

Study of Vitamin –D Levels in Urban Population

Sujatha Pasula¹, S Hari Priya², Boppishetti Raja Adithya²

ABSTRACT

Introduction: Vitamin D deficiency is considered to contribute to bone loss and muscle weakness, thus leading to fractures. The objective of the present study was to analyze serum vitamin D levels.

Materials and methods: The study group was comprised of urban population with 640 women and 537 men whose age range was 18- 78years. Renal and liver diseases, diabetes mellitus and other endocrinal disorders were excluded. Further exclusion criteria included the use of medication known to interfere with calcium metabolism and participants must not have been users of any hormones in the previous 1 year.

Results: In the studied subjects Vitamin D insufficiency was found to be 54% in women and 50% in men. Among women subjects in the age group 59-78 years, the proportion was more which amounted to 63%.

Conclusion: Vitamin D deficiency is a public health issue in urban population. Risk and benefits of preventive actions need to be examined in further studies.

Keywords: Vitamin D, urban population, osteoporosis, food fortification.

INTRODUCTION

Indians have vast diversity in traditional, cultural, social and lingual aspects. India is a tropical country extending from 8.4° N latitude to 37.6° N latitude near to equator where ample sunlight is available throughout the year. Hence there was a misbelief that Vitamin D (Vit-D) deficiency is uncommon in India.¹ However Vit D deficiency in all the age groups and both sexes across the country is common finding and has wide range of previous publications.² Serum levels decline with age earlier in women than in men.³ Depending on reproductive and Postmenopausal age groups Vitamin D status is affected.

Vitamin D is a sterol that has a hormone like function. The active molecule 1,25-dihydroxycholecalciferol binds to intracellular receptor proteins. The 1, 25-dihydroxy D3 receptor complex interacts with DNA in the nucleus of target cells. This either selectively stimulates gene expression or specifically represses gene transcription. Common genetic variants of the vitamin D binding protein (DBP) can predict differences in response of serum 25-hydroxyvitamin D [25(OH)] to vitamin D supplementation.⁴

Vit D is a fat soluble vitamin. Multiple factors like geographical area, pollution, clothing, skin pigmentation and duration and time of exposure to sunlight affect its synthesis

in the body.⁵ Physiological production of Vit D is endogenously in the dermis and epidermis of exposed parts of body from 7-dehydrocholesterol an intermediate in cholesterol synthesis, is converted to cholecalciferol. Calcium-Vitamin D-Parathyroid hormone endocrine axis is responsible for maintaining homeostasis of calcium. Most prominent action of 1,25-dihydroxy D3 are to regulate the plasma levels of calcium and phosphorous.⁶ Vitamin D inadequacy during adolescence leads to increase in the risk of osteoporosis later in life.⁷ Vit D deficiency and low calcium intake are important risk factors in preventing osteoporosis.⁸ There is widespread prevalence of Vit D deficiency with low dietary calcium intake in Indian population according to various studies published earlier. The hypovitaminosis D group has two subgroups: insufficiency (serum levels between 10 and 29 ng/ml) and deficiency (levels<10 ng/ml).⁹ Vit D deficiency is a common problem in India due to several factors: like food fads and food habits, high fiber diet containing phosphates and phytates which can deplete Vit D stores, genetic factors, number of hours spent indoor have increased in the urban Indians, increased pollution and last but not least the cultural and traditional habits prevalent in certain religions. From the aforesaid reasons, the present study was conducted to study vitamin D deficiency in urban population.

Materials and methods:

The study group was comprised of urban population with 640 women and 537 men whose age range was 18- 78years. Basic information like age, weight, life style habits, hypertension were taken from the individuals by questionnaire. Written consent was obtained from subjects. The study was approved by the ethical committee of the institution.

Exclusion Criteria: H/O of Diabetes mellitus, renal and liver diseases, trauma, endocrinal disorders and vitamin D supplementation. Further exclusion criteria included the use of medication known to interfere with calcium metabolism, users of testosterone, anabolic steroids, glucocorticoids, or bisphosphonates in the previous 1 year. Also pregnant women /

¹Assistant Professor, ²Tutor, Department of Biochemistry, KAMSRC, L.B Nagar, Hyderabad, Telangana, India

Corresponding author: Dr. Pasula sujatha, M.B.B.S; M.D (Biochemistry), Assistant Professor, Department of Biochemistry, KAMSRC, L.B Nagar, Hyderabad, Telangana, India.

How to cite this article: Sujatha Pasula, S Hari Priya, Boppishetti Raja Adithya. Study of vitamin – D levels in urban population. International Journal of Contemporary Medical Research 2016;3(1):50-53.

	Age groups (years)					
	19-28	29-38	39-48	49-58	59-68	69-78
Women						
N	150	123	107	98	75	87
mean Vit-D(S.D)	32(8.9)	30 (7.7)	27(7.2)	26(5.4)	22(4.8)	20(3.2)
deficiency(%)	9	12	12	13	18	20
insufficiency(%)	41	45	47	55	65	69
Men						
N	101	61	97	116	100	68
mean Vit-D(S.D)	32(8.7)	30(7.4)	28(7.9)	27(5.4)	24(5.1)	22(3.4)
deficiency(%)	10	12	11	13	17	18
insufficiency(%)	40	44	45	50	58	59

Table-1: Vitamin D status by sex and age

immuno-compromised patients have been excluded. Blood was collected in vacutainers and estimated for vitamin –D. Investigations like blood sugar, blood urea, serum creatinine, bilirubin, ALT and serum electrolytes were done to rule out Diabetes Mellitus, Liver and Renal diseases. Vitamin –D was estimated with Immuno Diagnostic systems by ELISA method using ELISA reader at 505nm.kit was calibrated and also controls were run with every batch.

STATISTICAL ANALYSIS

The data was analysed by using SPSS v20 version and Microsoft Excel software.

RESULTS

Cut off values were set according to the kit insert provided with the kit. The descriptive data was analyzed by 10-year age bands to calculate age-specific mean, prevalence of vitamin D deficiency and insufficiency.

In the study 54% of women and 50% of men had vitamin D levels below 29 ng/ml i.e insufficiency. Among 65-79 year-old women, the proportion amounted to 63%.

Over all 52% of subjects studied had insufficiency.

Deficiency in women is 14% and in men it is about 13.5% which is approximately

Trendline descent seen with increase in age.

From figures 2 and 3 it is evident that vitamin D levels decreased with increase in age.

DISCUSSION

Vit D deficiency is not only a problem in India. It is seen even in other topical countries also.¹⁰ Although, there is sufficient sunshine in India, we are still lacking in preventing it. Overall results of various studies conducted to date in urban and rural India indicate that widely prevalent vitamin –D deficiency is functionally relevant to skeletal health including osteomalacia and rickets.²⁰ In the present study we have taken the vitamin D levels in women and men who are healthy. From the statistical evaluation (table -1) Vit D deficiency in females is 14% and insufficiency is 54% were as in

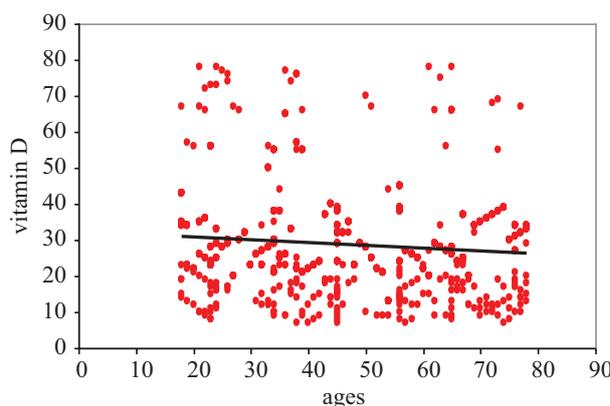


Figure-1: Correlation between vitamin D and ages.

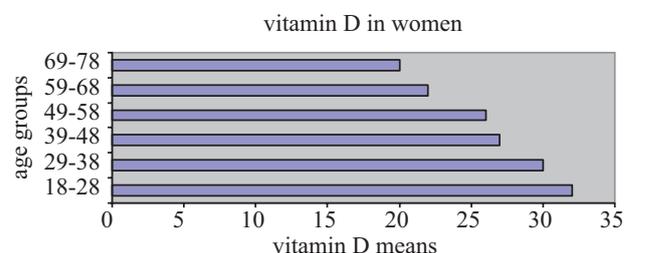


Figure-2: Bar diagram representing vitamin-D means of age groups in females

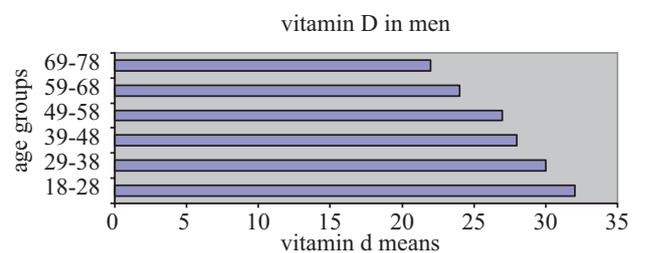


Figure-3: Bar diagram representing vitamin-D means of age groups in males

men deficiency is 13.5% and insufficiency is 50%. It is observed that women of age group of 59 -78 have insufficiency of 63% which is in correlation with study of Riggs et.al.^{11,12} Vitamin D levels are inversely proportional with age in both women and men as shown in figures 2 and 3. This shows the amount of sunshine people are exposed to in the daytime is insufficient because of change in life style in the present

scenario. So there are decreased levels of vitamin D in urban population.

This study is in correlation with Tuohimaa. P et al who stated that older people who are at increased risk of vitamin D insufficiency are about 63% of total population, so they need to spend more time outdoors.¹³ However, older people also have lowered capacity to synthesize vitamin D when exposed to sunlight, so it is difficult for them to meet their requirements via sun light.¹⁴ Vit D insufficiency and deficiency are easily preventable.^{15,16} As the famous saying goes “Prevention is better than cure” Vit D deficiency also should better be prevented than leaving it towards cure. Food fortification with Vit D is a good option in solving this issue. Similarly food fortification and public health policies for Vit D supplementation and mineral requirement is needed.^{17,18} In view of all the above findings, some of the recommendations¹⁹ to decrease prevalence of hypovitaminosis D are -

1. Screening for vitamin D deficiency in individuals at risk for deficiency,
2. Infants and children aged 0 –1 yr require at least 400 IU/d (IU = 25 ng) of vitamin D and children 1 yr and older require at least 600 IU/d to maximize bone health, 3. Adults aged 19–50 yr require at least 600 IU/d of vitamin D to maximize bone health and muscle function,
4. All adults aged 50–70 and 70+ yr require at least 600 and 800 IU/d, respectively, of vitamin D to maximize bone health and muscle function,
5. Pregnant and lactating women require at least 600 IU/d of vitamin D and recognize that at least 1500–2000 IU/d of vitamin D may be needed to maintain a blood level of 25(OH)D above 30 ng/ml, children and adults on anticonvulsant medications, glucocorticoids, antifungals such as ketoconazole, and medications for AIDS be given at least two to three times more vitamin D for their age group to satisfy their body’s vitamin D requirement

CONCLUSION

The deficiency of vitamin D is highly prevalent in urban healthy adult population. More subjects in all age groups in both genders in urban and rural subjects in different parts of the country should be studied in future. Still, this study clearly brings forth the low dietary calcium intake of both the urban and rural subjects, high phytate content of the rural diet and the limited exposure of the urban adults and children to sunlight.

The administration of vitamin D, which also needs trials of longer duration of treatment, to evaluate the effect of different lifestyle factors in this population.

REFERENCES

1. Awumey EM, Mitra DA, Hollis BW, et al. Vitamin D metabolism is altered in Asian Indians in the southern

United States: a clinical research center study. *J Clin Endocrinol Metab* 1998; 83: 169-173.

2. Dawson-Hughes B, Heaney RP, Holick MF, et al. Estimates of optimal vitamin D status. *Osteoporos Int* 2005; 16: 713-716.
3. Maggio D, Cherubini A, Lauretani F et al. 25(OH)D serum levels decline with age earlier in women than in men and less efficiently prevent compensatory hyperparathyroidism in older adults. *J Gerontol A Biol Sci Med Sci* 2005; 60A: 1414–9.
4. Fu L, Yun F, Oczak M, et al. Common genetic variants of the vitamin D binding protein (DBP) predict differences in response of serum 25-hydroxyvitamin D [25(OH)] to vitamin D supplementation. *Clin Biochem* 2009; 42: 1174-1177.
5. Vikram Londhey; Vitamin D Deficiency: Indian Scenario; Editorial; JAPI; 2011; 59.
6. Heaney RP. Vitamin D depletion and effective calcium absorption. *J Bone Min Res* 2003; 18: 1342.
7. Khadilka AV. Vitamin D deficiency in Indian Adolescents. *Indian Paediatr* 2010; 47: 756-757.
8. Malhotra N, Mithal A, Gupta S, et al. Effect of Vitamin D supplementation on bone health parameters of healthy young Indian women. *Archives of Osteoporosis* 2009; 4:47-53.
9. F. Formiga, A. Ferrer, J. Almeda, A. San jose, A. Gil, R. Pujol; Utility of geriatric assessment tools to identify 85-years old subjects with vitamin D deficiency; *The Journal of Nutrition, Health & Aging*; 2011; 15(2):110-4
10. González-Molero, S Morcillo, S Valdés et al: Vitamin D deficiency in Spain: a population-based cohort study *European Journal of Clinical Nutrition* 2008;65, 321-328
11. Harinarayan CV, Alok Sachan, P. Amaresh Reddy, et al. Vitamin D status and Bone Mineral Density in Women of Reproductive and Postmenopausal age groups: A cross-sectional study from South India. *J Assoc Physicians India* 2011; 59: 695-701.
12. Riggs BL. Role of vitamin D- endocrine system in the pathophysiology of postmenopausal osteoporosis. *J Cell Biochem* 2003; 88: 209-215.
13. Tuohimaa P. Vitamin D and aging. *J Steroid Biochem Mol Biol* 2009; 114: 78-84.
14. M arwaha RK, Tandon N, Garg MK, et al. Vitamin D status in healthy Indians aged 50 years and above. *J Assoc Physicians India* 2011; 59: 703-707.
15. Hollick MF. Vitamin D deficiency. *N Engl J Med* 2007; 357:266-281
16. Hollis BW. Circulating 25- hydroxyvitamin D levels indicative of Vitamin D insufficiency: implications for establishing a new effective dietary intake recommendation for vitamin D. *J Nutr* 2005; 135: 317- 322.
17. Babu US, Calvo MS. Modern India and the vitamin D dilemma: evidence for the need of a national food fortification program. *Mol Nutr Food Res* 2010; 54: 1134-47.
18. R eport of Joint FAO/ WHO Expert Consultation on

- vitamin and mineral requirement in human nutrition: Bangkok 1998. Second Edition FAO Rome, 2004.
19. Michael F. Holick, Neil C. Binkley, Heike A. Bischoff-Ferrari, Catherine M. Gordon, David A. Hanley, Robert P. Heaney, M. Hassan Murad, and Connie M. Weaver: Evaluation, treatment, and prevention of vit D deficiency: *Journal of Clinical Endocrinology & Metabolism*, July 2011, 96(7): 1911–1930.
 20. R. Goswami, S.K. Mishra & N. Kochupillai Prevalence & potential significance of vitamin D deficiency in Asian Indians *Indian J Med*; 2008; 229-23

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 07-11-2015; **Published online:** 28-11-2015