Journal of Cardiovascular Disease Research
ISSN: 0975-3583, 0976-2833 VOL 8, ISSUE 4, 2017

Study of Vitamin D Levels among Patients visiting a tertiary care centre

Dr Premi Vijay Kumar[1]

[1]Assistant Professor, Department of Orthopaedic, Venkateshwara Institute of Medical Sciences, Gajraula, Amroha, Uttar Pradesh

Corresponding author: Dr Premi Vijay Kumar

Abstract

Vitamin D deficiency is a prevalent nutritional insufficiency in India, yet it often goes undetected and untreated. The insufficiency had an impact on individuals regardless of their gender, age, sex, ethnicity, or locality. Currently, there is significant research being conducted on vitamin D deficiency due to its involvement in different illnesses, in addition to its well-known effects on the skeletal system. In adults, a long-term lack of vitamin D leads to the development of osteomalacia, osteoporosis, and muscle weakness. This is a cross-sectional study, carried out among the 210 subjects of both the sexes aged 18 years and above at Orthopaedics department, who came for the estimation of serum Vitamin D3. Our study shows 42.85 % subjects had Severe deficiency, 28.57 % had deficiency, 7.14 % subjects were Insufficient , and 21.42 % had normal Vitamin D3 levels.This study will act as a guideline for conducting further studies on a larger scale to get a wider picture of prevalence of vitamin D deficiency in our country.

Keywords: Vitamin D3 levels, Adults.

Introduction

Vitamin D deficiency is a prevalent nutritional insufficiency in India, yet it often goes undetected and untreated. The insufficiency had an impact on individuals regardless of their gender, age, sex, ethnicity, or locality. Currently, there is significant research being conducted on vitamin D deficiency due to its involvement in different illnesses, in addition to its well-known effects on the skeletal system. In adults, a long-term lack of vitamin D leads to the development of osteomalacia, osteoporosis, and muscle weakness. The range from [1-7]. Recent studies have also established a connection between vitamin D insufficiency and an elevated risk of acquiring tuberculosis, otitis media, upper respiratory tract infections, influenza, and various other illnesses. The range is from [8- 12]. The deficit of this substance has also been associated with an elevated chance of developing hypertension, diabetes, obesity, and high triglyceride levels, ultimately leading to an increased risk of cardiovascular

mortality [13]. Vitamin D is a fat-soluble vitamin, known for its antirachitic activity.[14] Calciferols are a group of lipidsoluble compounds with a 4-ringed cholesterol backbone and refer to both, Vitamin D3, i.e., cholecalciferol and Vitamin D2, i.e., ergocalciferol.[15] Generally Vitamin D3 is referred to Vitamin D. Vitamin D can be synthesized endogenously and with the sun exposure about 90% of the required Vitamin D is synthesized in the skin.[16] It is required for controlling the normal levels of calcium and phosphate in the blood which are needed for contraction of muscle, normal mineralization of bone, nerve conduction, and general cellular function in all cells of the body and is also found to be important for immune function, for inflammation, cell proliferation, and differentiation.[17,18] 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.[19,20] This study aims to report the prevalence and correlates of Vitamin D deficiency in a representative sample of adults.

Material and Methods

This is a cross-sectional study, carried out among the 210 subjects of both the sexes aged 18 years and above at Orthopaedics department, who came for the estimation of serum 25(OH)D level. The exclusion criteria include: 1. pregnant and lactating women 2. Patient of age below 18 years 3.those who were taking vitamin supplements. 4. Patients with major CVS disorders, endocrine disorders, renal disorders and liver disorders 5. Who are not willing to participate.. Age, gender, skin complexion and symptoms related to vitamin D3 deficiency was noted. Overnight fasting Blood samples were collected from all the 210 subjects under aseptic precaution into plain vacutainers and properly labeled followed by separation of serum. Then, the estimation serum 25(OH)D level was done by immunoassay fully automatic hormonal anlayser. We classified participants as normal, vitamin D deficient and insufficient as per recently available literature . Vitamin D Level (ng/ml) >30 (Normal) , 21-29.9 (Insufficient) , 10-20.9 (Deficient), <10 (severe deficiency). Statistical analysis: Variables were expressed as Frequency and percentages.

Results

Table 1: Age, Gender and Skin Complexion

		Subjects n=210	**Percentage**
Gender	**Male**	120	57.14 %
	Female	90	42.85 %
		Subjects n=210	**Percentage**
Age in years	**18-35**	95	45.23 %
	36-50	60	28.57 %
	>50	55	26.19 %
		Subjects n=210	**Percentage**
Skin Complexion	**Fair**	110	52.38 %
	Brown	60	28.57 %
	Dark	40	19.04 %

Table 2: Symptoms of Vitamin D3 deficiency in Subjects

Symptoms	**Subjects n=210**	**Percentage**
Bone pain	165	78.57 %
Muscle pain	140	66.66 %
Fatigue	190	90.47 %
Muscle cramps	60	28.57 %
Mood changes	40	19.04 %
Immune impairment	55	26.19 %
Overweight	35	16.66 %

Table 3: Vitamin D3 levels in subjects

Vitamin D3 levels (ng/dl)	**Subjects n=210**	**Percentage**
<10 (Severe deficiency)	90	42.85 %
10-20.9 (deficiency)	60	28.57 %
21-29.9 (Insufficient)	15	7.14 %
>30 (Normal)	45	21.42 %

Table 1shows age , gender and skin complexion of subjects. Table 2 shows symptoms in subjects, 90.47 % subjects had fatigue, 78.57 % had bone pain, 66.66 % had muscle pain, 28.57 % had muscle cramps , 19.04 % had mood changes, 26.19 % had Immune impairment (repeated infections) .

Table 3 shows 42.85 % subjects had Severe deficiency, 28.57 % had deficiency, 7.14 % subjects were Insufficient , and 21.42 % had normal Vitamin D3 levels.

Discussion

Naturally occurring food sources containing significant amounts of vitamin D include mushrooms, fish, and egg yolk, cod liver oil, and offal such as liver of eel. Fortified foods such as milk, breakfast cereals, juices, yogurt, and supplements also contain vitamin D [21]. Vitamin D enhances the absorption of calcium and phosphorus by 30-40% and 80%, respectively, from the intestine, and maintains a steady state of parathyroid hormone in the blood involved in calcium homeostasis. It also strengthens the innate immunity, modulates immune functions, inhibits cellular proliferation, and stimulates terminal differentiation of cells [22-24]. The increased level of serum PTH stimulates the renal synthesis of calcitriol to maintain optimum intestinal absorption, thus maintaining normal serum calcium levels [25]. Vitamin D promotes chronic diseases such as diabetes mellitus, cancers, autoimmune diseases [26]. Our study shows 42.85 % subjects had Severe deficiency, 28.57 % had deficiency, 7.14 % subjects were Insufficient , and 21.42 % had normal Vitamin D3 levels. Vitamin D deficiency is present in all age groups, and risk factors include excessive sunscreen use, fat malabsorption, darker skin tone, and aging, increasing indoor lifestyle, glass shielding of sunlight, and clothing that covers the whole body , Vegan diet also increases the risk of Vitamin d3 deficiency. Vitamin D deficiency is associated with skeletal malformations, rickets in children, and osteomalacia in adults, as well as various diseases such as malignancy, blood pressure and pulse pressure, Parkinsonism, depression, hypertension, Rheumatoid arthritis.[27] Williams et al. found that 82% of Indian adults suffer from Vitamin D deficiency, which is strongly associated with obesity and metabolic syndrome [28]. Similarly, Krishnan et al. found that 69.2% of elderly participants had Vitamin D deficiency, with the highest prevalence in northern India [29]. Babu et al. also reported a high prevalence of Vitamin D deficiency (72.4%) in rural adults in Kolar district, with the highest prevalence in women . Furthermore, Mithal et al. conducted a population-based study in southern India and found that 68.6% of the population had Vitamin D deficiency, with the highest prevalence in women [30]. Harinarayan et al. found that 75% of

young adults in an urban population in India had Vitamin D deficiency, with the highest prevalence in winter [31]. Marwaha et al. reported that 79% of urban participants and 73% of rural participants had Vitamin D deficiency [32]. Overall, these studies demonstrate a high prevalence of Vitamin D deficiency in various populations in India, with some groups experiencing an alarmingly high prevalence of deficiency. These findings underscore the need for increased public awareness, regular monitoring, and improved strategies for Vitamin D

supplementation and fortification. Various factors contributing to its high prevalence, one of the primary causes is a lack of exposure to sunlight, as many urban people tend to stay indoors or cover their bodies extensively due to cultural or religious practices. Air pollution is also a contributing factor, as it can decrease the penetration of ultraviolet radiation, which is required for Vitamin D synthesis. Furthermore, dietary factors play a role, as Vitamin D-rich foods are not commonly consumed in India, and a predominantly vegetarian diet further limits the sources of this nutrient. Additionally, the prevalence of obesity, which is linked to Vitamin D deficiency, is increasing in India, contributing to the growing burden of this deficiency.

Conclusion

Our study reveals that a significant percentage of individuals have Vitamin D deficiency or insufficiency. It is crucial to raise awareness about the importance of adequate Vitamin D levels in maintaining overall health and preventing associated health issues. Regular screening, increased sun exposure, dietary modifications, and Vitamin D supplementation can be effective measures to overcome Vitamin D deficiency. Overall, the study emphasizes the need for concerted efforts towards promoting Vitamin D sufficiency.

References

1. Hazell TJ, DeGuire JR, Weiler HA. Vitamin D. An overview of its role in skeletal muscle physiology in children and adolescents. Nutr. Rev. 2012;70:520-33.

2. Holick MF. The role of vitamin D for bone health and fracture prevention. Curr. Osteoporos. Rep. 2006;4:96102.

3. Lips P, van Schoor NM. The effect of vitamin D on bone and osteoporosis. Best Pract. Res Clin. Endocrinol. Metab. 2011;25:585-91.

4. Janssen HC, Samson MM, Verhaar HJ. Vitamin D deficiency, muscle function, and falls in elderly people. Am J Clin. Nutr. 2002;75:611-615.

5. Bischoff HA, Stahelin HB, Urscheler N, Ehrsam R, Vonthein R, Perrig-Chiello P, et al. Muscle strength in the elderly: Its relation to vitamin D metabolites. Arch Phys Med Rehabil. 1999;80:54-58.

6. Bischoff-Ferrari HA, Dawson-Hughes B, Willett WC, Staehelin HB, Bazemore MG, Zee RY, et al. Effect of Vitamin D on falls: A meta-analysis. JAMA. 2004;291:1999-2006.

7. Bischoff-Ferrari HA, Dietrich T, Orav EJ, DawsonHughes B. Positive association between 25-hydroxy vitamin D levels and bone mineral density: A population-based study of younger and older adults. Am. J Med. 2004;116:634-639.

8. Nnoaham KE, Clarke A. Low serum vitamin D levels and tuberculosis: A systematic review and meta- analysis. Int. J Epidemiol. 2008;37:113-119.

9. Martineau AR. Old wine in new bottles: Vitamin D in the treatment and prevention of tuberculosis. Proc Nutr Soc. 2012;71:84-89.

10. Linday LA, Shindledecker RD, Dolitsky JN, Chen TC, Holick MF. Plasma 25-hydroxyvitamin D levels in young children undergoing placement of tympanostomy tubes. Ann Otol Rhinol Laryngol. 2008;117:740-744.

11. Ginde AA, Mansbach JM, Camargo CA Jr. Association between serum 25-hydroxyvitamin D level and upper respiratory tract infection in the Third National Health and Nutrition Examination Survey. Arch Intern Med. 2009;169:384-390.

12. Cannell JJ, Vieth R, Umhau JC, Holick MF, Grant WB, Madronich S, et al. Epidemic influenza and vitamin D. Epidemiol Infect. 2006;134:1129-1140.

13. Martins D, Wolf M, Pan D, Zadshir A, Tareen N, Thadhani R, et al. Prevalence of cardiovascular risk factors and the serum levels of 25-hydroxyvitamin D in the United States: Data from the Third National Health and Nutrition Examination Survey. Arch Intern Med. 2007;167:1159-1165.

14. Sharman IM. Vitamin D: Anti-rachitic factor and kidney hormone. Nutr Food Sci. 1975;75:4–7.

15. Houghton LA, Vieth R. The case against ergocalciferol (Vitamin D2) as a vitamin supplement. Am J Clin Nutr. 2006;84:694–7.

16. Holick MF. Vitamin D: A millenium perspective. J Cell Biochem. 2003;88:296–307.

17. Kumar V, Abbas AK, Aster JC. Robbins Basic Pathology. Environmental and Nutritional Diseases. 9th ed. Philadelphia: Elsevier Saunders; 2013. pp. 438–41.

18. Melamed ML, Michos ED, Post W, Astor B. 25- hydroxyvitamin D levels and the risk of mortality in the general population. Arch Intern Med. 2008; 168:1629– 37.

19. Holick MF. The role of vitamin D for bone health and fracture prevention. Curr. Osteoporos. Rep. 2006; 4:96- 102.

20. Lips P, van Schoor NM. The effect of vitamin D on bone and osteoporosis. Best Pract. Res.Clin. Endocrinol. Metab. 2011; 25:585–591.

21. Lamberg-Allardt C. Vitamin D in foods and as supplements. Prog Biophys Mol Biol 2006; 92:33-8.

22. Lips PW, Hackeng WH, Jongen MJ, et al. Seasonal variation in serum concentrations of parathyroid hormone in elderly people. J Clin Endocrinol Metab 1983; 57:204-6.

23. Yin K, Agrawal DK. Vitamin D and inflammatory diseases. J Inflamm Res 2014; 69-87.

24. Wei MY, Giovannucci EL. Vitamin D and multiple health outcomes in the Harvard cohorts. Mol Nutr Food Res 2010; 54:1114-26.

25. Lips P. Vitamin D deficiency and secondary hyperparathyroidism in the elderly: consequences for bone loss and fractures and therapeutic implications. Endocr Rev 2001; 22:477-501.

26. Holick MF. High prevalence of vitamin D inadequacy and implications for health. Mayo Clin Proc 2006; 81:353-373.

27. Ahn J, Peters U, Albanes D, et al. Serum vitamin D concentration and prostate cancer risk: A nested case–control study. J Natl Cancer Inst 2008; 100:796-804.

28. Chomchoei C, Apidechkul T, Wongnuch P, et al. Perceived factors influencing the initiation of methamphetamine use among Akha and Lahu youths: a qualitative approach. BMC public health 2015; 19:1-1.

29. Girgis CM, Clifton-Bligh RJ, Hamrick MW, et al. The roles of vitamin D in skeletal muscle: form, function, and metabolism. Endocr Rev 2013; 34:33-83.

30. Mithal A, Wahl DA, Bonjour JP, et al. Global vitamin D status and determinants of hypovitaminosis D. Osteoporos Int 2009; 20:1807-20.

31. Harinarayan CV, Ramalakshmi T, Prasad UV, et al. Vitamin D status in Andhra Pradesh: A population based study. 1. Indian J Med Res 2008; 127:211-8.

32. Marwaha RK, Tandon N, Garg MK, et al. Vitamin D status in healthy Indians aged 50 years and above. J Assoc Physicians India 2011; 59:706-9.