



Determination Of Changes in Vitamin D, Folic Acid, and Vitamin B12 Levels in Patients Presenting To The Emergency Department After Suicidal Interventions

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ABSTRACT

Depression is a psychological and physiological destruction process. In recent years, it has been one of the leading causes of public health problems in our country and in the world. Our aim in this study; To contribute to the literature in the light of the data we obtained by measuring the levels of vitamin D, folic acid and vitamin B12 in patients who applied to the emergency department after suicidal attempts.

In the study, vitamin D, folic acid and vitamin B12 levels in blood tests taken from patients who applied to Sivas Cumhuriyet University Faculty of Medicine Department of Emergency Medicine between July 2019 and December 2020 with suicide attempts and healthy volunteers selected in line with the criteria were retrospectively analyzed. Consent forms received from Sivas Cumhuriyet University ethics committee with decision number 2020-06/14 were read and signed by healthy volunteers similar in gender and age and the patient group included in the study. Groups were formed by taking detailed anamnesis and physical examinations from volunteers who agreed to participate in the research.

In our study, we compared the levels of vitamin D, folic acid and vitamin B12 in patients who applied to the emergency department after a suicide attempt with the normal population. Vitamin D and vitamin B12 levels were found to be significantly lower in the patient group compared to the control group.

Our current clinical study supports many studies in the literature, with the detection of low levels of vitamin D and vitamin B12 after the examinations of the patient group who came to the emergency room with a depressive episode and the control group.

Keywords: Depression, Suicidal Behavior, Vitamin D, Vitamin B12, Folic Acid

İntihar Girişimi Sonrası Acil Servise Başvuran Hastalarda D Vitamini, Folik Asit Ve Vitamin B12 Düzeylerindeki Değişikliklerin Belirlenmesi

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ÖZ

Depresyon psikolojik ve fizyolojik bir yıkım sürecidir. Son yıllarda ülkemizde ve dünyada halk sağlığı sorunlarının önde gelen nedenlerinden biri olmuştur. Bu çalışmadaki amacımız; intihar girişimi sonrası acil servise başvuran hastalarda D vitamini, folik asit ve B12 vitamini düzeylerini ölçerek elde ettiğimiz veriler ışığında literatüre katkı sağlamaktır.

Araştırmada Temmuz 2019-Aralık 2020 tarihleri arasında Sivas Cumhuriyet Üniversitesi Tıp Fakültesi Acil Tıp Anabilim Dalı'na intihar girişimi ile başvuran hastalardan ve belirlenen sağlıklı gönüllülerden alınan kan testlerinde D vitamini, folik asit ve B12 düzeyleri belirlendi. Kriterler geriye dönük olarak analiz edildi. Sivas Cumhuriyet Üniversitesi etik kurulundan 2020-06/14 karar numaralı alınan onam formları, çalışmaya dahil edilen hasta grubu ve cinsiyet, yaş benzer sağlıklı gönüllüler tarafından okunup imzalandı. Araştırmaya katılmayı kabul eden gönüllülerden detaylı anamnez ve fizik muayeneleri alınarak gruplar oluşturuldu.

Çalışmamızda intihar girişimi sonrası acil servise başvuran hastalarda D vitamini, folik asit ve B12 vitamini düzeylerini normal popülasyonla karşılaştırdık. Hasta grubunda D vitamini ve B12 vitamini düzeyleri kontrol grubuna göre anlamlı olarak düşük bulundu.

Mevcut klinik çalışmamız, acil servise depresif atakla gelen hasta grubu ve kontrol grubunun muayeneleri sonrasında D vitamini ve B12 vitamini düzeylerinin düşük olduğunun tespiti ile literatürdeki birçok çalışmayı desteklemektedir.

Anahtar Kelimeler: Depresyon, İntihar Davranışı, D Vitamini, B12 Vitamini, Folik Asit

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Introduction

Suicidal behavior is the desire and act of ending one's own life. In many literature reviews, this behavior has been associated with depression, and important steps have been taken in terms of treatment within the scope of existing studies. Depression is the most common debilitating psychiatric illness, the pathophysiology of which is related to many aspects of neurohumoral functions¹. Depression is a process that increases psychological and physiological destruction if left untreated. More than 300 million people worldwide have major depressive disorder, which is increasing day by day². According to the Centers For Disease Control and Prevention (CDC) data, there has been a continuous increase in suicidal behaviors in the last 10 years. Worldwide, more than 800,000 people die by suicide each year³. There is a diagnosable psychiatric disorder in most suicides, especially mood disorder⁴. The most frequent application and first intervention place of the patient population after suicidal behavior is emergency services. For this reason, clinical studies, especially in emergency services, for the current patient population have gained more importance in recent years.

Since vitamins and minerals contribute to many physiological processes in the biological cycle of the human body, a decrease in the function of many metabolic functions in the body can be observed in case of their deficiency. As a result, it can lead to chronic health problems in the long run. In order to ensure optimal health in the medium and long term, providing minimum vitamin supplementation to prevent deficiency symptoms should be an important public health issue⁵. Nutritional habits are accepted as one of the important reasons that provide the pathophysiological mechanisms in the formation process of psychiatric disorders⁶.

Vitamin D plays an active role in calcium and bone metabolism, the endocrine system, and the hormonal cycle, but research over the past two decades has also revealed numerous biological effects, including immunomodulation, induction of cell differentiation, and inhibition of growth⁷.

There is a very close relationship between vitamin B12 and folic acid metabolism. They are the main determinants of one-carbon metabolism in which S-adenosylmethionine (SAM) is formed. The SAM metabolite is the precursor of methyl groups, which are very important for the continuation of neurological functions in the body⁸. Vitamin B12 and folic acid supplementation may play a role in the prevention of megaloblastic anemias, some

neuropsychiatric syndromes such as Alzheimer's-dementia and mood disorders. (9)

Our aim in this study is to contribute to the literature in the light of the data we obtained by measuring the levels of vitamin D, folic acid, and vitamin B12 in patients who applied to the emergency department after suicidal attempts.

Materials and Methods

In this study, $\alpha= 0.05$; When $\beta= 0.10$ and $(1- \beta)= 0.90$, it was decided to include 35 individuals in each group, and the power of the test was found to be $p=0.907$.

In the study, the patient group of 35 people who applied to Cumhuriyet University Faculty of Medicine, Department of Emergency Medicine, between July 2019 and December 2020 after a suicide attempt was evaluated after detailed anamnesis and physical examination. While forming the control group in our study, a similar population was preferred in order to increase the reliability of the research in terms of age and gender. The control group was selected from a population similar to the patient group in terms of age and gender. The study was completely voluntary within the scope of the informed consent form for both groups.

~5 mL blood samples were taken into biochemistry tubes (red caps) from the forearm veins of healthy and patient volunteers who agreed to participate in the study. The blood samples taken were kept at room temperature for 5 minutes. After waiting, it was placed in a centrifuge at 4000 rpm for 5 minutes. was centrifuged. The resulting supernatant, ~400 μ L, was transferred to at least two Ependorf tubes and stored at -200C until the study was performed. When the desired number of patients was reached, the samples were removed, brought to room temperature and measured according to the kit procedure specified by the manufacturer.

B12, Folic Acid, Vitamin D levels were measured from plasma/serum samples obtained from patients and healthy control groups. Data were analyzed using SPSS Data:23.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as mean \pm standard deviation (SD). In the evaluation of the data, the significance test of the difference between the two means (Independent t test) was used when the parametric test assumptions were fulfilled, and the Man Whitney U test was used when the parametric test assumptions were not fulfilled.

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Results

In our study, we analyzed the sociodemographic data of the patients, as well as the amount of vitamin D, folic acid, and vitamin B12 in plasma. We evaluated the comparative results of these vitamins, which manage many biological processes in human metabolism, in patient and control groups.

The mean age of 35 patients we evaluated was 30.13±11.69 years, and the mean age of 35 individuals in the control group was 30.95±9.48 years (p=0.17; p>0.05). (Table 1)

20 (57.1%) of the individuals in the patient group were female and 15 (42.9%) were male; 20 (57.1%) of the individuals in the control group were female and 15 (42.9%) were male (p=1; p> 0.05). (Table 1)

Table 1. Age and Gender Distribution Between Patient and Control Groups

	Patient Group N(%)	Control Group N(%)	Independent T Test
Gender			
Female	20 (57,1)	20 (57,1)	P=1
Male	15 (42,9)	15 (42,9)	
The Average Age	30,13±11,69	30,95±9,48	P=0,17

* p<0,05

When we compared the measured levels of vitamin D, folic acid, and vitamin B12 in patients admitted to the emergency department after a suicide attempt with the control group, we found a statistically significant difference between the two groups in terms of vitamin D and vitamin B12. (p<0.05)

Table 2. Comparison of Vitamin Values Between Patient and Control Groups

Vitamin Name	Patient Group Mean (Mean ± Sd)	Control Group Mean (Mean ± Sd)	P Values Student's t test
D Vitamin (mcg)	13,61	25,19	0,03*
Folic Acid (ng/mL)	7,76	8,30	0,49
B12 Vitamin (pg/ml)	274,77	359,05	0,001*

*P<0,05

Discussion

In recent years, the frequency of suicidal behavior has gradually increased and has become a social problem and can lead to fatal consequences. Since the first place of application of the patient population is the emergency services, clinical evaluations and statistical analyses, especially in the emergency, should have clinical importance in the literature.

When we examine the data obtained in the study, When we grouped the patients admitted to the emergency department by gender after a suicide attempt, suicidal behavior was found to be higher in females (female: male ratio 1.53:1.15). Women have higher suicidal ideation and behavior patterns compared to men^{10,11}. Our study's result is consistent with other studies (Table 1).

A study on risk factors in patients over 65 years of age who exhibit suicidal behavior, especially male gender, psychiatric history, stressors, and living alone, were found to be more significant in predicting completed suicides¹².

A low level of vitamin B12 was found in depressed patients, and in the results of studies conducted with the general population, a significant correlation was found between low vitamin B12 levels and depression¹³. Our study's results are similar to this.

Vitamin B12 is the precursor of methionine amino acid and SAM metabolite, which is responsible for the metabolism of neuropsychological functions in metabolism. Vitamin B deficiency and its treatment are extremely important, as disruption in the methylation cycle will increase the functionality of memory, dementia, and cognitive impairment. In this sense, it is very valuable to have low levels of vitamin B12 in patients who exhibit suicidal behavior. There are studies that show that vitamin B deficiency contributes to the complexity of depressive symptoms¹⁴.

Studies also show that vitamin B12 supplementation reduces symptoms of depression and anxiety¹⁵. Considering the literature review, more comprehensive studies can be conducted on the possibility that patients with depressive moods take vitamin B12 supplements to reduce depressive episodes. In our study, vitamin B12 values measured in the patient population were significantly lower compared to the control group.

There are clinical studies showing that folic acid deficiency shows the same neuropsychological symptoms as vitamin B12 deficiency and increases

the tendency to depression¹⁶. However, in our study, folic acid deficiency was not found to be significant between the patient and control groups. At the same time, folic acid level was found to be normal in the patient group in our study.

Recent studies have shown that insufficient vitamin D status is frequently observed in patients with depression¹⁷. In this sense, our current clinical study is similar to other studies. The results we found were lower in the patient group than in the control group and were compatible with other studies (Table 2). There are clinical data that analyze the relationship between vitamin D deficiency and depression and show improvements in depressive mood after vitamin D supplementation¹⁸. Although vitamin D deficiency is quite common in the world, it has been associated with anxiety disorders and major depressive disorders in many studies. There is also a clinical study in the literature that vitamin D supplementation reduces the symptoms of anxiety and depression¹⁹. However, a study that noted that there was no improvement in the present findings in the period observed after vitamin D supplementation in elderly patients with depressive symptoms and decreased physical functionality was also included in the literature²⁰.

In a study of clinical and preclinical studies examining the role of vitamin D on patients with dementia, mood disorders, and psychosis, it was thought that there was not enough evidence to say that vitamin D has a direct effect on the neuropsychological process²¹.

CONCLUSIONS

Depression, which is an important health problem in recent years, may result in suicidal behavior and death. Studies conducted on this depressive patient population in emergencies, which are places of referral after suicide, are valuable.

Our study measured vitamin D, folic acid, and vitamin B12 levels in patients who applied to the emergency department after suicidal attempts. When we compared the levels of vitamin D, folic acid, and vitamin B12 in the patients who applied to the emergency department after a suicide attempt, we found that the levels of vitamin D and vitamin B12 were significantly lower in the patient group compared to the control group. The data we obtained in the literature review supported similar studies on depressive patients.

There is a need for more comprehensive studies by reach a larger number of patients and, in this context, vitamin-supported primary treatment planning on patient groups. Comprehensive studies

can be directed by using depression scales in order to have an objective evaluation of the same patient population after the treatments.

Our study has some limitations. The first and most important limitation is that it was studied with a relatively small group of patients. At the same time, our current study is single-centered and more comprehensive studies are needed. One of the limitations of our study was the inability to observe the clinical course after vitamin D levels returned to normal, as we correlated vitamin D and vitamin B12 deficiency, which we found in the patient group compared to the control group, with depressive mood.

It was thought that giving vitamin supplements to patients who presented with a suicide attempt and whose serum vitamin levels were low would prevent repeated suicide attempts. It is planned to conduct the study for a longer period of time (about 5 years) and with a larger number of patients to show whether patients with vitamin deficiencies who have attempted suicide in the future experience relapse after vitamin supplementation and whether the suicide attempt repeats.

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