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Orginal article

Detection of vitamin B12 deficiency in patients with major depression

Major depresyon hastalarında vitamin B12 eksikliğinin tespiti

Muzaffer Keklik[1], Uğur Kalan[2], Özerhan Özer[2], Ferhat Arık[2], Sevgi Bayram[3]

1 Kayseri Training and Research Hospital, Department of Hematology

2 Kayseri Training and Research Hospital, Department of Internal Medicine

3 Kayseri Training and Research Hospital, Department of Psychiatry

Corresponding Author: Muzaffer Keklik, M.D. Kayseri Training and Research Hospital, Department of Hematology, Kayseri, Turkey. E-mail: muzafferkeklik@yahoo.com

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ABSTRACT

Aim: Vitamin B12 is a water-soluble vitamin that has a key role in the normal functioning of the hematological and nervous system. Also**,** vitamin B12 deficiency could cause psychiatric symptoms such as depression when it is untreated. Our aim was to determine vitamin B12 deficiency frequency of patients diagnosed with major depression.

Method: The present study included 425 adult patients with major depression based on Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5) criteria at Kayseri Education and Research Hospital. In all patients, laboratory evaluations were performed: complete blood count (CBC), serum vitamin B12 and folate levels, and routine biochemical tests.

Results: The results of 425 depressive patients were analyzed. Depression was prevelant among females (74.6%). Also, total 93 patients (21.9%) were vitamin B12 deficient. While in female patients vitamin B12 deficiency was 22.7%, in male patients, the rate was 19.4%. There were no significant differences between folate and hemoglobin (Hb) levels, platelet (PLT) and white blood cell (WBC) counts.

Conclusion: The results of this study shown that, the frequency of vitamin B12 deficiency among people is major depression not uncommon. It would be beneficial to consider the physical symptoms and to conduct the required examinations to determine vitamin B12 deficiency among this patients.

Key words: depression, vitamin B12

ÖZET

Amaç: Vitamin B12 suda eriyen bir vitamin olup, hematolojik sistem ve sinir sisteminin normal fonksiyon görmesinde anahtar rol oynar. Ayrıca, vitamin B12 eksikliği tedavi edilmediğinde depresyon gibi psikiyatrik belirtilere yol açabilir. Bu çalışmada amacımız, majör depresyon tanılı hastalarda vitamin B12 eksikliği sıklığını tespit etmekti.

Metod: Çalışmada Kayseri Eğitim ve Araştırma Hastanesi'nde DSM-5 kriterleri baz alınarak majör depresyon tanısı konan 425 erişkin hastaya ait veriler değerlendirildi. Tüm hastaların CBC, serum vitamin B12 ve folat düzeyleri ile rutin biyokimyasal tetkikleri incelendi.

Bulgular: Toplam 425 depresif hastanın verileri incelendi. Hastaların %74.6'sı kadındı. Vitamin B12 eksikliği 93 hastada tespit edildi (% 21.9). Kadınlarda vitamin B12 eksikliği % 22.7 iken, erkeklerde bu oran % 19.4 olarak saptandı. Her iki cinsiyet grubunda da folik asit, Hb, PLT ve WBC sayılarında anlamlı farklılık yoktu.

Sonuç: : Bu çalışmanın sonuçları, majör depresyon hastalarında vitamin B12 eksikliğinin nadir olmadığını göstermiştir. Depresif semptomları olan hastalarda fizik bulguları değerlendirmek ve vitamin B12 eksikliğini saptamaya yönelik gerekli testleri yapmak faydalı olabilir.

Anahtar kelimeler: Depresyon, vitamin B12

INTRODUCTION

Vitamin B12 plays essential roles in folate metabolism and in the synthesis of the citric acid cycle intermediate, succinyl-CoA. Thus it is important in DNA synthesis and neurological status. Also, vitamin B12 deficiency is associated with hematological and psychiatric manifestations including depressive symptoms, personality change and dementia (1-3). Recent literature has showed the links between vitamin B12 deficiency and depression (4-6). Depression is a global public health problem particularly in developing countries. A wide array of etiological hypotheses has been suggested to underlie depression. The present study was conducted to evaluate vitamin B12 levels of patients diagnosed with major depression.

MATERIALS AND METHODS

The present study included 425 adult patients with major depression in accordance with Diagnostic and Statistical Manual of Mental Disorders, Fifth edition (DSM-5) (7), who are on antidepressant medication aged ≥ 18 years between 2014 and 2016 at Kayseri Education and Research

Hospital. Demographic characteristics like age, gender, smoking, alcohol consumption, and comorbidities were recorded. In all patients, the following laboratory evaluations were performed: complete blood count (CBC), vitamin B12 and folate values, and routine biochemical tests. The World Health Organisation (WHO) has recommended that a level of <150 pmol/L be used as the threshold for defining vitamin B12 deficiency (8). Other measures that might confirm the vitamin B12 deficiency such as holotranscobalamin, methylmalonic acid or homocystein are expensive and are not used in the clinic setting.

For statistical analysis, all data were analyzed using the Statistical Package for the Social Sciences (SPSS) computer program version 22.0. Data were expressed as the median (range) (for skewed data) or mean± standard deviation (SD) (normally distributed data).

RESULTS

The study population consisted of 425 persons (317 females, 108 males). The mean age of patients was 43.33±15.37 years for women and 44.24±15.48 years for men. Clinical and laboratory characteristics of patients are provided in Table 1. There were an apparent over-representation of people women (74.6%). Among the male and female patients, age, smoking, hypertension and diabetes mellitus rates were similar. On the other hand, use of alcohol was more prevelant among males (25%). In both genders, there were no significant increases or decreases at folate and Hb levels, PLT and WBC counts. Total 93 patients (21.9%) were vitamin B12 deficient and 332 (78.1%) had normal levels of B12. While in female patients vitamin B12 deficiency was 22.7% (n=72), in male patients, the rate was 19.4% (n=21).

Table 1. Patients' characteristics.

Variable	Female (n=317)	Male (n=108)
Age,years[a]	43.33±15.37	44.24±15.48
Smoking (%)	235 (74.1)	88 (81.5)
Use of alcohol (%)	15 (4.8)	27 (25)
Hypertension (%)	51 (16.1)	28 (25.6)
Diabetes Mellitus (%)	45 (14.2)	17(15.7)
Hb (g/dl)[b]	13.30 (7.30- 16.9)	14.60 (9.50-18.20)
WBC ($x10^9$/L) [b]	7.30 (3-15)	7 (4-16)
PLT ($x10^9$/L) [b]	277 (123-876)	248 (135-443)
Vitamin B12 (pmol/L)[b]	221 (50-680)	214 (84- 818)
Folate (ng/ml)[b]	6.5 (5- 10)	7.3 (6-11)

Hb hemoglobin; *WBC* white blood cell; *PLT* platelet
[a] Mean ± standard deviation [b] Median (range)

DISCUSSION

Vitamin B12 deficiency results most commonly from abnormal absorbtion and insufficient dietary intake and this deficiency lead to the delayed DNA synthesis resulting in megaloblastic anemia and

some psychiatric sympthoms. The true prevalence of vitamin B12 deficiency in the general population is unknown, but early detection by screening populations at risk is important because of the possibility of neuropsychiatric consequences (9,10).

In clinical studies, vitamin B12 deficiency have been found to be associated with major depression (11-13). Also, low B12 levels detected in approximately 20% of depressive patients (14). In our study, vitamin B12 deficiency was 21.9% in patients with major depression and this finding was comparable with the literature. Moreover, in a study, people with vitamin B12 deficiency were found to have 2.05 times the risk of depression (3). Also, Kaner et al. was found to significantly lower levels of vitamin B12 in depression group compared to controls (6). In another study, vitamin B12 treatment with antidepressants significantly improved depressive symptoms in patients (4). Our findings were approximately similar with these studies. Also, Kim JM et al. showed positive relationship between vitamin B12 deficiency and depressive symptoms in older depressive patients (13). Also, Ng et al. found that vitamin B12 deficiency was associated with depressive symptoms in older adults (15). In our study, a small number of patients were older, and there were no significant differences in the vitamin B12 levels between young and older patients. On the other hand, some studies failed to show a difference between vitamin B12 values of the depression and control groups (16-18). Because of these studies mainly conducted in younger depressive patients, no association was found between vitamin B12 deficiency and depression. In our study population, the mean age of patients was 43.33±15.37 years for women and 44.24±15.48 years for men. Most patients were young. Even so vitamin B12 deficiency detected quite prevalent among this patients. In addition to these conflicting findings, Seppala et al. found that vitamin B12 deficiency was associated with melancholic depressive symptoms but not with non-melancholic depressive symptoms (10). In our study, we did not look at to depression subtypes. Also we were not able to obtain post-treatment B12 levels. These are some of the limitations of our study. However, our findings have important clinical implications.

In conclusion, the coexistence of vitamin B12 deficiency and depression are not uncommon. It is important to recognize and treatment vitamin B12 deficiency to prevent neuropsychiatric dysfunctions. Future research exploring vitamin B12 deficiency of patients with depression is warranted.

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