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ORIGINAL ARTICLE

Examination of Vitamin D Levels in Patients with Schizophrenia and Schizoaffective Disorder: A Retrospective Study

Şizofreni ve Şizoaffektif Bozukluğu Olan Hastalarda D Vitamini Düzeylerinin İncelenmesi: Retrospektif Bir Çalışma

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ABSTRACT

Background/Aims: The relationship between vitamin D and schizophrenia has been the focus of studies in the last 20 years. Studies have shown that approximately 65% of schizophrenia patients have vitamin D deficiency. This study aimed to retrospectively investigate the vitamin D levels of schizophrenia and schizoaffective disorder (SAD) patients receiving inpatient treatment at a tertiary care hospital.
Material and Methods: Patients diagnosed with Schizophrenia and SAD who received inpatient treatment at the psychosis service of a tertiary care hospital in the last two years (2021-2023) were included in this study. The data of 230 patients were examined retrospectively from hospital and file records.
Results: Among the patients in the study, 47.8% were female with a mean age of 42.3±15.8 years, and 52.2% were male with a mean age of 37.2±14.1 years. Among women, 24.5% had SAD and 75.5% had schizophrenia, among men, 30.8% had SAD and 69.2% had schizophrenia. Vitamin D deficiency was found in 73% of the group, vitamin D insufficiency was found in 17.4%, and normal vitamin D levels were found in 9.6%. No statistically significant relationship was found when vitamin D levels were compared between male and female patient groups (p = 0.068). When vitamin D levels were compared between patient groups diagnosed with schizophrenia and SAD, no statistically significant relationship was found. (p>0.05)
Conclusion: Despite advances in the treatment of schizophrenia, these advances are insufficient to reduce the morbidity and mortality of the disease, so prophylactic measures should be explored. Adequate D vitamin supplementation during critical stages of life, including pregnancy, might be a meaningful, simple, safe, and cost-effective intervention.

Keywords: Retrospective study, schizophrenia, schizoaffective disorder, vitamin D deficiency, vitamin D insufficiency

ÖZ

Amaç: D vitamini ve şizofreni arasındaki ilişki son 20 yılda yapılan çalışmaların odak noktası olmuştur. Çalışmalar şizofreni hastalarının yaklaşık %65'inde D vitamini eksikliği olduğunu göstermiştir. Bu çalışmanın amacı, üçüncü basamak bir hastanede yatarak tedavi gören şizofreni ve şizoaffektif bozukluk (ŞAB) hastalarının D vitamini düzeylerini retrospektif olarak araştırmaktır.
Gereç ve Yöntem: Bu çalışmaya son iki yıl içinde (2021-2023) üçüncü basamak bir hastanenin psikoz servisinde yatarak tedavi gören şizofreni ve ŞAB tanılı hastalar dahil edilmiştir. 230 hastanın verileri hastane ve dosya kayıtlarından retrospektif olarak incelenmiştir.
Bulgular: Çalışmaya alınan hastaların %47,8'i (n=110) kadın olup yaş ortalamaları 42,3±15,8 iken %52,2'si (n=120) erkekti ve yaş ortalamaları 37,2±14,1'di. Kadınların %24,5'i (n=27) ŞAB, %75,5'i (n=83) şizofreni; erkeklerin ise %30,8'inde (n=37) ŞAB ve %69,2'sinde (n=83) şizofreni hastasıydı. Grubun %73'ünde (n=168) D vitamini eksikliği, %17,4'ünde (n=40) D vitamini yetersizliği ve %9,6'sında (n=22) normal D vitamini düzeyleri saptandı. Kadın ve erkek hasta grupları arasında D vitamini düzeyleri karşılaştırıldığında istatistiksel olarak anlamlı bir ilişki bulunmadı (p=0,068). Şizofreni ve ŞAB tanılı hasta grupları arasında D vitamini düzeyleri karşılaştırıldığında istatistiksel olarak anlamlı bir ilişki bulunmadı (p>0.05).
Sonuç: Şizofreni tedavisindeki ilerlemelere rağmen, bu gelişmeler hastalığın morbidite ve mortalitesini düşürmekte yetersiz kalmaktadır, bu nedenle profilaktik önlemler araştırılmalıdır. Hamilelik de dahil olmak üzere yaşamın kritik aşamalarında yeterli D vitamini takviyesi anlamlı, basit, güvenli ve uygun maliyetli bir müdahale olabilir.

Anahtar Kelimeler: şizoaffektif bozukluk, şizofreni, D vitamini eksikliği, D vitamini yetersizliği, retrospektif çalışma

Introduction

Schizophrenia is among the serious mental disorders and is one of the 25 most common causes of disability worldwide (1). It is characterized by psychotic symptoms that usually begin in early adulthood and a large global burden of disease and has a high heritability rate. However, the underlying disease mechanisms are not yet fully understood (2).

Vitamin D is a steroid hormone that can be taken exogenously in the form of foods and supplements or produced endogenously through sunlight exposure. Most of it (85%) is synthesized in the skin with the effect of ultraviolet B rays in case of sun exposure, and a small amount is taken in certain foods containing vitamin D such as salmon, tuna, and fish oil (1).

The prevalence of vitamin D deficiency is increasing

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worldwide and is estimated to affect almost one in five people. The highest prevalences are found in North Asia and the Middle East. Vitamin D deficiency is also widespread in our country. Although it is not possible to screen the whole population for vitamin D deficiency, it is recommended that serum levels should be measured at least in high-risk groups and replacement should be provided if deficient because vitamin D is important for human metabolism and its deficiency is associated with serious health problems. Therefore, it is of great importance that this easily preventable and treatable vitamin Deficiency is detected and necessary interventions are performed (3).

In addition to its most well-known role in calcium, phosphate, and bone metabolism, vitamin D also plays a role in neurodevelopment, synaptic plasticity, neuroprotection and neurotransmission, dopamine system, and immune response (4).

It is obvious that vitamin D, which regulates the release of neurotrophic agents essential for neuronal differentiation and shows neuroprotective effects by supporting the production of calcium-binding proteins, is closely related to psychiatric diseases(5).

The role of vitamin D in the pathophysiology of schizophrenia is supported by many studies conducted with increasing interest, especially in the last 20 years. Several hypotheses suggesting that low vitamin D levels are a risk factor for the development of schizophrenia are based on some epidemiologic evidence linking schizophrenia with births in winter (low maternal vitamin D), urban upbringing, and migration to places with less sunlight exposure (2). Adequate cut-off values for vitamin D levels vary depending on the specific functions of the vitamin in body metabolism. In most cases, levels lower than 20 ng/mL are defined as inadequate, while blood levels of 30 ng/mL or higher are considered optimal (6). Factors such as not being able to benefit from enough sunlight, living in northern latitudes, having dark-pigmented skin, and being born in winter are common causal factors in both vitamin D deficiency and schizophrenia (3).

According to studies, vitamin D deficiency is very common in patients with schizophrenia and may be associated with negative symptoms, suicide risk, agoraphobia, and antidepressant consumption (7,8). Studies have shown that approximately 65% of schizophrenia patients have vitamin D deficiency (9). Additionally, it has been reported that the risk of schizophrenia in people with vitamin D deficiency is 2,16 times higher (10). Therefore, the present study aimed to retrospectively investigate the vitamin D levels of schizophrenia and SAD patients receiving inpatient treatment at a tertiary care hospital.

Material and Methods

Study Design and Data Collection

Patients diagnosed with Schizophrenia and SAD who received inpatient treatment at the psychosis service of a tertiary care hospital in the last two years (2021-2023) were included in this study. The data of 230 patients were examined retrospectively from hospital and file records. In the study, 0-20 ug/L (microgram/liter) deficiency, 21-29 ug/L insufficiency, and 30-70 ug/L normal range were taken as reference for the 25-hydroxy vitamin D levels of the patients (Table 1).

Table 1. Vitamin D Levels

The Reference Range	Unit	Clinical Situation
0-20	Microgram/Liter	Deficiency
21-29	Microgram/Liter	Insufficiency
30-70	Microgram/Liter	Normal Range

Measurement of Vitamin D Levels

After overnight fasting for 12 hours, 2 ml venous blood samples obtained from the participants were placed in anticoagulated tubes and centrifuged at room temperature (NF 1200R, NuveR).

After centrifugation, vitamin D levels were measured by HPLC (Chromsystems, Germany).

Ethical Approval

This research was approved by The XX University Non-Interventional Clinical Research Ethics Committee with decision number 05 dated 05.03.2023. The research complies with the provisions of the Declaration of Helsinki (as revised in Brazil 2013).

Statistical Analysis

Data were analyzed with the SPSS 25.0 (IBM SPSS Statistics 25 software (Armonk, NY: IBM Corp.)) package program. Continuous variables were presented as mean ± standard deviation, median (25th and 75th percentiles), and minimum-maximum values; categorical variables were presented as numbers and percentages. Differences between categorical variables were analyzed using chi-square analysis. $p<0.05$ was considered statistically significant.

Results

Among the patients included in the study, 47.8%

(n=110) were female with a mean age of 42.3±15.8 years, and 52.2% (n=120) were male with a mean age of 37.2±14.1 years. Among women, 24.5% (n=27) had SAD and 75.5% (n=83) had schizophrenia; among men, 30.8% (n=37) had SAD and 69.2% (n=83) had schizophrenia. Vitamin D deficiency was found in 73% (n=168) of the group, vitamin D insufficiency was found in 17.4% (n=40), and normal vitamin D levels were found in 9.6% (n=22).

In female patients, the rate of vitamin D deficiency was 80% (n = 80), the rate of vitamin D insufficiency was 13.6% (n = 15), and the normal vitamin D level was 6.4% (n = 7). In male patients, the rate of vitamin D deficiency was 66.7% (n=80), the rate of vitamin D insufficiency was 20.8% (n=25), and the normal vitamin D level was 12.5% (n=15). As shown in Table 2, no statistically significant relationship was found when comparing vitamin D levels between male and female patient groups (p = 0.068).

Table 2. Vitamin D Levels by Gender

	Deficient n (%)	Insufficient n (%)	Optimal n (%)	*p*-value
Female (n=110)	88 (80.0)	15 (13.6)	7 (6.4)	(0.068)
Male (n=120)	80 (66.7)	25 (20.8)	15 (12.5)	

The rates of vitamin D deficiency in patients with schizophrenia and SAD are shown in Table 3. When vitamin D levels were compared between patient groups diagnosed with schizophrenia and SAD, no statistically significant relationship was found as shown in Table 3 (p>0.05).

Table 3. Vitamin D Levels by Psychiatric Disorders

	Deficient n (%)	Insufficient n (%)	Optimal n (%)	*p*-value
Schizophrenia (n=166)	123 (75.3)	28 (16.9)	13 (7.8)	(0.303)
Schizoaffective Disorder (n=64)	43 (67.2)	12 (18.8)	9 (14.0)	

Discussion

Vitamin D deficiency is a global health problem for all ages, even in countries with year-round sunlight exposure. Increasing physical activity and spending more time outdoors for sunlight exposure can stimulate endogenous vitamin D production and improve vitamin D levels. In this study, 73% of patients with schizophrenia and SAD had vitamin D deficiency, 17.4% had vitamin D insufficiency and 9.6% had normal vitamin D levels. In many studies conducted in patients with schizophrenia in the literature, high vitamin D deficiency results were found at a similar rate to our results (4,11,12). Similarly, in a large-scale study including 36 articles with a total of 12528 participants, vitamin D levels of schizophrenia patients were significantly lower than controls (13).

Unhealthy eating habits decreased physical activity and less exposure to sunlight have been observed in inpatient psychiatry wards (4). Vitamin D deficiency found in patients with schizophrenia may be related to the sedentary lifestyles of these patients and their inability to utilize sunlight sufficiently due to less exposure to the outdoor environment.

Although studies in patients with SAD are much fewer in the literature, deficiency in vitamin D levels was found in 34.7% of patients in one study (6). In this study, no statistically significant relationship was found when vitamin D levels were compared between the groups of patients diagnosed with schizophrenia and SAD. This may be thought to be since the two diseases have similar neurodevelopmental backgrounds and the patients have similar characteristics in terms of symptoms and living conditions.

In our study, no statistically significant relationship was found between male and female patient groups in terms of vitamin D levels, similar to some studies in the literature (14,15). In many studies conducted in healthy populations, vitamin D levels are lower in women than in men and this has been attributed to hormonal differences (16-17). This contradictory finding is remarkable. This may be explained by the fact that many factors including race, geography, health status, cultural, genetic, and personal characteristics affect vitamin D levels (16-17).

Studies have shown that the use of antipsychotics in combination with vitamin D supplementation may improve total attention span and positive and negative symptoms of schizophrenia. Vitamin D levels should be measured regularly, replacement should be made when necessary and patients should be encouraged to be exposed to sunlight to maintain optimum vitamin D levels (18-20).

Our study has some limitations such as being a cross-sectional study, having a relatively small sample group, and not considering the factors that may affect vitamin D deficiency. Although there are many studies investigating vitamin D deficiency in psychotic disorders, we thought that our research could contribute to the literature since studies in patients with SAD are rare. Future studies are needed to investigate the causes of vitamin D deficiency and the prophylactic vitamin D administration results.

Despite the new developments in the treatment of schizophrenia and SAD, these disorders are still disorders that do not have adequate recovery rates and affect

the quality of life and functionality of patients severely. Vitamin D deficiency may be an under-recognized health risk for inpatients with schizophrenia or SAD. Supplementing with sufficient vitamin D is an efficient, simple, safe, and cost-effective approach in psychotic disorders like schizophrenia and SAD.

Declarations

Conflict of Interest

The Authors declare that they have no conflict of interest.

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Authors' Contribution

Study design: ANIK, ATG Data collection: SBT, ATG Data analysis and interpretation: ANIK, ATG, Writing-Reviewing and Editing: ANIK, SBT, ATG, Drafting of the article: SBT, ANIK Critical review: ANIK, SBT, ATG.

Ethics Approval

This research was approved by The XX University Non-Interventional Clinical Research Ethics Committee with decision number 05 dated 05.03.2023.

Presentation

This study was presented as an oral presentation at the 15th International Congress of Psychopharmacology.

References

1.AlGhamdi SA. Effectiveness of Vitamin D on Neurological and Mental Disorders. Diseases. 2024;12(6):131

2.Jahorkowski P, Hindley GFL, Shadrin AA, Tesfaye M, Bahrami S, Nerhus M, et al. Genome-wide Association Analysis of Schizophrenia and Vitamin D Levels Shows Shared Genetic Architecture and Identifies Novel Risk Loci. Schizophr Bull. 2023;49(6):1654-1664.

3.Öncül Börekçi N. D Vitamini Eksikliği ile İlgili Güncel Bilgiler. Jour Turk Fam Phy. 2019; 10 (1): 35-42. Doi: 10.15511/jtfp.19.00135

4.Goh XX, Tee SF, Tang PY, Chee KY, Loh KKW. Impact of body mass index elevation, Vitamin D receptor polymorphisms and antipsychotics on the risk of Vitamin D deficiency in schizophrenia patients. J Psychiatr Res. 2024;175:350-358. doi: 10.1016/j.jpsychires.2024.05.005.

5.Demirkol ME, Tamam L, Çakmak S, Yeşiloğlu C. Şizofreni tanılı Hastalarda Metabolik Sendrom ve D Vitamini düzeyleri ilişkisi. Cukurova Medical Journal. 2019;44(3):1110-1117.

6.Boerman R, Cohen D, Schulte PF, Nugter A. Prevalence of Vitamin D Deficiency in Adult Outpatients with Bipolar Disorder or Schizophrenia. J Clin Psychopharmacol. 2016;36(6):588-592.

7.Fond G, Faugere M, Faget-Agius C, Cermolacce M, Richieri R, Boyer L, et al. Hypovitaminosis D is associated with negative symptoms, suicide risk, agoraphobia, impaired functional remission, and antidepressant consumption in schizophrenia. Eur Arch Psychiatry Clin Neurosci. 2019;269(8):879-886. doi:10.1007/s00406-018-0932-0.

8.Puşuroğlu M, Baltacıoğlu M, Helvacı Çelik F, Bahceci B, Hocaoglu C. Şizofreni Hastalarında Serum D Vitamini Seviyeleri ile İntihar Düşüncesi Arasındaki İlişki. Ankara Eğitim ve Araştırma Hastanesi Tıp Dergisi. 2022;55(2):138-142.

9.Siddique JA, Quereshi SF, Shawosh YA. Role of Vitamin D in Schizophrenia in Elderly Patients. Journal of Geriatric Mental Health. 2018;5:65-67.

10.Tolppanen AM, Sayers A, Fraser WD, Lewis G, Zammit S, Mcgrath J, et al. Serum 25-hydroxyvitamin D3 and D2 and non-clinical psychotic experiences in childhood. PLoS One. 2012;7:e41575

11.Tsiglopoulos J, Pearson N, Mifsud N, Castagnini E, Allott K, Thompson A, et al. The prevalence of vitamin D deficiency and associated factors in first-episode psychosis. Early Interv Psychiatry. 2024;18(3):237-242. doi: 10.1111/eip.13465.

12.Belzeaux R, Boyer L, Ibrahim EC, Féron F, Leboyer M, Fond G. Mood disorders are associated with a more severe hypovitaminosis D than schizophrenia. Psychiatry Res. 2015;229(1-2):613-616. doi: 10.1016/j.psychres.2015.04.039.

13.Zhu JL, Luo WW, Cheng X, Li Y, Zhang QZ, Peng WX. Vitamin D deficiency and Schizophrenia in Adults: A Systematic Review and Meta-analysis of Observational Studies. Psychiatry Res. 2020;288: 112959. doi: 10.1016/j.psychres.2020.112959.

14.Ling C, Sun L, Luo B, Yu H, Li W, Yang Y, et al. Association of bone turnover markers and cognitive function in Chinese chronic schizophrenia patients with or without vitamin D insufficiency. BMC Psychiatry. 2023;23(1):867.

15.Baltacıoğlu M, Puşuroğlu M, Bahceci B, Hocaoglu C, Helvacı Celik FG. Şizofreni Tanılı Hastalarda D Vitamini Düzeylerinin Psikotik ve Depresif Belirtilerle İlişkisinin İncelenmesi. Akdeniz Tıp Dergisi. 2024; 10(1): 84-91.

16.Çubukçu M, Acı R, Müderrisoğlu S. Evaluation of Vitamin D Levels According to Age, Sex and Seasonal Characteristics in Samsun. Ankara Med J. 2019;(4):769-775.

17.Telo S. Elazığ İlinde D Vitamini Düzeylerinin Yaş, Cinsiyet ve Mevsimlere Göre Değişimi. Fırat Tıp Dergisi. 2017; 22(1): 29-33.

18.Neriman A, Hakan Y, Ozge U. The psychotropic effect of

vitamin D supplementation on schizophrenia symptoms. BMC Psychiatry. 2021;21(1):309. doi: 10.1186/s12888-021-03308-w.

19.Kalejahi P, Kheirouri S, Noorazar SG. A randomized controlled trial of Vitamin D supplementation in Iranian patients with schizophrenia: Effects on serum levels of glycogen synthase kinase-3β and symptom severity. Int J Psychiatry Med. 2023;58(6):559-575. doi: 10.1177/00912174231193303.

20.Lally J, Ajnakina O, Singh N, Gardner-Sood P, Stubbs B, Stringer D, et al. Vitamin D and clinical symptoms in First Episode Psychosis (FEP): A prospective cohort study. Schizophr Res. 2019;204: 381-388. doi: 10.1016/j.schres.2018.08.011.