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UBIQUITY OF VITAMIN D: A RETROSPECTIVE, HOSPITAL BASED STUDY

Biochemistry

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ABSTRACT

Vitamin-D_3, an essential fat soluble vitamin is also known as sunshine vitamin. Its deficiency is linked to various disorders such as rickets, infertility, depression and many more. Optimum bone health and calcium absorption is mediated by vitamin-D. Less exposure to sunlight leads to 80-90% population with vitamin D deficiency. In India where light complexion is preferred in both the genders as society is under the influence of social media, sun exposure is less and therefore natural absorption and assimilation is low. Dietary changes and supplementation is the need of the hour. In the present retrospective study conducted in Chattrapati Shivaji Subharti Hospital, Meerut,U.P. In this hospital patients from both urban and rural areas visits, and thus a total of 869 patients were selected and included for the study. Five groups of span of 20 years were divided; both males and females were studied. It was found that 78.48% of females were studied and on the contrary only 21.52% were males. Serum levels of vitamin-D were checked of all the patients and comparison was done by Mann-Whitney test. It was found that 66.5% of 0-20 years females were found to be deficient of vitamin D and males of same age group 0-20 years were 18.46%,50% of females of age >80 years were found to be having sufficient vitamin D levels and males >80 years were 100% insufficient. It was suggested to not to ignore and underestimate this vitamin too, and complete guidance should be given for diet and supplements for patient's optimum health.

KEYWORDS

Vitamin D_3, Cholecalciferol, Sunlight, diet, deficiency, high risk, bone loss

INTRODUTION:

Vitamin D_3, also referred as Cholecalciferol is a fat soluble vitamin. It is produced inside our body endogenously when ultraviolet rays from sunlight strikes the topical skin and trigger natural synthesis of vitamin D in liver (1). This is why it is known as the "Sunshine Vitamin". It was not so famous but today most of the population is suffering with its deficiency due to little to no exposure to natural sunlight because it was taken for granted. Recent studies and advancement in diagnostics and research developed some attention towards its importance in adult bone health and for the diagnosis along with treatment of chronic/metabolic diseases such as rickets (2), depression(3), asthma(4), infertility and PCOS (5) and more(6).

Human body needs major minerals such as sodium, potassium, calcium, chloride etc. which exhibits essential functions and catalyze various chemical reactions, thus they all are categorized as essential minerals (7). For optimum bone health and formation the most important minerals are calcium and phosphorus. Their levels in the blood are controlled by a complex tri-level network which involves three participants i.e. Vitamin D, calcitonin and parathyroid hormone.(6) Due to modernization and busy schedules Vitamin D deficiency is now incorporated into life style disorders. It is especially common amongst, adults and individual who do not expose themselves to get enough sunlight –(8).

Review of Literature:

Position of Indian subcontinent according to earth's spherical curvature is such that is blessed with abundance of sunlight most of the year as tropic of cancer passes right above them middle of this country (9). This leads to a paradigm of not expecting vitamin D deficiency normal in India; though few states can still be excluded from this conversation(6). Vitamin D deficiency was underrated and now it has shaped itself into a pandemic. A hospital based study once concluded as it might be undiagnosed or neglected for long or least bothered nutritional deficiency throughout the world(10). A study in India by a group of researchers explained that Vitamin D deficiency is widespread and it is irrespective of their age, gender, cast and geographical representation (11, 12). This has been proved since ages that vitamin D can be acquired by nutritional means (10–20 %) and naturally it is absorbed and assimilated via cutaneous synthesis by direct action of sunlight over it. This holds the major portion of assimilated vitamin D i.e. 80–90 % (13, 14).

25-hydroxy vitamin D [25(OH) vitamin D] has been directly linked with several other disorders such as metabolic syndrome, diabetes, cardiovascular diseases, autoimmune diseases such as crohn's disease, rheumatoid arthritis, infections such as tuberculosis and risk of developing cancer of breast, colon, prostate and ovary.(14) Vitamin D deficiency is currently rampanting in India. Indian literature uniformly points to low 25(OH) vitamin D levels in various population studies, despite abundant sunshine being present in the country (15). However, western literature has reported 25 (OH) vitamin D deficiencies as being rare in the Indian sub-continent(16). Though, the last two decades have shown an increase in the series of retrospective and prospective studies, which decipher the epidemiology and clinical significance of 25-hydroxy vitamin D deficiency and its association with several diseases in the Indian population–(11)(17)(18).The prevalence of Vitamin D deficiency ranged from 40% to 99%, with most of the studies reporting a prevalence of 80%–90%. It was prevalent in all the age groups and high-risk groups alike(19).

METHODOLOGY

The present retrospective cross-sectional study was conducted in the Chattrapati Shivaji Subharti Hospital, Department of Biochemistry and Laboratory Services at Swami Vivekananda Subharti University, Meerut, U.P., India. Institutional ethical consideration was taken before commencing the research. Suspected cases in which serum 25 (OH) Vit D assay had been performed some visited hospital under executive health check-ups and some were admitted in the hospital (OPD/IPD) were included in the study; for a span of two years (1st Aug 2016 till 20 March 2018). Data for vitamin D level, age and sex was collected from internal hospital information records. Serum levels of 25-hydroxy vitamin D [25(OH) vitamin D] were estimated on venous blood sample in an automated quantitative test VIDAS. It was used for the determination of 25-hydroxy vitamin D_3 in human serum using ELFA technique (ENZYME LINKED FLUORESCENT ASSAY).

Both internal and external quality control ran routinely and results were obtained within the recommended range of assay. Serum vitamin D levels in subjects were further divided into three groups as per latest recommendation of International Endocrine Society on serum vitamin D levels (6, 20). Subsequently, subjects were divided into five groups depending upon their age i.e. 0-20years, 21–40years, 41–60years, 61-80 years and 80 years and above. Similarly patient's data was further analyzed as per visit of patients in hospital during summer and autumn

(1st April–30th September) and winter and spring (1st October– 31st March) season.

RESULTS:

In the present study, records of 869 subjects were retrieved from the hospital records evaluating vitamin D levels, at Chattrapati Shivaji Subharti Hospital, Meerut. Among which males and females of different age group were included. Males were 21.52% (N=187) and females 78.48% (N=682). The mean value of 25(OH) vitamin D levels were divided into three categories as per the recommendations of International Endocrine Society on serum vitamin D as deficient, insufficient and sufficient. They were expressed as Mean ±S.D for males and females respectively. Comparison between two groups was done using MAAN-WHITNEY TEST.

On further division between males and females based on their ages 66.5% of 0-20 years females were found to be deficient of vitamin D and 50% of age >80 years were found to be having sufficient vitamin D levels other age groups in males; 0-20 years (18.46%),21-40(28.79%),41-60(42.13%) and 61-80(48.28%) and in females; 0-20 years (29.83%),21-40 years((25%),41-60 (27.08),61-80(24%) and >80 years (0%).

Table 1: Mean & Standard Deviation of Vitamin "D "Level in Males Corresponding To Different Age Groups

S. NO.	Age Groups (In Years)	Vitamin "D" Level In Male **(N=187) (Mean ± S.D.)**					
		Deficient	No.	Insufficient	No.	Sufficient	No.
1	0-20 Years (N=57)	13.152± 3.766	27	25.93± 3.177	13	62.89± 37.852	17
2	21-40 Years (N=56)	11.824± 3.467	31	23.127± 3.148	11	46.764± 18.20	14
3	41-60 Years (N=48)	13.882± 4.262	14	24.07± 2.191	21	46.92± 13.90	13
4	61-80 Years (N=25)	12.746± 3 .60	13	26.967± 1.586	06	63.733± 16.73	06
5	More Than 80 Years(N=01)	9.16±0	01	0±0	00	0±0	00

Table 2: Mean & Standard Deviation of Vitamin "D " Level In Females Corresponding To Different Age Groups

S. NO.	Age Groups (In Years)	Vitamin "D" Level In Female **(N=682) (Mean ± S.D.)**					
		Deficient	No.	Insufficient	No.	Sufficient	No.
1	0-20 Years (N=65)	10.898± 3.452	43	24.30± 2.160	10	48.933± 21.668	12
2	21-40 Years (N=389)	11.660± 4.370	202	25.104± 2.654	75	44.672± 19.281	112
3	41-60 Years (N=197)	12.199± 4.151	12	24.897± 2.502	24	46.53± 17.475	46
4	61-80 Years (N=29)	10.944± 3.979	10	22.15± 1.571	22	55.64± 24.67	55
5	More Than 80 Years (N=02)	26.6±0	0	32.5±0	01	0±0	01

Table 3:comparsion In Different Types Of Vit."d" Level B/w Male & Female In Different Age Groups (by Mann- Whiteny Test)

S. No.	Age Groups (In Years)	**Probable Value Of Mann- Whiteny Score B/W Male & Female**		
		Deficient	Insufficient	Sufficient
1	0-20 Years	.0158** **P>.01 (N.S.)**	.1585** **P>.01 (N.S.)**	.2202** **P>.01 (N.S.)**
2	21-40 Years	.8144** **P>.01 (N.S.)**	.0705** **P>.01 (N.S.)**	.6922** **P>.01 (N.S.)**
3	41-60 Years	.1883** **P>.01 (N.S.)**	.0350** **P>.01 (N.S.)**	.9276** **P>.01 (N.S.)**
4	61-80 Years	.2937** **P>.01 (N.S.)**	.0004* P<.01 (SIG.)	.4081** **P>.01 (N.S.)**
5	More Than 80 Years	**Not Found**	**Not Found**	**Not Found**

***Shows A Significant Difference B/W Male & Female At .01 Level Of Significance. I.E. P<.01**

****Shows No Significant Difference B/W Male & Female At .01 Level Of Significance. I.E. P>.01**

S. No.	Age Groups (In Years)	**Prevalence Of Vitamin "D" Level For Male (N=187) In Different Age Groups**					
		Deficient	**No.**	**Insufficient**	**No.**	**Sufficient**	**No.**
1	0-20 Years (N=57)	47.37% (A)	27	22.81% (B)	13	29.83%	17
2	21-40 Years (N=56)	55.36%(A)	31	19.64%(B)	11	25%	14
3	41-60 Years (N=48)	29.17%	14	43.75%(A)	21	27.08%(B)	13
4	61-80 Years (N=25)	52%(A)	13	24% (B)	06	24%(B)	06
5	More Than 80 Years(N=01)	100%(A)	01	00%(B)	00	00%(B)	00

(A)=Maximum Prevalence & (B) =Minimum Prevalence

S. No.	Age Groups (In Years)	**Prevalence Of Vitamin "D" Level For Female (N=682) In Different Age Groups**					
		Deficient	**No.**	**Insufficient**	**No.**	**Sufficient**	**No.**
1	0-20 Years (N=65)	66.15%(A)	43	15.39%(B)	10	18.46%	12
2	21-40 Years (N=389)	51.93%(A)	202	19.28%(B)	75	28.79%	112
3	41-60 Years (N=197)	40.61%(A)	80	17.26%(B)	34	42.13%	83
4	61-80 Years (N=29)	31.03%	09	20.69%(B)	06	48.28%(A)	14
5	More Than 80 Years (N=02)	00%(B)	0	50%(A)	01	50%(A)	01

(A)=Maximum Prevalence & (B) =Minimum Prevalence

DISCUSSION AND CONCLUSION:

Vitamin D deficiency has shaped itself into a silent pandemic. After different researches conducted in different parts of the world, whether it is a hot temperate zone or a cold; almost all are either deficit/insufficient of vitamin D in one way or other.

India being close to tropic of cancer is well known for its hot climate and ample sun exposure throughout the year, but still 60-70% of Indian population is suffering from vitamin D deficiency. High skin pigmentation (Darker complexion) might be a major factor in the low 25 (OH) D levels in the Indian sub-continent.

Data that we extracted from a retrospective hospital based study, represented mostly females and males of young age are suffering of hypovitaminosis D (less vitamin D levels) as compared to elderly generation. Through this study we found that 66.5% of females between age group of 0-20 years were deficient of vitamin D and 50% of females age more than 80 years had sufficient vitamin D. Males of the same age group 0-20 years only 47.37% were deficient and males more >80 years, deficiency was 100%.

It was thus suggested that every individual should have their vitamin D levels checked once a year. In schools/colleges/offices should be designed to allow ample sunlight in their premises or its exposure should be made necessary for at least for 20 minutes on daily basis. Regular exercises performed in presence of sunlight, vitamin D rich foods or supplements to be provided if insufficient/ deficient. National level awareness programmes should be conducted by both government and private sectors.

Conflict of Interest:

All the Authors shows no conflict of interest.

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