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Exploring the Relationship Between Vitamin D Frequency and Demographic Parameters in the General Population

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ABSTRACT
Background: Many chronic illnesses such as cancer, osteoporosis, cardiovascular disease, rickets, and musculoskeletal diseases are associated with insufficient vitamin D. The purpose of this study was to determine the vitamin D levels in our region.
Materials and Methods: This cross-sectional study was conducted in duration of eight months from March to October 2021. The study included 156 individuals suspected for vitamin D deficiency. Patients with severe chronic diseases were excluded, and both genders recruited. All data were collected and analyzed through Microsoft Excel 2007.
Results: A total of 156 individuals were recruited in which individuals of age 11 to >55 years were included. Among total, 123 individuals were male while 33 females were found. All included individuals were categorized in different four categories. In which highest number of individuals were found in 41-55 years age (36%), followed by 26-40 years age (33.3%), and 26.2% individuals in age group 11-25 years. Vitamin D lower level found in 8.9% individuals.
Conclusion: Individuals shows significant vitamin D insufficiency, particularly among females and older age groups. To prevent any serious effects of vitamin D deficiency, the implementation of psychosocial intervention, supplementation, and increased awareness of the importance of vitamin D is recommended.
Keywords: Vitamin D, Age, Gender, Hypovitaminosis, Deficiency, Insufficiency, Demographic.

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INTRODUCTION

A serious threat to public health is vitamin D deficiency. Numerous causes, such as changes in lifestyle and environment, are blamed for this pervasive problem.[1] Children who get rickets due to low vitamin D levels may experience weakening and demineralization of their bones. It increases the incidence of bone fractures in adults, especially in women, by causing osteomalacia and osteoporosis.[2] In addition to its function in maintaining calcium homeostasis and regulating bone structure, vitamin D—more specifically, serum 25(OH)D, or 25(OH)D—is engaged in other biological processes through certain cell receptors.[3] It has previously been documented that even a small amount of daily sun exposure activates significant amounts of vitamin D components, which support optimal health and fortify the body's biological defenses against life-threatening illnesses.[4] Consequently, diets high in vitamin D ought to be mentioned as a substitute to prevent the health issues associated with vitamin D insufficiency in individuals of all ages, particularly senior citizens.[5] A possible correlation was observed between the level of vitamin D and muscle exhaustion, whereas any deviation from normal limits in vitamin D was associated with notable changes in muscle performance and activity, particularly during exercise interventions of varying intensities and capabilities.[6] As a result, the shift in vitamin D levels appeared to have an impact on physical performance.[7]

Vitamin D is vital for people of all ages' immunological, reproductive, muscular, skeletal, and integumentary systems.[8] Many studies demonstrate a strong relationship between vitamin D levels and chronic illnesses. Age, race, use of drugs that affect vitamin D metabolism, high body mass index, insufficient use of vitamin D supplements, inactivity, ignorance about the advantages of vitamin D, and educational characteristics are some of the factors that lead to vitamin D deficiency.[9] It has previously been documented that giving senior citizens the required dosages of calcium and vitamin D for three months significantly improves their skeletal and neuromuscular functions.[10] The majority of studies found a correlation between vitamin D levels and adolescent girls' and boys' muscle force and strength. On the other hand, a lack of vitamin D causes muscle myopathy, which results in tired muscles and a decreased desire to engage in regular exercise regimens.[11, 12]

Pakistan is one of the sunniest countries in the world, yet a large portion of its population lacks enough vitamin D. Pregnant women, newborns, and nursing moms have all been shown to have deficits, according to reports from Pakistan. This study set out to evaluate the level of vitamin D in the Pakistani region of Peshawar.

MATERIALS AND METHODS

This descriptive cross-sectional study conducted in Khyber Teaching Hospital, Peshawar. The study duration was eight months from March to October

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2021. A total of 156 individuals were recruited from age 11 to >55 years of age. Both gender (male and female) irrespective of ethnicity were recruited suspected for Vitamin D deficiency. Severe affected patients with other comorbidies including Crohn's disease, metabolic disorders and kidney diseases patients were excluded from the study. Informed consent was obtained from all patients before enrollment and ethical approval hospital administration obtained before conducting the study.

Blood samples of 3ml were obtained in gel tube (vacutainer tube) from all recruited individuals. All tubes were properly labeled and then transported pathology department for sample processing. All tubes were centrifuge with 2000 rpm and then serum were taken and added in the autoanalyzer cuvettes. Serum 25-OH-D level were evaluated through Mindray Analyzer BS-200. Demographic data along with laboratory analyzed data were added in the designed proforma. All individuals were categorized into four groups: Deficit (<10 IU), Inadequate (11–30 IU), Normal (31–100 IU), and Hypervitaminosis D/Toxicity (>100 IU).

Descriptive statistics were calculated for demographic data, laboratory test results through Microsoft Excel 2007. Data analysis was conducted and calculated the standard deviation and means. All data were presented in tables.

RESULTS

In this study, there were 156 participants (n=156), with ages ranging from 11 to over 55 years. The distribution included 123 male patients and 33 female patients. The participants were categorized into four groups based on age: 41-55 years old (36%), 26–40 years old (33.3%), 11–25 years old (26.2%), and >55 years old (4.5%) (Table 1a & Table 1b).

Table 1(a): Different age wise groups distribution of individuals

Age wise groups (Years)	Total % (n)
11-25	26.2 (41)
26-40	33.3 (52)
41-55	36.0 (56)
>55	4.5 (7)
Grand Total	100 (156)

Table 1(b): Different age wise groups distribution of individuals

Gender-wise distribution	Total % (n)
Male	78.8 (123)
Female	21.2 (33)

The study examined the vitamin D levels in the blood of each patient, identifying three subgroups: Lower Vitamin D (<10 IU), Not Sufficient (10-30 IU), and Normal (30-100 IU) vitamin D levels. In n=14, n=77, and n=65, respectively, the vitamin D level was lower (8.9%), not sufficient (49.4%), and normal (41.7%) (Table 2).

Table 2: Vitamin D level among total recruited participants

Vitamin D Level (IU)	Total % (n)
Lower Vitamin D <10	8.9 (14)
Normal 30-100	41.7 (65)
Not Sufficient Vitamin D 10-30	49.4 (77)
Grand Total	100 (156)

DISCUSSION

In the liver, vitamin D is first converted to the intermediate molecule 25-hydroxyvitamin D, which then attaches to intracellular receptors to control the expression of certain genes.[13, 14] The general population frequently has vitamin D deficiency, according to findings from cross-sectional studies.[15]

There is proof that vitamin D insufficiency is widespread in both developed and developing countries. Countries in South Asia and the Middle East have higher rates of vitamin D deficiency.[16] According to a study, 90% of healthy individuals have low levels of vitamin D (insufficiency and deficiency); our reported vitamin D deficiency is lower.[17] The findings of this study are more in line with another study that found vitamin D insufficiency is more common in women than in males. The findings of this study are consistent with a different study that found that persons under 50 are frequently more vulnerable to vitamin D deficiency than older adults.[18] The majority of the elderly, institutionalized individuals, expectant mothers, young children, and non-Western immigrants are among the six risk groups.[19] A diet deficient in fish and dairy products, little sun exposure, skin pigmentation, wearing sunscreen, and clothing choices are risk factors for vitamin D insufficiency.[20]

Vitamin D deficiency may be more common due to skin-darkening anxieties, religious beliefs requiring people to avoid sunlight on their full body, and the tradition of women only showing their hands and faces when they walk outside.[21] A significant association was discovered by another study between sunscreen use, thick clothes, and vitamin D deficiency.[22] Furthermore, the male respondents avoid the sun due to misconceptions about its harmful effects, summer heatwaves in some parts of the world, or lack of knowledge about the importance of vitamin D for normal body growth and metabolism.[23]

Because it was retrospective in nature, it lacked information on patient illnesses, histories, and treatments and could only identify connections rather than causal relationships between factors. It was a single-center study, so its conclusions cannot be applied to other contexts. To provide a pertinent picture of the impacted locations, more research comparing hospitals and institutions is required. Blood samples were only obtained once, and there were no follow-ups, due to budgetary constraints. For several reasons, daily vitamin D consumption was also unknown. In order to understand the state of

vitamin D deficiency, it is necessary to compare the population in urban and rural areas with a control group.

CONCLUSION

Participants who are younger and female are more likely to be vitamin D insufficient. This increases the risk of immune-related chronic diseases of the musculoskeletal, immunological, and reproductive systems. To avoid major repercussions, it is imperative that the public be made aware of the importance of vitamin D to health. Avoiding vitamin D insufficiency may be possible with a healthy lifestyle that includes adequate sun exposure. Thus, interventional research and clinical trials are required to establish the appropriate dosages, amounts, and effects of vitamin D supplementation. In order to combat vitamin D deficiency, it is imperative to increase sun exposure, eat a diet high in vitamin D, and introduce food fortification with vitamin D.

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