investigation of all these causes; An exception is made for anti-HIV, which requires the patient's consent. Therefore, we have to request, at the first consultation, free T4, TSH, serum B12 measurement, VDRL and head CT with and without contrast. Other causes

of reversible dementia are alcoholism and excessive use of medications for the Central Nervous System, such as benzodiazepines (LEIVAS EFL, 2021).

Vitamin B12 or cyanocobalamin is a micronutrient essential for life and human development. It is part of the cobalamin family, considered a water-soluble vitamin, synthesized exclusively by microorganisms. Vitamin B12 is found in foods of animal origin, especially milk, meat and eggs. However, significant amounts of the vitamin are not found in vegetables. For adults and the elderly, the recommended daily intake of vitamin B12 is 2.4 µg per day. B12 deficiency can only occur with a neurological condition and without anemia in some patients (LEIVAS EFL, 2021).

Dementia is a syndrome with multiple causes, characterized by the acquired deterioration of cognitive abilities that impair daily activities. In addition to memory, other mental functions are affected, such as language, visio-spatial skills, calculations and problem solving. Neuropsychiatric and social problems also arise, leading to symptoms such as depression, withdrawal, hallucinations, delusions, agitation, insomnia and disinhibition (CARONI, et al., 2023).

The most common causes of dementia in individuals over 65 years of age are: Alzheimer's disease (AD) (which accounts for approximately 60 percent), vascular dementia (15 percent), and mixed vascular and Alzheimer's dementia (15 percent). Other diseases accounting for approximately 10% include dementia with Lewy bodies; Picks disease; fronto-temporal dementias; normal pressure hydrocephalus (NPH); alcoholic dementia; infectious dementia, such as human immunodeficiency virus (HIV) or syphilis; and Parkinson's disease. Some sources suggest that up to 5% of dementias evaluated in clinical settings can be attributed to reversible causes,

such as metabolic abnormalities (for example: hypothyroidism), nutritional deficiencies (e.g., vitamin B12 deficiency), or dementia due to depression syndrome (BATES). et al., 2004).

The potential influence of nutritional factors on the origin or development of dementia has been extensively explored. Vitamin B12 deficiency is often linked to dementia (BATES et al., 2004).

Clinical studies involving patients with various types of dementia have indicated that many of these conditions result from decreased function of neurons that release a specific neurotransmitter. In addition to its relationship with macrocytic anemia, vitamin B12 is biochemically important in the transmethylation of neuroactive substances such as myelin and neurotransmitters. Vitamin deficiencies affect this process, according to the "hypomethylation hypothesis" (HOLDEN; WOODS, 2005).

One of the other mechanisms by which low levels of vitamin B12 can affect cognition is by disrupting the methylation reaction in the central nervous system (CNS). This can lead to an increase in homocysteine levels, which has direct neurotoxic effects (HOLDEN; WOODS, 2005).

Elderly people often show no symptoms in the early stage of vitamin B12 deficiency. However, over time, more serious conditions may develop, such as megaloblastic anemia, changes in homocysteine metabolism, and neurological symptoms. If left untreated for a prolonged period, a lack of vitamin B12 can even lead to death (COUDERCA et al., 2015).

The diagnosis of vitamin B12 deficiency has traditionally been made based on low levels of vitamin B12 in the blood, often below 200 pg per mL (150 pmol per L), along with clinical signs of the disease. However, studies indicate that elderly patients may present neuropsychiatric symptoms even

without evident blood changes. Furthermore, measuring metabolites such as methylmalonic acid and homocysteine has been shown to be more sensitive for diagnosing vitamin B12 deficiency than measuring blood B12 levels alone (HOLMBERG, 2007).

Clearly, regular screening would lead to early diagnosis and reduce related shortages. However, long-term studies are needed to assess the importance of treating individuals without symptoms. Although no specific risk group has been identified among the elderly, aging itself increases the chance of vitamin B12 deficiency. Therefore, it would be appropriate to encourage people, especially the elderly, to maintain a not only satisfactory but also an ideal level of vitamin B12 through diet (HOLMBERG, 2007).

MATERIAL AND METHODS

PubMed database and was limited to articles between 2004 and 2023 that met the criteria of being literature reviews and case reports.

Next, the keywords in the article titles were analyzed and those whose themes best fit our objective were selected.

Six articles were selected for full reading.

REFERENCES

1. BATES, J., J. Boote e C. Beverley. Intervenções psicossociais para pessoas com doença demencial mais branda: uma revisão sistemática. *Revista de Enfermagem Avançada*. 2004.
2. CARONI, Danielly; RODRIGUES, Júlia Stuchi; SANTOS, Aliny Lima. Influência da alimentação na prevenção e tratamento do Alzheimer: uma revisão integrativa. **Research, Society and Development**, v. 12, n. 5, p. e14812541677-e14812541677, 2023.
3. COUDERCA L, CAMALET J, SCHNEIDER S, et al. Cobalamin deficiency in the elderly: aetiology and management. A study of 125 patients in a geriatric hospital. *J Nutr Health Aging*, v.19, n. 2, p. 234-9, 2015.
4. HOLDEN, U. P., Woods, R. T. *Abordagens Positivas para o Tratamento da Demência* (3ª ed.). Edimburgo: Churchill Livingstone. 2005.
5. HOLMBERG, S. Avaliação de uma intervenção clínica para errantes em uma unidade de enfermagem geriátrica. *Arch Psychiatr Nurs*. 2007.
6. LEIVAS, ELIZABETE DE FIGUEIREDO. A DEFICIÊNCIA DA VITAMINA B12 NO SURGIMENTO DE DEMÊNCIA EM IDOSOS: UMA REVISÃO DA LITERATURA.

DISCUSSION

A rather controversial issue, but at the same time of great clinical significance, is the possibility of recovery from the above disorders after leveling vitamin B12 levels. From a clinical point of view, the key question is to determine whether the therapeutic intervention, based on treatment, results in the resolution of already evident cognitive disorders (CARONI, et al., 2023).

CONCLUSION

In addition to its relationship with macrocytic anemia, vitamin B12 is biochemically important in the transmethylation of neuroactive substances such as myelin and neurotransmitters. One of the other mechanisms by which low levels of vitamin B12 can affect cognition is by disrupting the methylation reaction in the central nervous system (CNS). This can lead to an increase in homocysteine levels, which has direct neurotoxic effects (HOLDEN; WOODS, 2005). Regular screening would lead to an early diagnosis and reduce related deficiency. However, long-term studies are needed to evaluate the importance of treating individuals without symptoms (HOLMBERG, 2007).