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Original Research Article

A study of prevalence of vitamin d deficiency in patients in tertiary care hospital of an urbanized city

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Abstract: Recent studies have reported prevalence of Vitamin D deficiency in different sex and age group in developing countries. This is a cross-sectional study which was conducted in urbanized tertiary care hospital. Various factors which affect Vitamin D levels where taken account of. Age, sex, diet, sun exposure and anthropometry, family history, mobility of patient, calcium supplements and bio chemical profile where noted. Results of study 74.7% people where Vitamin D deficient. Out of 150 patients 59.5% were males and 40.7% were female. We found in our study that adequate sun exposure has positive co relation with Vitamin D status. Half an hour or more exposure had relatively low prevalence of Vitamin D deficiency (64.5% Vs 85.8%). Vitamin D level were significantly lower in overweight people (93.5%) compared to normal healthy people (49.2%). Prevalence of Vitamin D deficiency was higher in high socioeconomic group (69.2% Vs 53.3%). Prevalence of Vitamin D deficiency in diabetic was (81.4% Vs 72%). We observed association between Vitamin D deficiency and CVD was significant. Prevalence of Vitamin D deficiency is high in study population proper education of people, supplements of calcium, proper sun exposure, good control of DM, control of obesity, treatment of CVD, proper mobility, all can decrease incidence of Vitamin D deficiency.
Keywords: Vitamin D deficiency, tertiary care hospital, Calcium supplements, obesity, CVD

INTRODUCTION

It has been estimated that 1 billion people worldwide have Vitamin D deficiency or insufficiency. Earlier it was thought that India being a tropical country with abundant sun exposure, there should not be Vitamin D deficiency in India. But a lot of studies done after that showed that there is a widespread prevalence of varying degrees (50-90%) of Vitamin D deficiency [1] with low dietary calcium intake in Indian population [2]. Inadequate exposure to sunlight and poor nutrition are factors contributing to the Vitamin D deficiency [3]. Long indoor working hours may contribute to deficiency in adult populations particularly in those not receiving Vitamin D supplementation in any form. Cultural and traditional habits prevalent in certain religions like “Burqa” and the “pardah” system have been well known. Repeated and unplanned, unspaced pregnancies in dietary deficient patients can aggregate Vitamin D deficiency in the mother and the foetus [4].

Much attention has focused recently on the impact of Vitamin D on various aspects of health. Besides rickets and reduced bone mineral density, Vitamin D has been linked to an array of health conditions, e.g., diabetes mellitus [5, 6], stroke [7, 8], autoimmune disease, and cancer. Data have also associated Vitamin D deficiency with increased prevalence of CVD, tuberculosis, prostate, breast and colon malignancy and osteoarthritis [9].

Despite the above-mentioned facts, a search into the literature reveals only a few such studies highlighting the currently prevailing spectrum of the Vitamin D deficiency as a whole. Taking all these factors into consideration, we decided to do a study to understand the current spectrum of the Vitamin D deficiency in patients admitted or attending OPDs in a tertiary care hospital along with its risk factors and its associations.

MATERIAL & METHODS

This is a cross sectional study which was conducted in Jaslok Hospital and Research centre which is a tertiary care centre. Cases of this study were 150 patients admitted to the hospital or attending OPDs.

This study has shown the overall prevalence of Vitamin D deficiency. Various factors which affect Vitamin D levels have been discussed in this study. Various co-morbidies which have been associated with Vitamin D are discussed in the study.

Inclusion criteria

1. Patient admitted to jaslok hospital or attending OPD's at jaslok who is above 18 years.
2. Written informed valid consent.

Exclusion criteria:

1. Less than 18yrs of age.
2. Patients suffering from any liver or kidney pathology.
3. If patient refusing for consent.
4. If patient suffering from any parathyroid diseases..
5. If patient is on Vitamin D supplements.

After taking informed valid consent from the patient, basic history and information regarding the age, sex, diet, sun exposure, any co-morbid condition, any family history, intake of any medications, history of taking any calcium supplements, mobility etc. were taken. Further the values of Vitamin D along with calcium, phosphorous, alkaline phosphates and PTH levels, FBS, HbA1C values noted.

Statistical analysis

After data collection, data entry was done in MS Excel. Data analysis is done with the help of SPSS Software version 22 and Sigma plot Ver. 11. Quantitative data is presented with the help of Mean, SD, Median and IQR, comparison among study groups is done with the help of Mann-Whitney test and Kruskal-Wallis One Way Analysis as per results of Normality test.

Correlation among various variables is assessed with Pearson correlation coefficient Qualitative data is presented with the help of Frequency and Percentage table, association among study group is assessed with the help of Chi-Square test. P value less than 0.05 is taken as significant level.

RESULTS

Results from our study confirm that there is a high prevalence of Vitamin D deficiency in our country despite being a tropical country with abundant sun exposure [3]. 74.7% people in this study were either Vitamin D deficient or insufficient.

Table:-1

SEX		**VIT D3 MOD**		**Total**
		Deficient	**Sufficient**	
Male	**Count**	**70**	**19**	**89**
	Percent	**78.7%**	**21.3%**	**100.0%**
Female	**Count**	**42**	**19**	**61**
	Percent	**68.9%**	**31.1%**	**100.0%**
Total	**Count**	**112**	**38**	**150**
	Percent	**74.7%**	**25.3%**	**100.0%**
Chi-Square Test	**Value**	**df**	**P value**	**Association is**
Pearson Chi-Square	**1.837**	**1**	**0.175**	**Not significant**
Fisher's Exact Test			**0.187**	**Not significant**

Recent studies have shown that prevalence of Vitamin D deficiency is very high in general population also [2]. Our study group comprised of 150 people either getting admitted or coming as our patients. Of which 59.3% were males and 40.7% were females. We also divided our study group in 3 categories (<40yrs, 41-60yrs, >60yrs). In our findings Table:-1, there was no significant gender difference (p value of 0.175). In our study, there was no significant association of Vitamin D deficiency and diet and dairy products, Table:-1 (p value 0.223). We found in our study that adequate sun exposure has positive correlation with Vitamin D status. (p value of 0.004).

Table 2: Association among study group between BMI STATUS AND VIT D DEFICIENCY

BMI STATUS		**VIT D3 MOD**		**Total**
		Deficient	**Sufficient**	
Normal Health	**Count**	**30**	**31**	**61**

	Percent	**49.2%**	**50.8%**	**100.0%**
Over Wt	**Count**	**72**	**5**	**77**
	Percent	**93.5%**	**6.5%**	**100.0%**
Obese	**Count**	**10**	**2**	**12**
	Percent	**83.3%**	**16.7%**	**100.0%**
Total	**Count**	**112**	**38**	**150**
	Percent	**74.7%**	**25.3%**	**100.0%**
Chi-Square Test	**Value**	**df**	**P value**	**Association is**
Pearson Chi-Square	**35.872**	**2**	**0.000**	**Significant**

Patients who were immobile or mobile with support (disabled) were 100% Vitamin D deficient. Vitamin D levels were significantly lower in overweight and obese people (93.5% and 83.3% respectively), Table:-2 compared to normal healthy people (49.2%). we also compared prevalence of Vitamin D deficiency in patients with cardiovascular disease (CVD) and non CVD patients.

Table 3: Association among study group between CVD AND VITAMIN D DEFICIENCY:

CVD		**VIT D3**		**Total**
		Deficient	**Sufficient**	
Yes	**Count**	**21**	**2**	**23**
	Percent	**91.3%**	**8.7%**	**100.0%**
No	**Count**	**91**	**36**	**127**
	Percent	**71.7%**	**28.3%**	**100.0%**
Total	**Count**	**112**	**38**	**150**
	Percent	**74.7%**	**25.3%**	**100.0%**
Chi-Square Tests	**Value**	**df**	**P value**	**Association is**
Pearson Chi-Square	**3.975**	**1**	**0.046**	**Significant**
Fisher's Exact Test			**0.066**	**Not significant**

We observed that association between Vitamin D deficiency and CVD was significant. (p value 0.046). Out of 150 people, 43 were diabetics - Table:-3. The prevalence of Vitamin D deficiency among the diabetics was 81.4% VS 72% in non-diabetics. In our study though, the association between Vitamin D and diabetes was not significant (p value 0.230). Calcium level has positive significant association with Vitamin D level (p value 0.017), Table:- 4. It was noted that people with Vitamin D deficiency had high level of PTH.

Table 4: Showing correlation of Vitamin D3 levels with other variables:

Variable	**Pearson Correlation**	**P value**	**Correlation is**
VIT D3			
S. Ca	**0.195**	**0.017**	**Significant**
PO4	**0.105**	**0.202**	**Not significant**
ALP	**0.027**	**0.746**	**Not significant**
S.PTH	**-0.217**	**0.008**	**Significant**
EXPOSURE (hours/ week)	**0.162**	**0.047**	**Significant**
FRACTION OF BSA	**0.122**	**0.138**	**Not significant**
AGE (YEARS)	**-0.236**	**0.004**	**Significant**

DISCUSSION

This is a cross sectional study evaluating Vitamin D status in patients either admitting or attending the OPDs in a tertiary care hospital in the western part of India. In this study, we have taken various factors those affect Vitamin D status in the body and also some associations related to Vitamin D deficiency.

Our study group comprised of 150 people either getting admitted or coming as our patients. Of which 59.3% were males and 40.7% were females.(table-1) We also divided our study group in 3 categories (<40yrs, 41-60yrs, >60yrs). In our findings, there was no significant gender difference (p value of 0.175). The reason for that could be no proper guidelines recommended by ICMR FOR Vitamin D intake. Also Indian guidelines for daily calcium requirement is also very low compared to western guidelines as stated earlier [10]. We found in our study that adequate sun exposure has positive correlation with Vitamin D status. (p value of 0.004) persons who were exposed for half an hour or more per day had relatively low prevalence of Vitamin D deficiency compared to persons who were less sun exposed (64.5% vs. 85.1%). In one study done the Asian migrants that moved to northern countries [2] and Canadian summer holiday takers that travelled closer to equatorial latitudes with good sun exposure showed a decrease and increase in their Vitamin D levels respectively, confirming this relationship [11].

Patients who were immobile or mobile with support (disabled) were 100% Vitamin D deficient. One study done by van der Mei *et al.;* in 2007 showed that greater disability and associated reduced exposure to sun may contribute to the high prevalence of Vitamin D insufficiency reported in a population-based MS case sample [12].

In our study, we observed that there was an inverse association between obesity and Vitamin D levels. In this study, we had divided our subjects into three groups. Normal healthy individuals (BMI<25), overweight (BMI 25-29.99), Obese (BMI>30). Vitamin D levels were significantly lower in overweight and obese people(93.5% and 83.3% respectively) compared to normal healthy people(49.2%)(table -2)(figure-1)

In our study, we also compared prevalence of Vitamin D deficiency in patients with cardiovascular disease (CVD) and non CVD patients. We observed that association between Vitamin D deficiency and CVD was significant. (P value 0.046). (Table-3)(Figure-2) Grimes et al also recognized that mortality from IHD was inversely proportional to the amount of hours of sunlight in the United Kingdom [13]. In the most recent NHANES 2000-2004 survey, Vitamin D deficiency (25(OH)D <20 ng/mL) was associated with increased prevalence of self-reported coronary heart disease, heart failure and peripheral vascular disease[14].

Out of 150 people, 43 were diabetics. The prevalence of Vitamin D deficiency among the diabetics was 81.4% VS 72% in non-diabetics. In our study though, the association between Vitamin D and diabetes was not significant (p value 0.230).(figure-3) the reason for this study to be insignificant could be relatively small study. Also there are various other factors like skin pigmentation, sun exposure, cultural habits which influence Vitamin D status. One study done by Pittas AG et al showed that a combined daily intake of 1200 mg of calcium and 800 IU of Vitamin D lowered the risk of type 2 diabetes by 33% (relative risk, 0.67; 95% CI, 0.49 to 0.90) as compared with a daily intake of less than 600 mg of calcium and less than 400 IU of Vitamin D.[15] Evidences suggest that Vitamin D and calcium deficiency influences postprandial glycemia and insulin response.

We found that calcium level has positive significant association with Vitamin D level (p value 0.017). Many studies have shown that low calcium levels in the body affects the Vitamin D levels [16]. Low dietary calcium converts the 25(OH) D to polar metabolites in the liver and leads to secondary 25(OH) D deficiency. Similarly significant association was seen in serum PTH levels and Vitamin D status and had a negative correlation. It was noted that people with Vitamin D deficiency had high level of PTH (p 0.008)

CONCLUSION:

Prevalence of Vitamin D deficiency is high in study population proper education of people, supplements of calcium, proper sun exposure, good control of DM, control of obesity, treatment of CVD, proper mobility, all can decrease incidence of Vitamin D deficiency

REFERENCES

1. Whistler D. De morbo puerili anglorum, quem patrio idiômate indigenae vocant The rickets.. (Doctoral dissertation, Ex officina Wilhemi Christiani Boxii).
2. Holmes AM, Enoch BA, Taylor J, Jones ME. Occult rickets and osteomalacia amongst the Asian immigrant population. Quarterly journal of Medicine. 1973; 42(165):125-49.
3. Steenbock H. The induction of growth promoting and calcifying properties in a ration by exposure to light. Science (New York, NY). 1924 Sep; 60(1549):224-5.
4. Hess AF, Gutman P. The cure of infantile rickets by sunlight as demonstrated by a chemical alteration of the blood. Proceedings of the Society for Experimental Biology and Medicine. 1921 Oct; 19(1):31-4.
5. Norman AW, Frankel JB, Heldt AM, Grodsky GM. Vitamin D deficiency inhibits pancreatic secretion

of insulin. Science. 1980 Aug 15; 209(4458):823–5.
6. Pittas AG, Lau J, Hu FB, Dawson-Hughes B. The role of vitamin D and calcium in type 2 diabetes. A systematic review and meta-analysis. The Journal of Clinical Endocrinology & Metabolism. 2007 Jun; 92(6):2017-29.
7. Grimes DS, Hindle E, Dyer T. Sunlight, cholesterol and coronary heart disease. QJM. 1996 Aug; 89(8):579–89.
8. Fleck A. Latitude and ischemic heart disease. Lancet. 1989 Mar 18; 1(8638):613.
9. Hruska KA. Hyperphosphatemia and hypophosphatemia. In: Favus, MJ, ed. Primer on the metabolic bone diseases and disorders of mineral metabolism. 6th ed. Washington, DC: American Society for Bone and Mineral Research, 2006:233-42.
10. Vitamin D status in a rural population of northern Norway with high fish liver consumption. Public Health Nutrition / Volume 7 / Issue 06 / September 2004, pp 783-789.
11. Rucker D, Allan JA, Fick GH, Hanley DA. Vitamin D insufficiency in a population of healthy western Canadians. Canadian Medical Association Journal. 2002 Jun 11; 166(12):1517-24.
12. van der Mei IA, Ponsonby AL, Dwyer T, Blizzard L, Taylor BV, Kilpatrick T, Butzkueven H, McMichael AJ. Vitamin D levels in people with multiple sclerosis and community controls in Tasmania, Australia. Journal of neurology. 2007 May 1; 254(5):581.
13. Grimes DS, Hindle E, Dyer T. Sunlight, cholesterol and coronary heart disease. QJM. 1996 Aug; 89(8):579–89.
14. Seeman TE, Merkin SS, Crimmins EM, Karlamangla AS. Disability trends among older Americans: national health and nutrition examination surveys, 1988–1994 and 1999–2004. American journal of public health. 2010 Jan; 100(1):100-7.
15. Pittas AG, Lau J, Hu FB, Dawson-Hughes B. The role of vitamin D and calcium in type 2 diabetes. A systematic review and meta-analysis. The Journal of Clinical Endocrinology & Metabolism. 2007 Jun; 92(6):2017-29.
16. McCollum EV, Simmonds N, Becker JE, Shipley PG. Studies on experimental rickets XXI. An experimental demonstration of the existence of a vitamin which promotes calcium deposition. Journal of Biological Chemistry. 1922 Aug 1; 53(2):293-312.