



VITAMIN D AND ITS DEFICIENCY IN INDIAN POPULATION : RETROSPECTIVE STUDY

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ABSTRACT **Introduction and Background:** Vitamin D plays an important role in immune system and reproduction. Ultraviolet light exposure of the skin converts naturally occurring 7- dehydrocholesterol to cholecalciferol or Vitamin D₃. It is a Vitamin for those who are mostly indoors, especially in Northern latitudes, and covering their skin, blocking sunlight. Vitamin D exerts its genomic effects through a nuclear gene transcription factor, the vitamin D receptor (VDR), while its biologically active form plays vital role at tissue level.

Patients/Materials and Methods: The study was carried out on 458 both Male and Female patients ranging from 9 to 85 years. Patients Age, Sex and 25-hydroxy Vitamin D level were collected from Laboratory Information System (LIS). To our best knowledge we have focused on population based in our nearby areas.

Result- Present study record shows In age group <20 years (2.34%) individuals had Vitamin D deficiency, Insufficient subjects (2.59%) and only (1.21%) had Vitamin D Sufficient level. In age group 20.1-40 years (42.47%) with deficiency, (27.27%) with Insufficiency, (24.39%) with sufficient Vitamin D level, followed by above 60 years subjects (18.72%) had deficiency and (23.7%) had Insufficiency and (18.29%) with sufficient Vitamin D level.

Conclusion- Present study shows that Vitamin D deficiency is present in healthy individuals living in India irrespective of the Sunlight Exposure and dietary Habits.

KEYWORDS : Vitamin D₃, Mini Vidas, Biomerieux, Indians.

Introduction:

Vitamin D plays an important role in maintenance of calcium hemostasis, regulation of extra-cellular fluid (ECF) calcium concentration within narrow limits to support normal nerve and muscle function. In the context it appears that most critical endocrine role of vitamin D is to enhance the intestinal absorption of dietary calcium and phosphate.⁽¹⁾ Its deficiency plays an important role in development of metabolic bone diseases like rickets and osteomalacia. Through last two decades have shown an increase in series of retrospective and prospective studies which decipher the epidemiology and clinical significance of 25- hydroxyl vitamin D deficiency and its association with diseases in India Population.⁽²⁾ Currently, Vitamin D status is categorized based on Endocrine society guidelines as Deficiency, Insufficient and Sufficiency based on serum 25-OH Vitamin D levels. Although this classification is accepted widely, extensive efforts are being taken to interpret the basis of this criteria as most of global population are Deficient. Surprisingly in spite of being a country with abundant Sunlight, Vitamin D Deficiency found to be 70- 90 % across all age groups. The average level of serum 25-OH vitamin D level among Indians is lesser than the recommended criteria of 20ng/ml as per studies.⁽³⁾

Materials and Method-

A Retrospective and Observational study was conducted in the Department of Pathology, Metropolis Healthcare Laboratory, Baroda, from Jan 2017 to April 2017, This study was conducted on 458 patients registered for Health- check up for Vitamin D levels. Data of Vitamin D level, age, sex were collected from Lab Information System (LIS). Serum level of 25-hydroxy vitamin D (Analytical measurement range is 8.1- 126.0 ng/ml) estimated on venous blood sample by using Enzyme Immunoassay competitive methods with a final fluorescent detection (ELFA) on Mini Vidas (Biomerieux) having detection limit of <8.1 ng/ml. Internal and external quality control done routinely and results are within range of assay. Latest recommendation of International Endocrine society on serum Vitamin D level divided into Deficient <20ng/ml VDD, 20 – 29 ng/ml as Insufficient VDI, 30-100ng/ml Sufficient VDS, >100 ng/ml as Hypervitaminosis. Subjects were divided into four age groups <20, 20.1-40, 40.1-60, >60 years.

Statistical Analysis-

Result of the study was expressed in percentage and One way Analysis of Variance (ANOVA) was used to compare Male Vs Female 25 (OH) Vitamin D level between age Groups. Data was Analyzed by using the Statistical Package for the Social Sciences software, version 12.0 for Windows.

Result-

In present study a record of 458 subjects were included for check up at

Metropolis Laboratory at Baroda, data was retrieved from Lab (LIS). Among these, 47.59% Male and Female 52.40% with M: F ratio 0.09:1. The mean of 25(OH) Vitamin D of total subjects was found as (20.69±13.41) median 17.2. On Distribution Male subjects mean level (21.55±14) and median (16.8). and Mean level of Female (21.18±12.84) and Median level (17.2) as shown in Table 1. Now Further evaluation and Distribution of Vitamin (OH) level of Sex wise in Male and Female, as shown in Table 2, 65.28%(299) subjects found to be 25 (OH) Vitamin D Deficient (< 20 ng/ml) in which 47.15%(141) found to be Male and 52.84%(158) Female. So Insufficient Subjects (20-29ng/ml) 16.81 %(77), among which Male 49.35% (38) and Female 50.64% (39). So, Sufficient Subjects with 25(OH) Vitamin D (30-100ng/ml) 17.90%(82) among which Male are 47.56%(39), and Female are 52.43%(43). The Mean of 25(OH) Vitamin D with Sufficient Subjects is (43.37± 15.35) in Male and in Female (35.18± 6.87). In Vitamin D deficient level and Insufficient group there is no Statistical significance between Male and Female. But Vitamin D Sufficient group Mean level is (43.37±15.35) which is Disproportionately Higher than the Mean level of Female (35.18±6.87), with *p* value 0.0022 versus Male.

On Further Evaluation as shown in Table 3, on Segregation of 25(OH) Vitamin D level with Age group and Sex. In < 20 years Male Subjects (52.29%) with mean value 24.86±10.19 and Females subjects (52.08%) with mean 16.63±9.93. Now in Age Group (20.1- 40) years Male 80 (36.69%) with mean 18.98±14.48 and Female in same group 88 (36.66%) with mean 18.14±0.09. We found that majority of Subjects on categorization fall in Age group (40.1-60 yrs) with 87 (39.90%) Male with mean 23.06±15.6 and Female 104(43.33%) with mean 23.48±14.34, and in Age group >60 years Male subjects 46(21.10%) with mean value 22.64±14.64 and Female 43(17.91%) mean 21.4±14.27.

Table 4 shows Age wise Distribution of subjects as per Vitamin D Status found that, in Age group of <20 years individuals Deficient individuals are 7(2.34 %) with mean level of 9.22±2.64, 2(2.59%) with Insufficiency with mean 27.8±0.14 and 1(1.21%) with mean 33.2 are Sufficient subjects.

In age Group 20.1-40, individuals 127(42.47%) were Deficient with mean 12.42±3.51, Insufficiency 21(27.27%) with mean 24.49±2.72, and Sufficient individuals 20(24.39%) with mean 38.36±9.29. In age group 40.1-60 years Deficient subjects were 109(36.35%) with mean 13.05±3.06, Insufficient 36(46.75%) with mean 23.11±2.3, Sufficient subjects 46(56.09%) mean 42.79±14.6 and in > 60 years subjects 56 (18.72%) mean 13.02±2.95 Deficient, Insufficient 18(23.7%) with mean 24.63±2.31, Sufficient Subjects 15(18.29%) mean 44.5±16.39.

Discussion-

India, nation of Abundant sunshine found to have massive burden of Vitamin D Deficiency among public irrespective of locality⁽³⁾, so we conducted a systematic study and segregated subjects Sex wise and Age group with their Vitamin D Status in our locality. Total prevalence of 25(OH) Vitamin D Deficiency (VDD+VDI) was 82.09 % in which 65.28% had Deficiency and 16.18% had Insufficiency. Highest Deficiency is found in Females i.e 52.84% (158) with mean 21.18±12.84, followed by Males 47.15%(141). Similarly Vitamin D Insufficiency 50.64%(39) in Females and 49.35% (38) in Males, whereas Sufficient were observed in Female 52.4%(43) and Males 47.56%(39) respectively. The mean of 25(OH) Vitamin level is 20.69±13.41, which is having similarity to other studies observed by Kirtikar Shukla et.al ,which is lower than the normal range. Vitamin D deficiency is epidemic in India despite of plenty of sunshine. The interpretation of vitamin D levels should be done with the solar zenith angle, minimal erythemal dose, skin type, UV Index and geographical location. All Indian studies uniformly point to low 25(OH)D levels in the populations studies despite abundant sunshine. All studies have uniformly documented low dietary calcium intake compared to Recommended Daily/Dietary Allowances (RDA) by Indian Council of Medical Research (ICMR).⁽⁴⁾

Conclusion-

The present study clearly demonstrated the high prevalence of vitamin D deficiency in an otherwise healthy Indian population. Sun exposure is an untenable solution for most individuals in conjunction with low calcium intake makes matters worse. Scheme for conducting awareness program on vitamin D deficiency should be started from government as well as private organization at the local level to impart the importance of vitamin D and its clinical significance. The need of the hour is to develop reference values with respect to the Indian population.

Limitation of Study-

In spite of major outcomes of current prevalence of vitamin D status, this study had some limitations. We could not collect information regarding dietary vitamin D intake, UVB exposure, sunscreen use or measures of adiposity and calcium levels. Regarding multi-vitamin use, we do not have any data on vitamin D content or adherence, which may confound the effects of multivitamin use in different subgroups. Therefore, current retrospective data does not throw insight on longitudinal changes in vitamin D.

SEX	N%	Mean +/-SD	Median
Male	218 (47.59%)	21.55 +/- 14	16.8
Female	240 (52.40%)	21.18 +/- 12.84	17.2
Total	458 (100%)	20.69 +/- 13.41	17.2

N%	Deficiency (<20ng/ml)		Insufficient(20-29 ng/ml)		sufficient(30-100ng/ml)	
	299(65.28%)		77 (16.81%)		82 (17.90%)	
sex	Male	Female	Male	Female	Male	Female
N%	141 (47.15%)	158(52.84%)	38(49.35%)	39 (50.64%)	39(47.56%)	43(52.43%)
Mean+/-SD	12.59+/-3.38	12.76+/-3.17	23.76+/-2.59	24.16+/-2.48	43.37+/-15.35	35.18+/-6.87
Median	12.2	12.3	23.65	26.3	37.6	34.7

Sex	Male			Female		
AGE	N=218	Mean+/-SD	Median	N=240	Mean+/-SD	Median
0 Year - 20 Year	5(2.29%)	24.86+/-10.19	27.9	5(2.08%)	16.63+/-9.93	13.7
20.1 Year - 40 Year	80(36.69%)	18.98+/-14.48	14.8	88(36.66%)	18.14+/-9.09	14.5
40.1 Year - 60 Year	87(39.90%)	23.06+/-15.6	17.9	104(43.33%)	23.48+/-14.34	20.2
> 60 Years	46(21.10%)	22.64+/-14.64	21.3	43(17.91%)	21.4+/-14.27	15.55

Characteristic	Deficiency (<20ng/ml)			Insufficient(20-29 ng/ml)			Sufficient(30-100ng/ml)		
AGE	N=299	Mean +/-SD	Median	N=77	Mean +/-SD	Median	N=82	Mean +/-SD	Median
0 Year - 20 Year	7(2.34%)	9.72+/-2.64	8.1	2(2.59%)	27.8+/-0.14	27.8	1(1.21%)	33.2	33.2
20.1 Year - 40 Year	127(42.47%)	12.42 +/-3.51	12.1	21(27.27%)	24.49 +/-2.72	25.6	20(24.39%)	38.36 +/-9.29	36
40.1 Year - 60 Year	109(36.45%)	13.05 +/-3.06	12.5	36(46.75%)	23.11 +/-2.3	22.55	46(56.09%)	42.79 +/-14.6	37.25
> 60 Years	56(18.72%)	13.02 +/-2.95	12.05	18(23.37%)	24.63 +/-2.31	24.6	15(18.29%)	44.55 +/-16.39	37.2

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