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Assessment of Vitamin D Serum Levels in Individuals with Orthopaedic Disease: A cross sectional analysis

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ABSTRACT

Introduction: Orthopaedic surgeons may find it useful to know the prevalence of vitamin D sufficiency and insufficiency when treating patients to avoid potential complications during and after surgery, to maintain good physical function, and to maintain independence in daily life. This observational study's aim was to assess vitamin D serum levels in individuals who presented with orthopaedic disease.

Materials & Methods: The 262 patients from both genders who were included in the study were subjected to cross-sectional analysis for the current study. After an overnight fast without venostasis, a 10 ml blood sample was taken from each study participant. According to a recent consensus, the participants were categorised as vitamin D deficient, insufficient, or sufficient based on 25(OH)D values of 20 ng/ml, 21-29 ng/ml, and 30-100 ng/ml, respectively.

Results: The prevalence of vitamin D deficiency in females was higher than in males (20 ng/dl), although this difference was not statistically significant (p-value = 0.65). Males and females, respectively, had vitamin D insufficiency rates of 31.9% and 37.4% in the age group of 41 to 60 years. Both the difference in vitamin D deficiency and the difference in vitamin D insufficiency were significant in the 61-80 age group for both males and females.

Discussion & conclusion: vitamin D deficiency is certainly present among orthopaedic patients of all ages and occurs at an alarmingly high rate. Low vitamin D levels can be caused by poor dietary consumption, inadequate sun exposure, inadequate supplementation, and other issues. Public education regarding the necessity for dietary adjustments and lifestyle changes that allow for more opportunities to be exposed to sunshine is necessary.

Keywords: Prevalence, Orthopaedic patients, Micronutrients, Vitamin D.

Introduction

The prohormone vitamin D, also referred to as the "sunshine vitamin," has been shown to play a variety of roles in biological processes. Solar UVB radiation is thought to be the main source of this vitamin. As a result of this exposure, a reaction takes place in which a precursor changes into the active metabolite 1,25-

dihydroxyvitamin, which then produces vitamin D. Liver and kidney play crucial roles in the generation of vitamin D, as has been indicated by earlier studies.[1,2]

Vitamin D is crucial for bone metabolism as well as a number of non-skeletal illnesses such diabetes, cancer, cardiovascular disease, autoimmune diseases, and infectious diseases. It is now well established that a lack of vitamin D contributes to muscle weakness, which includes falls and fractures. More than 1 billion individuals worldwide, particularly in the Middle East and Asia, have been reported to have a high frequency of vitamin D deficiency. This condition has been observed in people of various racial and ethnic backgrounds.[3,4]

Maintaining a regulated metabolism inside the bone microenvironment requires vitamin D. As a result, endocrine modifications, such as severe vitamin D insufficiency, may cause an increase in bone turnover that affects the bone microenvironment. Adults who experience severe vitamin D deficiency may develop osteomalacia, a condition marked by inadequate bone mineralization. Similar to adults, children with severe vitamin D deficiency can develop rickets, which is characterised by a reduced mineralization of bone tissue and the growth plates. Additionally, a persistent vitamin D shortage causes secondary hyperparathyroidism, which speeds up and increases bone turnover.[5-7]

In fact, vitamin D insufficiency is epidemic in many cultures throughout the world and has been observed in healthy populations of both sexes and across all age categories. More than 90% of Indians who appear healthy also have subnormal 25(OH)D levels. There are few studies comparing vitamin D deficiency in orthopaedic patients to that in a group that appears to be healthy.[8]

Orthopaedic surgeons may find it useful to know the prevalence of vitamin D sufficiency and insufficiency when treating patients to avoid potential complications during and after surgery, to maintain good physical function, and to maintain independence in daily life. This observational study's aim was to assess vitamin D serum levels in individuals who presented with orthopaedic disease.

Materials & Methods

The 262 patients from both genders who were included in the study were subjected to cross-sectional analysis for the current study. The patients that were involved in the study had a minimum age of more than 18. The hospital's and medical college's orthopaedics department conducted the analysis. The investigation was conducted over the course of a full year. After receiving written informed consent, every participant was enlisted. Following a thorough history review and general and systemic physical examination, the study participants were chosen.

This cross-sectional study was conducted among subjects who were 18 years of age and older. Among the factors for exclusion are: Women who are pregnant or nursing 2. A person under the age of 18 3. Individuals using vitamin supplements. 4. People who suffer from severe liver, renal, endocrine, and CVS illnesses 5. Who don't want to participate. All participants provided their informed consent after receiving permission from the institution's institutional ethics committee.

Participants were chosen using a nonprobable sampling technique. After receiving information about the study, all participants, parents, and guardians voluntarily consented and signed written informed consent. Once participation had been approved, each patient's checklist—which was created with information on age, gender, weight, BMI, and socioeconomic status in mind—was filled out with demographic data.

After an overnight fast without venostasis, a 10 ml blood sample was taken from each study participant. The samples were set into ice chests. Whole blood was sent to the lab in batches while being kept refrigerated. After centrifugation at 3000 rpm for 15 minutes at 480C in the lab, serum was separated. After centrifugation, the serum was kept at a temperature of minus 20.8°C in the lab freezer until further examination. The concentrations of serum 25(OH)D will be calculated using a radioimmunoassay. Total calcium (Ca), inorganic phosphate, intact parathyroid hormone (PTH-i), alkaline phosphates, and 1,25(OH)2D were among the serum markers that were analysed.

In EDTA plasma collection tubes, the venous blood samples for PTH assay were collected. Using a two site binding immunoradiometric test, intact PTH was identified. The amount of time spent in direct sunshine on a daily basis and the percentage of body surface area exposed were recorded for evaluation. According to a recent consensus, the participants were categorised as vitamin D deficient, insufficient, or sufficient based on 25(OH)D values of 20

ng/ml, 21-29 ng/ml, and 30-100 ng/ml, respectively.

Statistical analysis: Variables were expressed as percentages. The data obtained was analyzed by chi-square test. P<0.05 was considered as statistically significant.

Results

It was discovered that 60% of the study volunteers were between the ages of 18 and 40, 31% were between the ages of 41 and 60, and 9% were over the age of 61. According to the findings, there were 50% females and 50% males.

In this investigation, a strong correlation between age and vitamin D insufficiency was found. In this study, a higher percentage of females than males had vitamin D deficiency, which is statistically significant (P 0.05). In comparison to participants who were of normal weight, a larger percentage of overweight subjects exhibited vitamin D insufficiency, which is statistically significant (P 0.05).

The prevalence of vitamin D deficiency in females was higher than in males (20 ng/dl), although this difference was not statistically significant (p-value = 0.65). When continuous associations were taken into consideration, there were significant differences between the vitamin D levels of men and women in the sample. The difference in vitamin D sufficiency in this age group was likewise substantial, as was the difference in vitamin D deficiency (20 ng/dl) between males and females in the same group. Males and females, respectively, had vitamin D insufficiency rates of 31.9% and 37.4% in the age group of 41 to 60 years. Both the difference in vitamin D deficiency and the difference in vitamin D insufficiency were significant in the 61-80 age group for both males and females.

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Table 1: Distribution of severity of deficiency

Vitamin D deficiency	No. of patients
Insufficient	34
Deficient	166
Severe deficient	62
Total	262

Discussion

The high prevalence of vitamin D deficiency is an extremely important public health issue. Chronic deficiency of vitamin D in adults causes osteomalacia, osteoporosis, muscle weakness and increased risk of falls. There is well known Epidemiological support for skeletal benefits of vitamin D. Even though India is a tropical country with good amount of ample sunlight all through the year, high percentage of deficiency was reported by previous studies.[3,9]

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It is beyond doubt that vitamin D deficiency shall be a concern among orthopaedic patients due to their lack of motility and high demand for bone formation. Until know researches have been conducted on evaluating vitamin D deficiency among orthopaedic patients. Considering the fact that high prevalence of vitamin D deficiency among orthopaedic patients in recent study, there is a need for through investigation of vitamin D and related factors among orthopaedic patients.[12]

Numerous more research reported it. Due to the type of clothing used and the totally covered wearing style, Ford et al. found that Asian women had a greater frequency of vitamin D

deficiency than Asian men. It has been claimed that using sunscreen with an SPF of 15 lowers the skin's ability to synthesize vitamin D by 99%. In our study, people who were obese had higher rates of vitamin D insufficiency. Numerous more research reported it.[11]

Conclusion

According to our study, vitamin D deficiency is certainly present among orthopaedic patients of all ages and occurs at an alarmingly high rate. Low vitamin D levels can be caused by poor dietary consumption, inadequate sun exposure, inadequate supplementation, and other issues. Public education regarding the necessity for dietary adjustments and lifestyle changes that allow for more opportunities to be exposed to sunshine is necessary.

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