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Assessment of Vitamin D Status in White Collared Employees

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ABSTRACT:

Introduction: Vitamin D deficiency prevails in epidemic proportions all over the Indian subcontinent, with a prevalence of 70%–100% in the general population. In India, widely consumed food items such as dairy products are rarely fortified with vitamin D. Indian socioreligious practices and employment environment do not facilitate adequate sun exposure, thereby negating potential benefits of plentiful sunshine. Consequently, subclinical vitamin D deficiency is highly prevalent in both urban and rural settings, and across all socioeconomic and geographic strata. Vitamin D deficiency is likely to play an important role in the very high prevalence of rickets, osteoporosis, cardiovascular diseases, diabetes, cancer and infections such as tuberculosis in India.

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.

Materials and methods: A total of 218 individuals were selected for analysis. Height, weight, pulse, blood pressure (BP), waist circumference, and body mass index (BMI) were measured. Serum vitamin D and plasma fasting sugar were analyzed.

Results: More than 49% of the subjects were found to be vitamin D deficient or insufficient. There were no significant differences in vitamin D levels among different age groups and gender. Low vitamin D levels were associated with increased waist circumference and high blood pressure. The diabetic patients had significantly lower vitamin D levels.

Conclusion: Vitamin D deficiency is highly prevalent in urban population and is associated with obesity,diabetes and hypertension.

Keywords: Vitamin D; obesity; hypertension.

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, 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]. Vitamin D and its active metabolite, 1, 25-di (OH)-vitamin D or calcitriol, have long been recognized as important regulators of serum calcium and bone health. Production of calcitriol is dependent on adequate vitamin D. Following constitutive conversion of vitamin D to 25 (OH)-vitamin D by the liver, most circulating calcitriol (hormonal calcitriol) is made by the highly regulated 1alpha-hydroxylase (CYP27B1) present in the kidneys. Numerous other tissues also

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possess 1alpha-hydroxylase and appear to produce calcitriol locally at high concentrations. The receptor for calcitriol, the vitamin D receptor (VDR), is expressed in virtually all tissues. Thus, this latter form of calcitriol production constitutes a classic paracrine-autocrine system. Local production of calcitriol may even be important in the classic calcitriol target tissues of bone and the parathyroid gland because investigators have demonstrated the presence of 1alpha-hydroxylase in bone and parathyroid cells.[7, 8] Activation of the VDR by hormonal or locally produced calcitriol generally promotes differentiation of tissues and inhibits proliferation. Some regulatory actions of VDR are even independent of calcitriol.

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.

OBJECTIVES:

With an aim to assess the vitamin D status, in the adult population of Rourkela city and estimate the frequency of vitamin D insufficiency and deficiency cases in the community involved in sedentary jobs, a camp was arranged in a private firm.

MATERIALS AND METHODS:

A camp was organized at Sambandh Finserve Private Limited, Rourkela after obtaining prior permission of the management of the firm. Most of the employees of the firm were involved in desk jobs with minimal physical activity and outdoor exposure. Concise instructions and preparatory information (overnight fasting of 8 hours) inscribed in pamphlets, in Odia and English, were distributed among all the employees. This camp was approved by our Institutional Ethics Committee.

A total of 218 individuals got enrolled for the camp. All individuals were asked to sign the informed consent form after registration. Height, weight, and waist circumference were measured, and BMI was calculated for all of them. Pulse and BP were measured by manual sphygmomanometer in sitting position.

Fasting plasma glucose was measured in automated analyzer (Erba Manheim EM 200) and vitamin D in hormone analyzer by chemiluminescence method.

They were then divided into 3 groups according to vitamin D status- deficiency (< 20ng/ml), insufficiency (20-30ng/ml) and sufficiency (> 30ng/ml).

Statistical analysis was performed using Graph Pad Prism. Causal relationship between the variables was determined by chi-square ($\chi 2$) test. The OR with 95% confidence interval (CI) was estimated using logistic regression predicting the factors associated with diabetes. For two-tailed p-values of <0.05 were considered significant, with 95% CIs.

RESULTS:

The data analysis revealed that 67.9% (n = 148) of the participants were young adults of age group less than 40 years. The frequency of vitamin D sufficiency was calculated to be 50.9% (11/218) in this community (Table 1). The incidence of vitamin D insufficiency and deficiency was observed to be respectively, 30.3 (n = 66) and 18.8% (n = 41).

The mean age of participants was 37.4 ± 11.1 years, frequency of hypertension was 40.82%, 53.67% had greater waist circumference, and 72.48% recorded high BMI, of which 32.91% (n = 52/158) were obese. Smoking history was positive in 31.19% cases and 63.3% study subjects did not involve in any kind of exercise. Hyperglycemia (diabetes mellitus and prediabetes) was represented in 28.4% of the study population.

The $\chi 2$ test in Table 2 revealed that blood pressure and waist circumference had a significant ($p < 0.05$) difference in proportion within each group.

Participants of a high waist circumference have more risk of vitamin D deficiency and insufficiency compared with those participants with normal waist circumference. As compared with normotensive subjects people with hypertension are more prone to be diagnosed with vitamin D deficiency/ insufficiency ($p < 0.01$).

As shown in Table 3, associated prediabetes (FPG of 100-125 mg/dl) raises the risk 1.85 ($p < 0.05$) times for vitamin D deficiency/ insufficiency. Individuals with diabetes mellitus (>125 mg/dL) are at a 2.91 times more risk for vitamin D deficiency/ insufficiency in comparison with those with normal levels ($p < 0.05$).

Pearson correlation analysis demonstrated significant positive correlation between vitamin D with BP (p=0.0048), waist circumference (p=0.0077) and plasma glucose (p=0.0011) as tabulated in Table 4.

Table 1: Distribution of study population according to serum vitamin D level.

Dependent variables	Frequency	Percentage
Sufficiency (>30 ng/ml)	111 (n=218)	50.9
Insufficiency (20-30 ng/ml)	66 (n=218)	30.3
Deficiency (<20 ng/ml)	41 (n=218)	18.8

Table 2: Percentage distribution of vitamin D status by physiological characteristics by chi-squared test.

Variable	Sufficiency	Insufficiency	Deficiency	Total	p-value
Age group in years					
20-40	80	42	26	148	
>40	31	24	15	70	0.404
Gender					
Males	70	36	22	128	
Females	41	30	19	90	0.412
BP (mm Hg)					
Normotensive	81	32	16	129	
Hypertensive	30	34	25	89	<0.00084*
BMI (kg/m^2)	30	20	10	60	
Normal (18.5–24.9)					
Overweight (25–29.9)	60	30	16	106	
Obese (≥30)	21	16	15	52	0.249
Waist circumference (cm)					
Normal	70	20	11	101	
High	41	46	30	117	<0.0001*
Exercise					
Yes	40	20	20	80	
No	71	46	21	138	0.153
Smoking					
Positive	30	22	16	68	
Negative	81	44	25	150	0.331

*$p < 0.05$ significant difference

Table 3: Prediabetes and diabetes mellitus association with vitamin D

Variables	Odds ratio	95% CI Lower	95% CI Higher	p-value
Prediabetes (100-125 mg|dl)	1..85	1.05	3.28	<0.01*
Diabetes (>125 mg|dl)	2.91	1.47	5.75	<0.01*

(Logistic regression, *p < 0.05 significant difference)

Table 4: Pearson correlation between serum vitamin D and physiological and biochemical parameters

Plasma glucose	Pearson correlation	Significance (two tailed)	n
Age	-0.08	0.08	218
Pulse	-0.07	0.09	218
BP	-0.19	0.0048*	218
BMI	-0.09	0.1855	218
Waist circumference	-0.18	0.0077*	218
Plasma glucose	-0.22	0.0011*	218

*p < 0.05 significant difference

DISCUSSION:

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 [9, 10]. 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 [11]. 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 [12]. Till the year 2000, there was no systematic study which directly assessed body vitamin D status of Asian Indians residing in India [11]. 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 [11]. Subsequently, studies conducted in different parts of the country have documented a widespread prevalence of VDD.

We found out that vitamin d deficiency in our study was around 49% which is less than various studies. But there was strong correlation of vitamin D levels with hyperglycemia and obesity. The risk of vitamin D deficiency/ insufficiency was greater in diabetic patients. Age and gender have no role in determining vitamin D status.

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. van Driel M, Koedam M, Buurman CJ, et al., Evidence for auto/paracrine actions of vitamin D in bone: 1alpha-hydroxylase expression and activity in human bone cells. FASEB J. 2006; 20:2417-2419.

8. Ritter CS, Armbrecht HJ, Slatopolsky E, Brown AJ. 25Hydroxyvitamin D (3) suppresses PTH synthesis and secretion by bovine parathyroid cells. Kidney Int. 2006; 70:654-659.

9. 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.

10. 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

11. Goswami R, Gupta N, Goswami D, Marwaha RK, Tandon N and Kochupillai N, 2000 Prevalence and significance of low 25hydroxyvitamin D concentrations in healthy subjects in Delhi, Am J Clin Nutr, 72; 472-475.

12. 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.