

Original article

Study to analyze correlation between vitamin D-3 deficiency and age in patients with orthopedic disorders

FAISAL MATAR ALANAZI¹, MOHAMMED MOHSEN ALMAZNAI², MURWI MUZHIR OWAID ALSHAMMARI³, KHALID MATAR AL ANAZI⁴, AHMAD MOHAMED AL GHAMDI⁵, KHALID MOHAMED ALMUTARI⁶

AUTHORS NAME AND AFFILIATIONS:

¹Doctor of Pharmacy, Senior Clinical Pharmacist, Head of Medical Affairs, Directorate of Hafar Al batin Ministry of Health, Saudi Arabia

²Master of Pharmacy, Director of Allied Healthcare Services Outcomes, Ministry of Health, AlDammam, Saudi Arabia

³Bachelor of Health Administration, Head of Health Assisting Services, Ministry of Health, Hafar Al batin, Saudi Arabia

⁴Head of Radiology Department, King Khalid General Hospital, Ministry of Health, Hafar Al batin, Saudi Arabia

⁵Master of Pharmacy, Senior Pharmacist, Ministry of Health, Jeddah, Saudi Arabia

⁶Bachelor of Health Administration, Ministry of Health, Hafar Al batin, Saudi Arabia

Corresponding Author: Faisal Matar Alanazi, Head of Medical Affairs, Directorate of Hafar Al batin Ministry of Health, Saudi Arabia

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Abstract

Background and Aim: A considerable number of studies have suggested that there is a strong correlation between 25-hydroxyvitamin D or vitamin D levels and overall health, with reported impacts ranging from mental health and vital organ health to musculoskeletal health. Our study's objective is to assess vitamin D deficiency in individuals of all ages and sexes with a particular emphasis on low levels of vitamin D-3 (30), which can help to prevent severe vitamin D shortage in light of the growing public health concern.

Material and Methods: The present observational, retrospective study was conducted at the king Khaled general hospital Hafar Al batin, Saudi Arabia for the duration of 2 years. The medical records of patients with orthopedic diseases who were admitted to the hospital across the age spectrum and in both genders were examined. To evaluate the relationship between vitamin D-3 levels and different age groups, we looked at the data of 800 such patients. Minor vitamin D deficiency is classified as vitamin D insufficiency (25-OHD 20-30 ng/mL) and moderate and severe vitamin D deficiencies are classified as deficiency (25-OHD 20 ng/mL).

Results: 800 patients' records were examined during the study period, with 250 men (31.25%) and 550 women (68.75%) represented in the patient records. 510 patients (63.75%) had vitamin

D deficiency (20 ng/ml), 140 patients (17.5%) had levels between 20 and 30 ng/ml, and 217 patients (21%) had adequate levels. Young people (ages 31 to 40) have higher levels of vitamin D deficiency than other age groups, according to age groupings. 20% of patients in the 31–40 year age group had vitamin D insufficiency.

Conclusion: Although people of all ages are at risk for vitamin D insufficiency, those between the ages of 31 and 40 were the most affected. Compared to men, women have a higher chance of developing hypovitaminosis D. Clinical professionals who are worried about vitamin D deficiency must work diligently and together to raise public awareness of the condition.

Key Words: Hypovitaminosis, Gender, Observational Study, Vitamin D

Introduction

For the health of people of all ages, vitamin D, also known as 25-hydroxyvitamin D [25(OH)D], is a fat-soluble important vitamin that controls calcium homeostasis.¹ Vitamin D can be created endogenously through vitamin D synthesis when the skin is exposed to the UV rays of sunshine. It is naturally present in many foods and dietary supplements.² The best indication of vitamin D levels, 25(OH)D, has a blood concentration of less than 30 nmol/L (nmol/L=0.4 ng/mL), which is deemed insufficient for adults' general health and welfare.³

The sunlight vitamin or the anti-rickets factor is how people have historically referred to vitamin D. It is vital for maintaining calcium homeostasis and is required for a variety of processes, including the normal mineralization of bones, muscular contraction, and the transmission of nerve impulses.⁴ Chronic vitamin D insufficiency causes gout, ankylosing spondylitis, generalized body aches, osteoporosis, osteomalacia, muscle weakness, osteoarthritis, generalized body aches, increased risk of falls, etc.⁵ Although vitamin D deficiency is very common, there is currently insufficient evidence to suggest vitamin D supplementation.⁶ There is a clear correlation between vitamin D insufficiency and a number of health outcomes, including all-cause death.⁷ In addition to being linked to cancer, autoimmune and infectious illnesses, hypertension, diabetes, and metabolic syndrome, vitamin D is a crucial nutrient for bone health and for reducing falls and fractures.⁸ Reduced calcium absorption, intestinal resistance to circulating 1, 25(OH)2D, decreased vitamin D receptors, decreased renal production of 1, 25(OH)2D by the ageing kidney, decreased skin production of vitamin D, and vitamin D substrate deficiency are just a few of the effects of ageing on vitamin D and calcium metabolism.⁹

Our study's objective is to assess vitamin D deficiency in individuals of all ages and sexes with a particular emphasis on low levels of vitamin D-3 (30), which can help to prevent severe vitamin D shortage in light of the growing public health concern.

Material and Methods

The institutional ethics committee gave its clearance before this study could be conducted. The study was an observational, retrospective study with a 2-year data collection period. The present study was conducted at the king Khaled general hospital Hafar Al batin, Saudi Arabia. The medical records of patients with orthopaedic diseases who were admitted to the hospital across

the age spectrum and in both genders were examined. To evaluate the relationship between vitamin D-3 levels and different age groups, we looked at the data of 800 such patients. According to a predetermined scale that we adopted from the literature and which is detailed in the paragraph below, we divided instances into mild, moderate, and severe categories. According to this classification, minor vitamin D deficiency is classified as vitamin D insufficiency (25-OHD 20-30 ng/mL) and moderate and severe vitamin D deficiencies are classified as deficiency (25-OHD 20 ng/mL).¹⁰

Statistical analysis

Microsoft Excel 2007 was used to compile and input the collected data, which was then exported to the data editor page of SPSS version 15 for analysis (SPSS Inc., Chicago, Illinois, USA). The level of significance and confidence level for each test were set at 5% and 95%, respectively.

Results

800 patients' records were examined during the study period, with 250 men (31.25%) and 550 women (68.75%) represented in the patient records. (Table 1) 510 patients (63.75%) had vitamin D deficiency (20 ng/ml), 140 patients (17.5%) had levels between 20 and 30 ng/ml, and 217 patients (21%) had adequate levels. (Table 2)

Young people (ages 31 to 40) have higher levels of vitamin D deficiency than other age groups, according to age groupings. 20% of patients in the 31–40 year age group had vitamin D insufficiency. Between various age groups, this variation in vitamin D was statistically significant. ($p \leq 0.05$)

Table 1: Gender wise Distribution of Study Participants

Gender	Number	Percentage (%)
Male	250	31.25
Female	550	68.75
Total	800	100

Table 2: Distribution of Patients as per Vitamin Deficiency

Vitamin D Level	Number	Percentage (%)
< 20 ng/ml	510	63.75
20-30 ng/ml	140	17.5
>30 ng/ml	150	18.75

Discussion

In India, vitamin D insufficiency is pervasive. Numerous studies have emphasized the low vitamin D levels found in a range of people, including young individuals, hospital staff, postmenopausal women, and schoolchildren.^{11,12} Our study demonstrates a significant frequency of vitamin D insufficiency among hospital inpatients in the orthopaedic department. The prevalence of vitamin D deficiency and vitamin D insufficiency in our study was determined to

be 61% and 18%, respectively, according to the classification taken from the literature. Among the general population, Hashemipour et al. found that the frequency of severe, moderate, and mild vitamin D deficiencies was 9.5%, 57.6%, and 14.2%, respectively. This represents an overall deficiency case rate of 67% and is consistent with the present study's findings.¹³ In India, patients with low back pain had a prevalence of vitamin D deficiency of almost 50%, which is also consistent with our findings.¹⁴

The findings of our study indicate that young individuals aged 31 to 40 years had a higher prevalence of deficit, with more females affected than males. Only a few other investigations have confirmed the link between feminine gender and vitamin D insufficiency.^{15,16} However, additional research published in the literature demonstrates that vitamin D deficiency in older persons is frequently thought to be more common.^{17,18} Similar to prior investigations, this study found a substantial correlation between vitamin D levels and the amount of skin exposed to sunshine and how long that exposure lasted.¹⁹ The main contributing factors in the local community were religiously covering the entire body or, in the case of female subjects, simply exposing the face and hands when stepping outside due to concerns about skin tannification. There may be substantial health consequences if more young individuals become afflicted by the deficit, which would have a significant negative impact on the country's economy.

The production of vitamin D, also known as the "sunshine vitamin," has been going on for more than half a billion years. When exposed to sunshine, previtamin D₃ isomerizes into vitamin D₃ in the body after absorbing ultraviolet B (UVB) radiation from 7-dehydrocholesterol. In addition to absorbing UVB radiation, previtamin D₃ and vitamin D₃ are also transformed into a range of photoproducts, some of which have distinct biological characteristics. Numerous prehistoric and historical perspectives exist on the creation of vitamin D and sunlight. According to a study, getting vitamin D from sunlight is preferable to taking supplements.^{20,21}

Given that young adults are the foundation of the nation's economic stability in terms of mitigating this growing health crisis, the current level of knowledge calls for collaboration among health institutions to assist find the most effective measures to enhancing the health of our population.

Conclusion

Although people of all ages are at risk for vitamin D insufficiency, those between the ages of 31 and 40 were the most affected. Compared to men, women have a higher chance of developing hypovitaminosis D. Clinical professionals who are worried about vitamin D deficiency must work diligently and together to raise public awareness of the condition.

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