

Evaluation of Vitamin D Status in Urban Population Employed In Office Jobs

Mukherjee Brijesh^{*}, Patra Saurav[#], Sahoo Sibasish^{\$}

^{*}Asst Prof, Biochemistry, Hi-tech Medical College and Hospital, Rourkela, Odisha

[#]Associate Professor, Biochemistry, KIMS, Bhubaneswar, Odisha

^{\$}Senior Resident, Biochemistry, AIIMS, Raipur, Chhatisgarh

Abstract:

Introduction: Vitamin D Deficiency (VDD) is a major health problem in both the developed and developing countries across the globe. In India, despite of ample sunlight (required for the synthesis of vitamin D endogenously), VDD prevalence has been documented to be in range of 50-90% among all the age groups. Scientific evidence reveals that, in addition to skeletal disorders, Vitamin D is also associated with the risk of cardiovascular diseases, obesity, hypertension and diabetes mellitus etc.

Aim: This study was conducted to evaluate vitamin D status in normal healthy individuals who are engaged in jobs where exposure to sunlight is low. The study also aimed to find out any gender differences and age variation in levels of vitamin D.

Material and methods: 165 normal individuals were randomly selected from various corporate offices of Bhubaneswar and vitamin D levels were estimated by chemiluminescence immunoassay. They were then divided into 3 groups- deficiency (< 20ng/ml), insufficiency (20-30ng/ml) and sufficiency (> 30ng/ml). Any subject with acute, chronic or terminal illness were excluded from the study

Results: More than 80% of the subjects were found to be vitamin D deficient or insufficient. The subject of older age group and females had more severe deficiency than young males.

Conclusion: Vitamin D deficiency is highly prevalent in urban population.

Keywords: Vitamin D; obesity; hypertension

I. Introduction

Vitamin D, also known as the sunshine vitamin, can be produced in the body with mild sun exposure or consumed in food or supplements. Adequate vitamin D intake is important for the regulation of calcium and phosphorus absorption, maintenance of healthy bones and teeth, and is suggested to supply a protective effect against multiple diseases and conditions such as cancer, type 1 diabetes and multiple sclerosis.

Worldwide, an estimated 1 billion people have inadequate levels of vitamin D in their blood, and deficiencies can be found in all ethnicities and age groups. (1-3) Indeed, in industrialized countries, doctors are even seeing the resurgence of rickets, the bone-weakening disease that had been largely eradicated through vitamin D fortification. (4-6). Numerous studies are being conducted worldwide to relate vitamin D and many chronic diseases. But it is interesting to note that normal levels of vitamin D, especially in urban population is generally low. So it is a matter of debate that whether vitamin D supplementation is of prophylactic value to prevent many diseases or it can be actually added as an adjuvant to treat the diseases along with main drug regimen.

II. Aim Of The Study

This study was conducted to evaluate vitamin D status in normal healthy individuals who are engaged in jobs where exposure to sunlight is low. The study also aimed to find out any gender differences and age variation in levels of vitamin D.

III. Materials

The study was conducted after approval from KIMS Ethical Committee from November, 2013 to April, 2014. 165 normal individuals were randomly selected from various corporate offices of Bhubaneswar and vitamin D levels were estimated. They were then divided into 3 groups- deficiency (< 20ng/ml), insufficiency (20-30ng/ml) and sufficiency (> 30ng/ml). The following inclusion and exclusion criteria were decided for the study

Inclusion criteria:

- >18 years of age, upper limit at the discretion of investigator.
- Subjects with indoor jobs with less than 30 minutes of exposure to sunlight per day

- Ability to understand and the willingness to sign and date a written informed consent at the screening visit before performing any protocol specific procedures.

Exclusion criteria:

- Age <18 years.
- Children, pregnant and lactating mothers.
- Any form of acute illness or terminal illness.
- Uncontrolled hypertension or uncontrolled diabetes.
- Any form of endocrine disorder, which could alter the plasma levels of vitamin D.
- Those receiving any form of therapy in the preceding one week, which would affect the plasma levels of vitamin D like vitamin D preparations, calcium, corticosteroids, etc.

IV. Methods

Vitamin D Assay by Chemiluminescence immunoassay:

25 OH Vitamin D assay is a direct, competitive chemiluminescent immunoassay (CLIA) for quantitative determination of total 25 OH vitamin D in serum or plasma. During the first incubation, 25 OH Vitamin D is dissociated from its binding protein and binds to the specific antibody on the solid phase. After 10 minutes the tracer (vitamin D linked to an isoluminol derivative) is added. After additional 10 minute incubation, the unbound material is removed with a wash cycle. Subsequently, the starter reagents are added to initiate a flash chemiluminescent reaction. The light signal is measured by a photomultiplier as relative light units (RLU) and is inversely proportional to the concentration of 25 OH Vitamin D present in calibrators, controls, or samples.

V. Observations And Discussions

Gender	Numbers	%
Males	86	52.12
Females	79	47.88

TABLE 1- Gender Distribution

	Mean	SD	Minimum (Years)	Maximum (Years)
Age	43.62	15.66	19	62

TABLE 2- Mean age of the study group

	Mean	SD
Plasma Vit D levels ng/ml	14.89	7.79
Range	3.0- 38.5 ng/ml	
Plasma Vit D status	Numbers	%
Deficiency (< 20ng/ml)	78	47.27
Insufficiency (20-30 ng/ml)	66	40.00
Sufficiency (>30 ng/ml)	21	12.73

TABLE 3- Mean and range

	Males	Females	p value
Vit D levels (ng/ml) Mean± SD	19.26±8.42	13.86±6.65	<0.05

TABLE 4- Comparison of mean vitamin D levels between males and females

Vitamin D levels in different age groups	Numbers	Mean	SD
<30 years	38	16.42	6.43
30-40 years	66	21.21	8.76
>40 years	61	12.66	7.34

TABLE 5- Mean vitamin D levels in different age groups

The gender distribution and mean age of the study group are depicted in table 1 and 2. The levels of vitamin D in the 3 groups- group 1 (deficiency), group 2 (insufficiency) and group 3 (sufficiency) are illustrated in table 3. It was observed that more than 80% of the study population had either deficiency or insufficiency of vitamin D. Table 4 shows comparison of vitamin D levels between males and females and table 5 shows mean vitamin D levels in different age groups.

Vitamin D Deficiency is on a rise as a major public health problem in India. Majority of the population in India resides in areas receiving ample sunlight throughout the year; still vitamin D deficiency is a problem of growing concern [7, 8]. Skin complexion, poor sun exposure, vegetarian food habits and lower intake of vitamin D fortified foods could be attributed to the high prevalence of VDD in India [9]. However till the early 1990s, VDD was considered to be rare in India. Such belief was based on studies measuring serum calcium and alkaline phosphatase in Indian population [10]. Till the year 2000, there was no systematic study which directly assessed body vitamin D status of Asian Indians residing in India [9]. A study conducted amongst apparently healthy subjects to measure their serum 25(OH)D level using sensitive and specific assay documented that significant hypovitaminosis D was present in up to 90 per cent of the subjects [9]. Subsequently, studies conducted in different parts of the country have documented a widespread prevalence of VDD.

This study also showed similar results with high prevalence of vitamin D deficiency in urban populations with indoor jobs. It was also observed that vitamin D deficiency is more in older age groups and the women in general had lower levels of vitamin D. The reasons for such findings in this study may be the fact that women and older people are more confined to their homes outside office hours whereas younger males are involved in more outdoor jobs on holidays and in leisure hours. So they are exposed to sunlight more compared to other groups which unfortunately is still not enough to overcome deficiency of vitamin D in most cases.

VI. Conclusion

Vitamin D deficiency is very prevalent in normal healthy individuals and we should be very careful in linking diseases with vitamin D deficiency unless there is strong proof of any association with a particular disease. Vitamin D supplementation though in our view will not be harmful in disease condition due to widespread nature of deficiency in all age groups.

References

- [1]. Holick MF. Vitamin D deficiency. *N Engl J Med.* 2007; 357:266-81.
- [2]. Gordon CM, DePeter KC, Feldman HA, Grace E, Emans SJ. Prevalence of vitamin D deficiency among healthy adolescents. *Arch Pediatr Adolesc Med.* 2004; 158:531-7.
- [3]. Lips P. Worldwide status of vitamin D nutrition. *J Steroid Biochem Mol Biol.* 2010; 121:297-300.
- [4]. Robinson PD, Hogler W, Craig ME, et al. The re-emerging burden of rickets: a decade of experience from Sydney. *Arch Dis Child.* 2006; 91:564-568.
- [5]. Kreiter SR, Schwartz RP, Kirkman HN, Jr., Charlton PA, Calikoglu AS, Davenport ML. Nutritional rickets in African American breast-fed infants. *J Pediatr.* 2000; 137:153-157.
- [6]. Misra M, Pacaud D, Petryk A, Collett-Solberg PF, Kappy M. Vitamin D deficiency in children and its management: review of current knowledge and recommendations. *Pediatrics.* 2008; 122:398-417.
- [7]. Marwaha RK and Sripathy G, 2008 Vitamin D and Bone mineral density of healthy school children in northern India. *Indian J Med Res,* 127; 239-44.
- [8]. Goswami R, Kochupillai N, Gupta N, Goswami D, Singh N and Dudha AJ, 2008 , Presence of 25(OH) D Deficiency in a Rural North Indian Village Despite Abundant Sunshine, *Assoc Physicians India,* 56; 755-7.
- [9]. Goswami R, Gupta N, Goswami D, Marwaha RK, Tandon N and Kochupillai N, 2000 Prevalence and significance of low 25-hydroxyvitamin D concentrations in healthy subjects in Delhi, *Am J Clin Nutr,* 72; 472-475.
- [10]. Hodgkin P, Kay GH, Hine PM, Lumb GA and Stanbury SW, 1973 Vitamin D deficiency in Asians at home and in Britain, *Lancet,* 2;167-172.