

**RESEARCH
ARTICLE**

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Evaluation of Vitamin D Levels in Home Care Patients

ABSTRACT

Objective: Vitamin D deficiency has become an epidemic for all age groups in the world. This research aims to evaluate the vitamin D deficiency in home care patients and related lifestyle reasons.

Methods: This research included Home Care patients registered to İstanbul Şişli Hamidiye Etfal Training and Research Hospital between January 2015 – February 2016. After getting the patients' vitamin D records retrospectively, we have inquired patients if they had regular exposure to sunlight, whether they had a history of fracture or osteoporosis, and other related lifestyle habits. D vitamin deficiency were grouped as normal (>30ng/ml), insufficiency (20-30ng/ml), deficiency (lower than 20ng/ml), and severe deficiency (lower than <10ng/ml). The data was evaluated with SPSS 20.0 program, using frequencies, chi-square, and T-tests.

Results: A total of 232 patients were included in this study. There were 160 (69%) women and 72 (31%) men. Vitamin D insufficiency was found in 11.2% (n=26), and vitamin D deficiency in 70.3% (n=163). 70.1% (n=96) of 137 patients who answered the questions were female and 29.9% (n=41) were male. 86.1% of them (n=118) did not benefit from sunlight, 63.5% (n=87) had not received vitamin D treatment before. Vitamin D deficiency was detected in 79.3% (n=69) of those who did not receive vitamin D treatment, and a significant relationship was found between them.

Conclusions: Our study found that most home care patients had low Vitamin D levels, did not have regular exposure to sunlight, and did not exercise regularly. Vitamin D replacement is vital in home-care patients as vitamin D deficiency increases the risk of osteoporosis, falls, and fractures.

Keywords: Vitamin D, Home Care, Home Health Care, 25(OH)D, Elderly.

Evde Bakım Hastalarında D Vitamini Düzeylerinin Değerlendirilmesi

ÖZET

Amaç: D vitamini eksikliği tüm dünyada bütün yaş grupları için bir salgın haline gelmiştir. Bu araştırmanın amacı evde bakım hastalarında D vitamini eksikliğini ve buna bağlı yaşam tarzı nedenlerini değerlendirmektir.

Gereç ve Yöntem: Bu araştırma, Ocak 2015 - Şubat 2016 tarihleri arasında İstanbul Şişli Hamidiye Etfal Eğitim ve Araştırma Hastanesine kayıtlı Evde Bakım hastalarında yapılmıştır. Hastaların D vitamini kayıtları retrospektif olarak toplandıktan sonra, hastalara düzenli güneş ışığına maruz kalıp kalmadıkları, kırık veya osteoporoz öyküsü olup olmadığı ve diğer ilgili yaşam tarzı özellikleri sorgulandı. D vitamini eksikliği şu şekilde gruplandırıldı; normal (> 30ng / ml), yetersizlik (20-30ng / ml), eksiklik (20ng / ml'den az) ve ciddi eksiklik (<10ng / ml'den az). Veriler SPSS 20.0 versiyonunda frekans, ki-kare ve T testi kullanılarak değerlendirildi.

Bulgular: Çalışmaya evde bakım hizmeti verilen 232 hasta dahil edildi. Hastaların %69'u (n=160) kadın; %31'i (n=72) erkekti. % 11.2'sinde (n=26) D vitamini yetersizliği; %70.3'ünde (n=163) D vitamini eksikliği saptandı. Soruları yanıtlayan 137 hastanın %70.1'i (n=96) kadın, %29.9'u (n=41) erkekti. Bunların %86.1'i (n=118) güneş ışığından faydalanmıyordu, %63.5'i (n=87) daha önce D vitamini tedavisi almamıştı. D vitamini tedavisi almayanların% 79,3'ünde (n = 69) D vitamini eksikliği tespit edildi ve aralarında anlamlı bir ilişki bulundu.

Sonuç: Çalışmamızda, evde bakım hastalarının çoğunun düşük D vitamini seviyelerine sahip olduğunu, düzenli olarak güneş ışığından faydalanmadıklarını, düzenli egzersiz yapmadıklarını bulduk. D vitamini eksikliği, osteoporoz, düşme ve kırık riskini artırdığı için, evde bakım hastalarında D vitamininin replasmanı önemlidir.

Anahtar Kelimeler: D Vitamini, Evde Bakım, Evde Bakım Hizmetleri, 25(OH)D, Yaşlı.

INTRODUCTION

Home health service provides physical and laboratory examinations, treatment, medical care, and rehabilitation services at home and in the family environment of individuals who need care due to various diseases (1). The prolongation of the average life expectancy along with the increase in the elderly population and consequently the chronic diseases have necessitated the need for qualified long-term care services (2). With home care service, it is aimed to provide care and health services for the patients who are elderly, disabled, with chronic diseases, and who need long-term care so that they can continue their lives within the home environment. In addition, social and psychological support services are provided to these people and their family members as a whole (1). With the increasing need for home care, the Ministry of Health started to provide home health services within the scope of the social state policy with the directive published in 2010.

Patients receiving home care services are individuals with a high risk of vitamin D deficiency due to reasons such as immobilization, disability, and being bedridden. Vitamin D can be classified as a steroid hormone produced in human skin from 7-dehydrocholesterol due to exposure to ultraviolet B rays (UVB; 280–315 nm range) from sunlight (3). To assess a patient's vitamin D status, 25(OH)D is measured, which is the vitamin D metabolite (4). Until the 21st century, vitamin D was primarily recognized for its role in regulating calcium and bone health and preventing rickets (5). However, in the last 20 years, research has shown that vitamin D also profoundly influences immune cells and generally lowers inflammation (6,7). Vitamin D is a powerful epigenetic regulator, influencing more than 2500 genes (8) and impacting dozens of our most serious health challenges, including cancer (9,10), diabetes mellitus (11), acute respiratory tract infections (12), and autoimmune diseases such as multiple sclerosis (13).

Elderly residents in residential care homes/nursing homes, particularly those with limited mobility, are likely to spend more time indoors and have limited sun exposure. For nearly 30 years, they have been recognized in the UK as a group vulnerable to vitamin D deficiency and requiring routine supplementation without pre-screening (14,15,16). In 2016, recommendations for daily vitamin D supplements were extended to the entire population in the winter months and throughout the year for those living in care homes (17). National bodies from countries around the world have issued similar recommendations for care home residents, including Australia, Canada, France, Norway, New Zealand, and the USA (18 19). Although the elderly and insufficient exposure to the sun are considered high-risk groups for vitamin D deficiency (20), in our country, routine

vitamin D supplementation without pre-screening is not recommended for home care patients yet.

Due to the high rates of vitamin D deficiency in home care patients, the importance of the subject was emphasized because of its complications and lack of studies in the literature. This study was performed to obtain information about the vitamin D levels, determine the related lifestyle reasons, and emphasize the importance of vitamin D replacement of the patients within the scope of home health services.

MATERIAL AND METHODS

Study Design: This study had a retrospective descriptive design.

Study Population and Design: This research was performed by evaluating the examination records of the patients registered in the Home Health Services Unit of Istanbul Şişli Hamidiye Etfal Training and Research Hospital for the past 14 months, between January 2015 and February 2016. No questionnaire was applied in the study. Instead, the patients were asked about benefiting from sunlight, using vitamin D supplements, history of active and passive exercises, history of fractures, whether they had a bone scan, and whether they were diagnosed with osteoporosis, by phone or during home visits. In addition, the patients' files were reviewed to record age, gender, medications used, comorbidities, and related to vitamin d deficiency complications. The research population consisted of home care patients registered in Şişli Hamidiye Etfal Training and Research Hospital Home Care services.

Home care patients whose previous examination results could be obtained, volunteer patients of both genders, who were contacted by telephone or visited at home, did not have any psychiatric disease, and did not have communication barriers, were included in the study. Those with communication barriers, those who did not agree to answer the questions, those diagnosed with any degree of active and/or chronic psychiatric disease, and those who had a history of psychiatric drug use at the time of admission were excluded from the study.

In order to determine the rates of vitamin D deficiency, the examination results of 232 patients registered in the home care unit were obtained. The causes of vitamin D deficiency were evaluated in 137 patients who could be contacted among the patients whose examination results were obtained.

Vitamin D deficiency and normal values were grouped based on the Osteoporosis and Metabolic Bone Diseases Diagnosis and Treatment Guidelines of the Turkish Society of Endocrinology and Metabolism (TEMED). Vitamin D deficiency were grouped as normal (>30ng/ml), insufficiency (20-30ng/ml), deficiency (lower than 20ng/ml) and severe deficiency (lower than <10ng/ml).

Research Approval: Sisli Hamidiye Etfal Training and Research Hospital Home Care Services Manager. 02.03.2016.

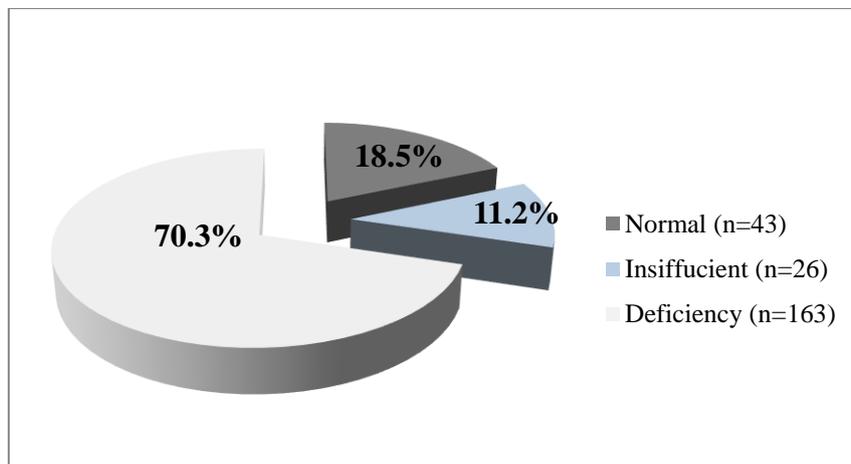
Statistical Analysis: The data were analyzed using a statistical package program (Statistical Package for the Social Sciences-SPSS for Windows, Version 20). The normality analysis of numerical values was performed using the Shapiro-Wilk test. The frequencies of the data were expressed as percentages (%) and n values. The Mann-Whitney U test compared numerical data that did not show normal distribution between two independent groups.

The chi-square test investigated the statistical difference between two variables with the nominal dichotomous distribution. The results were evaluated at the 95% confidence interval and a p-

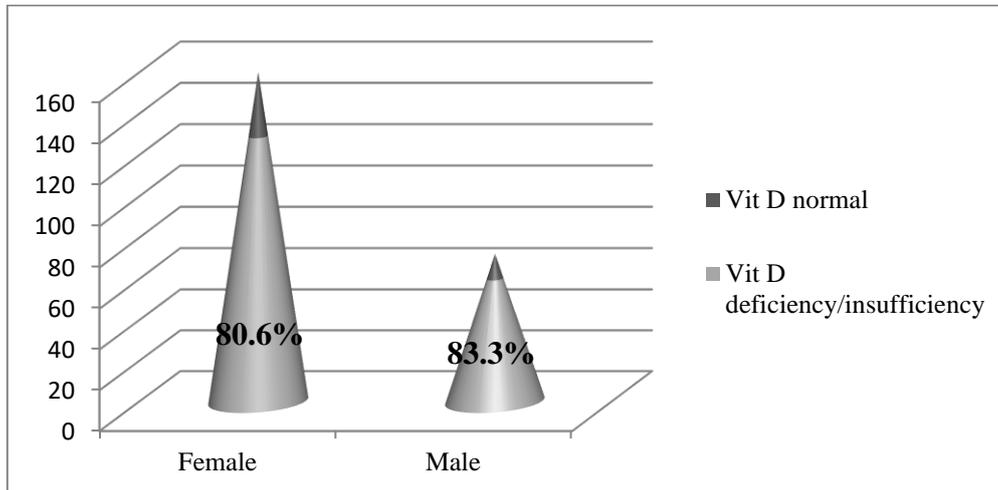
value of <0.05 was considered statistically significant.

RESULTS

Two hundred thirty-two patients who received home care services were included in the study. 69% of the patients (n=160) were female, and 31% (n=72) male. Vitamin D level was found to be normal in 18.5% (n=43) of home care patients. Vitamin D insufficiency was found in 11.2% (n=26), and vitamin D deficiency in 70.3% (n=163) (Graphic 1). When the vitamin D levels of patients were evaluated according to their genders, as shown in Graphic 2, 80.6% (n=129) of females and 83.3% of males (n=60) who received home care services had vitamin D deficiency or insufficiency. No significant relationship was found between gender and vitamin D deficiency (p=0.623).



Graphic 1. Vitamin D levels of patients



Graphic 2. Vitamin D levels by gender

137 of the 232 patients included in the study answered the questions. An additional evaluation was made between the vitamin D levels of 137 patients who answered the questions and criteria such as benefiting from sunlight, exercising, using vitamin D supplements, getting a diagnosis of osteoporosis. In this evaluation, no significant relationship was found between the vitamin D

levels of the patients who answered the questions by gender; in both samples, it was found that p-values were close to each other (p=0.689 n=137/ p=0.623 n=232). 70.1% (n=96) of the patients who answered the questions were female, and 29.9% (n=41) were male. 86.1% of them (n=118) did not benefit from sunlight, 63.5% (n=87) had not received vitamin D treatment before.

Vitamin D deficiency was detected in 79.3% (n=69) of those who did not receive vitamin D treatment, and a significant relationship was found between them (p=0.005) (Table 1). Also 89.6% (n=86) of those with vitamin D deficiency did not benefit from sunlight (p=0.194) (Table 2).

Table 1. Vitamin D levels by vitamin D use status of patients

Vitamin D Level	Normal	Insufficiency	Deficiency	P
Those who use Vitamin D	61.5% (n=16)	46.7% (n=7)	28.1% (n=27)	0.005
Those who do not use Vitamin D	38.5% (n=10)	53.3% (n=8)	79.3% (n=69)	

Table 2. Status of benefiting sunlight by vitamin D levels of patients

Status of Benefiting Sunlight	Yes	No	P
Vitamin D Normal	23.1% (n=6)	76.9% (n=20)	0.194
Vitamin D Insufficiency	20% (n=3)	80% (n=12)	
Vitamin D Deficiency	10.4% (n=10)	89.6% (n=86)	

59.9% (n=82) of the patients did not exercise regularly, 13.1% (n=18) had active exercises, and 16.8% (n=23) had passive exercises. 16.7% (n=3) of active exercisers, 13% (n=3) of passive exercisers, 33.8% (n=8) of both active and passive exercisers benefited from sunlight, and a significant relationship was found between them (p=0.014) (Table 3).

Table 3. Benefiting from sunlight rates by active/passive exercise status

Status of Benefiting Sunlight	Yes	No	P
Those who Exercise Actively	16.7% (n=3)	83.3% (n=15)	0.014
Those who Exercise Passively	13% (n=3)	87% (n=20)	
Those who Exercise Actively and Passively	6.9% (n=5)	93.1% (n=67)	
Those who do not Exercise	33.3% (n=8)	66.7% (n=16)	

The rate of those diagnosed with osteoporosis was 22.6% (n=31), and 69.3% (n = 95) did not know whether they had osteoporosis or not, as well as 21.9% (n=30) of the patients had a fracture history, while 75.2% (n=103) did not have a bone scan before (Table 4). 64.7% (n = 22) of those who had a bone scan did not have a history of fractures, and 17.5% (n=18) of those who did not have a bone scan had a history of fractures. A significant relationship was found between bone scan rates and fracture history (p=0.029).

Table 4. Fracture history, undergoing bone scanning and osteoporosis diagnosis rates of patients

	Yes	No	Unknown
Fracture History	21.9% (n=30)	% (n=107)	
Undergoing Bone Scanning Status	75.2% (n=103)	% (n=34)	
Osteoporosis Diagnosis	22.6% (n=31)	% (n=11)	69.3% (n=95)

18.8% (n=18) of those with vitamin D deficiency and 24.4% (n=20) of those who did not exercise regularly had a history of fracture (p=0.377 and 0.389, respectively). 20.7% (n=17) of those who did not exercise regularly were diagnosed with osteoporosis (p=0.087).

When the rates of undergoing a bone scan by gender were evaluated, 29.2% of females (n=28) and 14.6% of males (n=6) underwent a bone scan. No significant relationship was found between gender and undergoing a bone scan (p=0.071). Moreover, 85.3% (n =29) of those who had a bone scan were diagnosed with osteoporosis, and the relationship between them was considered significant (p=0.000). When the relationship between gender and the diagnosis of osteoporosis was evaluated, 26.0% of females (n=25) and 14.6% of males (n=6) were diagnosed with osteoporosis, and no significant relationship was found between gender and osteoporosis (p=0.181)

DISCUSSION

Vitamin D deficiency, which is considered a pandemic today, is observed at high rates in home-care patients as it is also common in society. In our study, approximately 4 out of 5 home care patients were found to have vitamin D deficiency or insufficiency. It was determined that the majority of home care patients with vitamin D deficiency did not benefit from sunlight and did not take vitamin D supplements before. The sunbathing opportunities of the elderly have decreased even more, especially in those who are home-dependent, which indicates the importance of oral vitamin D supplementation (21).

It is estimated that 200 million people in the world have osteoporosis, one of the complications of vitamin D deficiency. Moreover, every 1 in 3 women and 1 in 5 men are at risk for osteoporotic fractures (22). In this study, when the relationship between vitamin D deficiency was evaluated by gender of the patients, it was concluded that gender did not affect the vitamin D level. Similarly, no significant relationship was found between osteoporosis diagnosis and fracture history to gender. Supporting our study, Küçükardalı et al. and Erkin et al. stated that the bone fracture rate in geriatric patients in our country is between 7.3-14.3%, regardless of gender (23,24).

Our study revealed that there was a significant relationship between exercising and benefiting from sunlight. Supporting our study, Bischoff-Ferrari et al. found a positive relationship between 25(OH)D vitamin and lower extremity functions, proximal muscle strength, and physical activity (25,26). In line with our study results, we think that supporting home care patients in terms of active and passive exercise and increasing their benefit of sunlight will both increase the muscle strength of the patients and meet their vitamin D needs. In this way, complications that may develop will be prevented, and the quality of life of home care patients will be positively supported.

When the fracture rates, which is another complication of vitamin D deficiency, and bone scanning of the patients were evaluated, a significant relationship was found between them. In the study of Khaw et al. and Martinez et al., with vitamin D supplementation, they found a positive correlation between serum calcidiol levels and lumbar spine BMD in postmenopausal women and BMD of the femoral neck, thoracic, and Ward triangle in women over 60 years old (27,28). As per the Turkish Association of Endocrinology and Metabolism (TEMED), BMD is closely related to bone strength. Prospective studies have shown that the risk of fracture increases with the decrease in BMD. Therefore, BMD has been accepted as an excellent indicator of possible future fracture risk (20).

On the other hand, in the study of Bartl et al., it was emphasized that bone mineral density measurement is a valuable method to detect the presence of osteoporosis before a fracture occurs (29). Today, evaluation of BMD is considered the golden standard in diagnosing osteoporosis (22), and it is recommended that women aged 65 and over and men aged 70 and over should have a BMD measurement at least once in their lives (30). In our study, 85.3% of those who had a bone scan were

diagnosed with osteoporosis, and their relationship was considered significant.

It was determined that approximately 2 out of 5 patients diagnosed with osteoporosis also had a fracture history. Also, Akpolat et al. emphasized that the most critical complication associated with osteoporosis is a fracture (31). Wacker et al. found that the risk of fracture was lower in patients with 25(OH)D vitamin levels of >30 ng/mL (32). Vitamin D deficiency is an identified risk factor for osteoporosis, falls, and fractures (33). In addition, muscle strength, postural and dynamic balance can be increased with vitamin D supplementation (25,26).

CONCLUSION

With the prolongation of human life, the number of patients receiving home care services has gradually increased. The lack of sunbathing opportunities in home-care patients brought vitamin D deficiency along with it, and vitamin D deficiency rates of home care patients were found to be high in our study.

Benefiting sunlight directly affects the synthesis of vitamin D. Active or passive exercise positively affects vitamin D metabolism. Measurement of bone mineral density enables osteoporosis diagnosis and determination of vitamin D deficiency, which is another etiological cause.

Vitamin D replacement is vital in home-care patients as vitamin D deficiency increases the risk of osteoporosis, falls, and fractures.

With the detection and treatment of vitamin D deficiency, the quality of life of home care patients should be increased, and mortality and morbidity rates should be reduced. Also, considering the examples in the world, studies should be increased to ensure that home care patients receive vitamin D replacement without routine screening.

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