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The Retrospective Analysis of Vitamin D Levels of Pediatric Patients in a Small City Center in Turkey

Türkiye'de Küçük Bir Şehir Merkezinde Pediatrik Hastaların Vitamin D Seviyesinin Retrospektif Analizi

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Abstract

Objective: The aim of this study was to analyze the 25(OH)D3 levels and investigate a province's pediatric vitamin D insufficiency and deficiency based on residence location.

Materials and Methods: The pediatric patients who had 25(OH)D3 level results recorded in the patient file system from April 2013 to December 2014 were enrolled in the study. The demographic data of age, gender, address, and admission season of patients were recorded. The patients were divided into three group according to their 25(OH)D3 levels: Group 1 (deficiency, < 20 ng/mL); Group 2 (insufficiency, 20–29.9 ng/mL); and Group 3 (normal, ≥ 30 ng/mL).

Results: Seven hundred and seventy-five patients were included in the study. The average age of the patients was 14.5 ± 9 (1–123) months. The mean vitamin D levels indicated no statistically significant difference among the seasons (p = 0.751) and residence locations (p = 0.183).

Conclusion: The results of this study indicate that vitamin D levels are not affected by residence location. Similar studies need to be carried out in major cities.**(Sakarya Med J 2016, 6(3):136-140)**

Keywords: childhood, seasons, residence location, vitamin D

Öz

Amaç: *Bu çalışmanın amacı 25(OH)D3 seviyelerini analiz ederek bir ilin pediatrik vitamin D yetersizliği ve eksikliğini ev adresi bazlı araştırmaktır.*

Yöntem: *Çalışmaya Nisan 2013 ile 2014 tarihleri arasında hasta dosya sistemine 25(OH)D3 seviyesi kayıtlı pediatrik hastalar dahil edildi. Demografik veriler, yaş, cinsiyet, adres ve başvuru mevsimi kaydedildi. Hastalar 25(OH)D3 seviyelerine göre üç gruba ayrıldı: Grup 1 (eksiklik, < 20 ng/mL); Grup 2 (yetersizlik, 20–29.9 ng/mL); and Grup 3 (normal, ≥ 30 ng/mL).*

Bulgular: *Yedi yüz yetmiş beş hasta çalışmaya dahil edildi. Hastaların ortalama yaşları 14.5 ± 9 (1–123) ay idi. Ortalama D vitamini seviyesi mevsimsel (p = 0.751) ve adrese (p = 0.183) göre istatistiksel olarak anlamlı farklı değildi.*

Sonuç: *Bu çalışmanın sonucuna göre D vitamini seviyesi adresten etkilenmemektedir. Benzer çalışmaların büyük illerde yapılması gerekmektedir.* ***(Sakarya Tıp Dergisi 2016, 6(2):136-140)***

Anahtar Kelimeler: *çocukluk çağı, mevsimler, ev adresi, vitamin D.*

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INTRODUCTION

Vitamin D is a fat-soluble vitamin which is required for bone development and the immune system.[1,2] Vitamin D is called the sunshine vitamin because ultraviolet sunlight triggers vitamin D synthesis in the skin.[3] Fish, meat, and eggs contain high levels of vitamin D; however, dietary vitamin D alone does not fulfill the body's needs.[4] Vitamin D deficiency (VDD) and vitamin D insufficiency (VDI) are major public health problems in developing countries. VDD and VDI prevalence is variable from country to country.[5,6] VDD results in rickets in children and osteomalacia in adults.[4] Since 2005, the Republic of Turkey's Ministry of Health has been offering vitamin D preparations free of cost for every newborn child with VDD and VDI.[7] The prevalence of VDD and VDI has decreased dramatically as a result of this vitamin D supplementation.

In recent literature, there is no study that shows how the location-based characteristics of a city in Turkey affect VDD and VDI. The aim of this study was to retrospectively analyze the 25(OH)D3 levels of patients and investigate how a province's pediatric VDD and VDI rates are connected to the residence locations of the patients. As the serum concentration of 25-hydroxy vitamin D3 [25(OH)D3] is the best indicator of vitamin D status,[8] it was used in this study in the evaluation of the patients.

MATERIALS and METHODS

This research was designed as a retrospective study. As the serum concentration of 25-hydroxy vitamin D3 [25(OH)D3] is the best indicator of vitamin D status,[8] it was used in this study in the evaluation of the patients. Pediatric patients who had 25(OH)D3 level results recorded in the patient file system from April 2013 to December 2014 were enrolled in the study. The demographic data of age, gender, address, and admission season of patients were recorded. The patients were divided into three group according to their 25(OH)D3 levels: Group 1 (deficiency, < 20 ng/mL); Group 2 (insufficiency, 20–29.9 ng/mL); and Group 3 (normal, ≥ 30 ng/mL).

The serum 25(OH)D3 levels were measured with a chemiluminescence immunoassay using a Cobas e 601 module of the Cobas 6000 series autoanalyzer (Roche Diagnostics GmbH, Mannheim, Germany). All samples were studied at the same biochemistry laboratory.

The Statistical Package for the Social Sciences (SPSS) version 21 for Windows (IBM, Armonk, NY, USA) software was used for the statistical analysis. The normality of continuous data was assessed via the Kolmogorov-Smirnov test. The independent t-test was used for parametric continuous variables (25(OH)D3 levels between gender). The Pearson chi-square method was used for the comparison of the categorical values. The one-way analysis of variance (ANOVA) was used for descriptive data (Comparison of 25(OH)D3 levels between seasons and neighborhoods). The results were considered to be significant at $p < 0.05$.

Ethics committee approval for this study was given by the local ethics committee (Approval no: 2015/03-3).

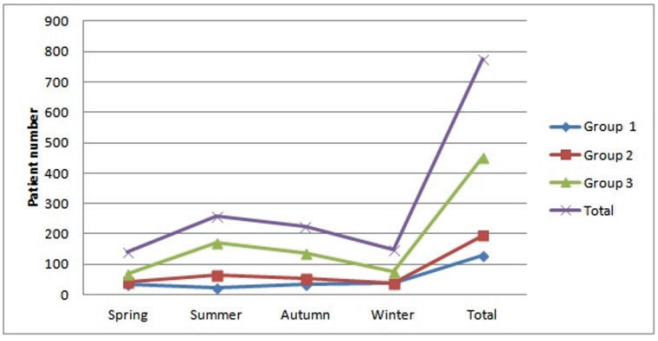
RESULTS

The number of patients initially included in the study was 1,173. After the first analysis, 398 patients were excluded from the study because of having an unknown address or living outside the city center. Seven hundred seventy-five patients were finally included the study. The average age of the patients was 14.5 ± 9 (1–123) months, and there were 440 (56.8 %) males and 335 (43.2 %) females. There was no statistical significance for 25(OH)D3 levels between genders ($p = 0.376$). The patients' seasonal distribution was analyzed, and there was no statistically significant difference among the groups ($p = 0.938$). The mean vitamin D levels of spring, summer, autumn, winter were 32.9 ± 13.2 ng/mL, 34 ± 14.8 ng/mL, 33.4 ± 14.1 ng/mL, and 34.6 ± 14.9 ng/mL, respectively. The mean vitamin D levels revealed no statistically significant difference among the seasons ($p = 0.751$). (Table 1) Figure 1 shows the seasonal distribution of the groups.

The number of patients and the residence location distributions for Groups 1, 2, and 3 were 128 (16.5%), 196 (25.3%), and 451 (58.2%), respectively (Table 1). The patients who were included in the study lived in 30 different neighborhoods in the city center. There was no statistically significant difference for the mean 25(OH)D3 levels ($p = 0.183$) among the neighborhoods. The neighborhoods were compared in terms of Groups 1, 2, and 3 patient number and there was no sta-

Table 1: Demographic data and laboratory results of study.			
			P
Age (months)		14.5 ± 9	
Gender (n/%)	Male	440 (56.8)	
	Female	335 (43,2)	
Gender mean 25 (OH) D3 levels (ng/mL)	Male	34.4 ± 14.6	0.376
	Female	32.9 ± 13.9	
Seasonal 25 (OH) D3 levels (ng/mL)	Spring	32.9 ± 13.2	0.751
	Summer	34 ± 14.8	
	Autumn	33.4 ± 14.1	
	Winter	34.6 ± 14.9	
Groups 25 (OH) D3 levels (ng/mL)	Group 1 (deficiency)	13.7 ± 4.2	0.001
	Group 2 (insufficiency)	24.9 ± 2.8	
	Group 3 (normal)	43.3 ± 10.3	

Figure 1: The patient groups' seasonal distribution.



tistically significant difference among the groups (p = 0.462). Figure 2 shows the distribution of VDD and VDI cases on the Adıyaman map. The neighborhoods, which are shown in the red frame, are the most common VDD and VDI patients. The numbers for each neighborhood, which are given in Table 2, appear in the yellow bubble in Figure 2.

DISCUSSION

VDD and VDI are preventable public health problems in the world. In the early 2000s, the Republic of Turkey's Ministry of Health launched a national campaign of vitamin D supplementation for children in the first six months of life.[7] After this campaign, VDD and VDI prevalence was reduced. Currently, this free of charge program for vitamin D supplementation is still in effect. Vitamin D supplementation is a means of protecting a child against rickets. Moreover, some studies have reported a relationship between the conditions of VDD and VDI and many diseases such as type 1 diabetes mellitus, systemic lupus erythematosus, multiple sclerosis, cardiovascular disease, and several other malignancies.[9] Therefore, because so many diseases in all age groups are related to VDD and VDI, VDD and VDI must be remedied.

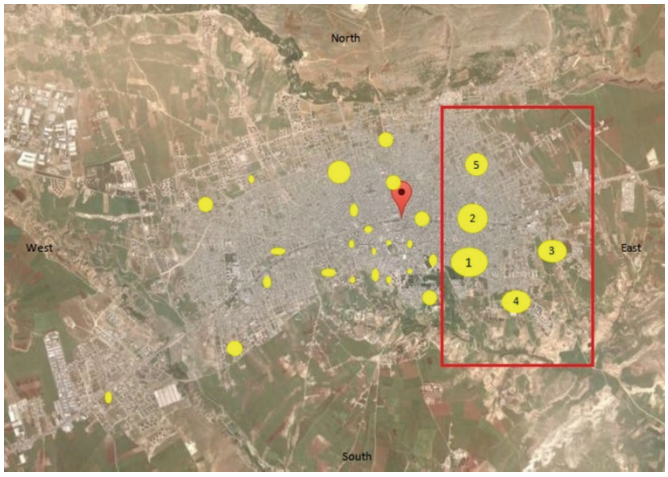


Figure 2: The distribution of Group 1 and Group 2 on the Adıyaman map. (The area in the red frame constitutes five neighborhoods. The same numbers appear in the yellow bubble in Table 1).

There are many risk factors for VDD and VDI, including breast feeding exclusively, skin color of children, age of individuals (infants, children, adolescents), pregnancy and nursing, dietary habits, development level of the country, traditional clothing (adolescents and young adults), chronic illnesses, and obesity.[6,7,10-13] Chung et al.[12], Du et al.[14], and Erol et al.[15] determined that VDD increases in the winter-spring season. However, our study proved that there is no relationship among seasons. According to official data, the average duration of sunshine throughout the year ranged from 2.4–11.6 hours/day in Adıyaman.[16] The minimum 2.4 hours/day of sunshine can explain why there is no difference in VDD and VDI rates among the seasons.

Gur et al.[17] showed that monthly family income level is related to VDD and VDI; however, they showed that the type of family residence (apartment or slum) does not affect the incidence of VDD and VDI. Akman et al.[18] grouped pediatric patients as urban and rural in Ankara, the capital city of Tur-

key, and compared the groups' vitamin D levels. This study showed that there were no significant statistical differences between the urban and rural groups' vitamin D levels.[18].

Adıyaman is a small city in Turkey, and 220,000 people live in the city center. Our study showed that there was no statistically significant difference among the groups' patients number in terms of the location of their residences ($p = 0.462$). However, the five neighborhoods that had the most cases of vitamin D deficiency and insufficiency are adjacent to each other. These five neighborhoods had a total of 129 VDD and VDI patients. The important point to be noted here, the total VDD and VDI pediatric patients, approximately 40% of those admitted to the hospital were from these five neighborhoods.

CONCLUSION

To date, no study has examined the vitamin D status of patients based on their residence location in a small city in Turkey. This study showed that vitamin D levels do not differ among neighborhoods in Adıyaman. However, the incidence of VDD and VDI is high in some neighborhoods. Therefore, pediatricians who are working in Adıyaman city center should exert special care when treating VDD and VDI patients from the Bahçelievler, Siteler, Yunus Emre, Imamaga, and Yesilyurt neighborhoods of the city. Similar studies should be carried out in major cities like İstanbul, Ankara, and İzmir, and residence location-based results should be used as a guide for pediatricians who treat patients with VDD and VDI.

Conflict of Interest:
The authors declare that they have no conflict of interest.

Financial Disclosure:
No financial support was received.

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