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Vitamin B12 deficiency, an overlooked risk factor of falling in elderly patients with chronic psychiatric disorders

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Short Communication

Abstract

BACKGROUND: Falls are among the most common accidents in psychiatric hospitals. One of the possible causes of falls is vitamin B12 deficiency, which is especially prevalent among older adults. However, it was not ignored in previous studies.

METHODS: This clinical trial was conducted on older patients with chronic psychiatric diseases admitted to a psychiatric hospital. Based on the data obtained from the multi-factorial fall risk assessment tool (MAHC-10) developed by the Missouri Alliance for Home Care (MAHC) and Tinetti Balance Assessment Tool, the patients at risk of falls were identified and their serum vitamin B12 levels were measured. The patients with vitamin B12 deficiency were selected to be studies in a 3-month trial. At the end of the trial, the patients took the Tinetti test once again. Pre- and post-intervention variables were compared with each other using the dependent t-test. P values of ≤ 0.05 were considered statistically significant.

RESULTS: After screening, 10 patients showed vitamin B12 deficiency and were included in the intervention. The mean age and length of stay of the patients were 66.30 ± 10.17 years and 24.55 ± 18.39 months, respectively. The mean scores for the "balance-gait" variable before and after the intervention were 13.40 ± 4.30 and 23.70 ± 4.15, respectively. These figures revealed a significant difference between the two groups (P = 0.001).

CONCLUSION: This study showed that vitamin B12 deficiency may be an often-overlooked cause of gait disorders in older patients with psychiatric problems. Treatment with vitamin B12 supplements can reduce the risk of falls in such patients.

KEYWORDS: Psychogeriatrics; Gait Dysfunction; Vitamin B12 Deficiency

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Introduction

The frequency of falls among inpatients is at least 2.3 in every 1,000 patient days and the fall risk is higher among elderly patients admitted to psychiatric wards, ranging from 1.2% to 23.0%.[1,2] One third of the cases of hospital falls cause physical injuries, which can increase the length of stay and hospital costs.[2] Such patients may be also sent to nursing facilities.[2,3] Concurrent affliction to diseases, musculoskeletal abnormalities, neurodegenerative disorders, and accompanied cognitive decline increase the risk of falls in such patients.[1-4] Additionally, such patients often take multiple medications, and taking two or more psychiatric medicines

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increases the risk of falls 2-9 folds.[1,5] One of the possible causes of falls is vitamin B12 deficiency, which is very prevalent among the elderly (24.8%) and was not taken into account in previous studies of psychogeriatric units.[6] Vitamin B12 deficiency can cause a wide range of neurological symptoms such as peripheral neuropathy, subacute combined degeneration caused by spinal cord injuries, dementia, and optic nerve damages, all of which are considered potential risk factors for falls in the elderly.[7] Therefore, the present pilot study was designed aiming to investigate the role of vitamin B12 deficiency in falls experienced in psychogeriatric wards.

Methods

Patients with major mobility difficulties or known neurologic and rheumatologic diseases were excluded. Then, all patients admitted to psychogeriatric wards of Razi Educational and Therapeutic Psychiatric Center (Tehran, Iran) were screened for fall risk using the multi-factorial fall risk assessment tool (MAHC-10) developed by the Missouri Alliance for Home Care (MAHC) and 43 patients (40%) with the score 4 or higher were included in the study. A skilled nurse took a 3 ml blood sample from the brachial vein of each patient. Serum vitamin B12 levels were then measured using ARCHITECT Co. measurement kits (Serial number 70194V100) employing the enzyme-linked immunosorbent assay (ELISA) technic. According to the laboratory reference, serum vitamin B12 levels of less than 200 ng/ml were regarded as vitamin B12 deficiency. The patients with vitamin B12 deficiency were evaluated by the Tinetti gait and balance assessment test. They were then were treated as follows: intramuscular injection of hydroxocobalamin (1000 µg) 3 times a week for three consecutive weeks followed by administration of a maintenance dose of 1000 µg/month for 3 months. At the end of the trial, the serum vitamin B12 levels were measured again. The patients with a low level of vitamin B12 repeated the treatment period but were excluded from the study. The Tinetti test was performed once again 3 months after serum vitamin B12 levels were normalized, and the cases of falls in this period were recorded on the related form by a trained nurse. Pre- and post-intervention variables in the Tinetti test were analyzed using paired t-tests to investigate changes in the risk of falling. P values ≤ 0.05 were regarded as statistically significant. This study project was approved by the Ethics Committee, University of Social Welfare and Rehabilitation Sciences, Tehran (Registration No. 931900005).

Results

Based on the inclusion and exclusion criteria, 106 patients were assessed for the risk of fall using the MAHC-10 tool. The results showed that 40 patients were at high risk of falling. The serum vitamin B12 levels were measured in 40 patients. In 10 of them (25%), the levels were lower than 200 ng/ml (173.90 ± 16.04). These 10 patients, 7 of whom were women (70%), were assigned to the intervention group. The mean age and length of stay of the patients were 66.30 ± 10.17 years and 24.55 ± 18.39 months, respectively. The diagnosis for all these patients was schizophrenia.

The serum vitamin B12 levels were normal in all patients at the end of the treatment period (410.00 ± 86.02 ng/ml). Given the laboratory findings, macrocytic anemia was not diagnosed in any of the patients.

As shown in table 1, the mean scores for the "balance" variable before and after the intervention were 7.60 ± 2.17 and 13.80 ± 3.25, respectively, suggesting that this variable changed significantly after the intervention (P = 0.038). The mean scores for the "gait" variable before and after the intervention were 5.80 ± 2.91 and 9.90 ± 1.45, indicating that this variable significantly improved after the intervention (P = 0.001).

Table 1. Mean scores of the Tinetti test variables of patients with vitamin B12 deficiency before and after vitamin B12 supplementation

Variable	Pre-intervention score (Mean ± SD)	Post-intervention score (Mean ± SD)	Difference (mean)	P
Balance	7.60 ± 2.17	13.80 ± 3.25	6.2	0.038
Gait	5.80 ± 2.91	9.90 ± 1.45	4.1	0.001
Balance-Gait	13.40 ± 4.30	23.70 ± 4.15	10.3	0.001

SD: Standard deviation

The mean scores for the "balance-gait" variable before and after the intervention were 13.40 ± 4.30 and 23.70 ± 4.15, respectively. These figures show that there was a significant change in this variable after the intervention (P = 0.001).

The pre- and post-intervention fall risk based on the "gait-balance" variable were compared using the Wilcoxon test (Table 2). The results indicated that all patients were at high risk before the intervention, whereas only 1 (10%) patient was still at high risk after the intervention. It can be thus concluded that this variable significantly improved after the intervention (P = 0.006).

Table 2. Comparison of fall risk among patients with B12 deficiency before and after vitamin B12 supplementation

Risk of fall	Pre-intervention [n (%)]	Post-intervention [n (%)]	P
Low	0 (0)	6 (60)	0.006
Moderate	0 (0)	3 (30)	
High	10 (100)	1 (10)	

Discussion

The study results showed that vitamin B12 deficiency was prevalent among elderly patients with chronic psychiatric diseases at risk of fall (25%) and treatment with vitamin B12 supplements positively affected their balance and gait, in addition to reducing the risk of falling.

Gait and balance impairments are among the common symptoms associated with vitamin B12 deficiency. Since vitamin B12 deficiency is very prevalent among the elderly, it should be taken as a possible cause of falls in this group of people.[6,7] Two main reasons can be proposed for vitamin B12 deficiency in patients with psychogeriatric disorders. The first one is nutritional deficiencies that are common in patients with chronic psychiatric diseases and are mutually related to psychiatric symptoms.[8] The second reason is vitamin malabsorption. It has been recently suggested that vitamin B12 deficiency in the elderly may be due to the co-occurrence of nutritional deficiencies and the disruption in cobalamin separation from food. This occurs due to hypochlorhydria caused by the relative atrophy of the gastric mucosa that may occur in the healthy elderly.[9] In addition to these two common causes, polypharmacy is another possible cause of vitamin B12 deficiency that has received less attention.

Some possible explanations can be proposed for the occurrence of balance and gait deficit in patients with B12 deficiency studied here. It is well known that vitamin B12 deficiency plays a role in aggravating cognitive impairment in elderly patients,[9] and cognitive disorders are directly associated with gait disorders among the elderly.[10] Moreover, subclinical damages to the peripheral nerves have been suggested as a risk factor for falls that may occur in the setting of vitamin B12 deficiency and increase the risk of falls by disturbing proprioception.[11] On the other hand, orthostatic hypotension is known to be a risk factor for falls in the elderly. Although cardiovascular causes are usually evaluated, it has been recently shown that vitamin B12 deficiency is one of the causes of autonomic dysfunction in the elderly.[12]

Conclusion

The findings of this pilot study suggested that

vitamin B12 deficiency may be considered as an often-overlooked cause of gait disorders and falls in psychogeriatric wards. This factor should be given serious consideration by psychiatrists and healthcare providers.

Conflict of Interests

Authors have no conflict of interests.

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