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Original Research

Assessment of vitamin D deficiency among children

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ABSTRACT:
Background: Vitamin D plays a key role in calcium and phosphate metabolism and is an essential micronutrient for bone health. The present study was conducted to assess vitamin D deficiency among children. **Materials & Methods:** 360 children of both genders were assessed for height, weight, nutritional intake and daily sun exposure was recorded. Serum 25OHD, serum calcium, phosphorus, magnesium, and alkaline phosphatase levels were measured. **Results:** Out of 200 boys, 24 (12%) and out of 160 girls, 30 (18.7%) girls had vitamin D deficiency. 25 OHD level was 34.6 ng/ml, PTH was 30.1 pg/ml, alkaline phosphatase was 315.6 U/L, calcium was 10.2 mg/dl, magnesium was 1.92 mEq/L, phosphorus was 5.81 mg/dL. **Conclusion:** Girls had higher prevalence of vitamin D deficiency as compared to boys.
Key words: Serum calcium, Magnesium Vitamin D.

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INTRODUCTION

Vitamin D plays a key role in calcium and phosphate metabolism and is an essential micronutrient for bone health. Following discoveries of ubiquitous presence of vitamin D receptors and enzyme machinery for vitamin D activation in most organs of the body, wider non-osseous roles for this steroid hormone have been proposed.[1] The universal prevalence of vitamin D deficiency, even in sunlit countries, along with various proposed health benefits from vitamin D supplementation with increased availability of vitamin D estimation facilities have catapulted screening for deficiency by several folds.[2]

The prevalence of vitamin D deficiency is 50-90 % in the Indian subcontinent and is attributed to low dietary calcium along with skin color and changing lifestyle.[3] Some postulate that a deficiency of dietary calcium rather than vitamin D deficiency is responsible for rickets after infancy, supported by the fact that they have a better response to treatment with calcium alone or in combination with vitamin D rather than vitamin D alone.[4] Vitamin D deficiency is observed among breastfed infants at one end with dietary calcium deficiency in older children at the other end. Between these two extremes, it is likely that vitamin D insufficiency and decreased calcium intake or high phytate intake combine to induce vitamin D deficiency and rickets, which may be the most frequent cause of rickets globally.[5]

In the pediatric subjects, who are susceptible to deficiency and impaired bone mineral metabolism, screening for vitamin D deficiency is particularly recommended.[6] The present study was conducted to assess vitamin D deficiency among children.

MATERIALS & METHODS

The present study was conducted among 360 children of both genders. Parents were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. Parameters such as height, weight, nutritional intake and daily sun exposure was recorded. One blood sample (15 mL) was obtained for each participant. Serum 25OHD levels were determined using chemiluminescent assay. Serum calcium, phosphorus, magnesium, and alkaline phosphatase levels were measured using an end point assay in a multichannel analyzer. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 360		
Gender	**Boys**	**Girls**
Number	200	160

Table I shows that out of 360 children, boys were 200 and girls were 160.

Table II Prevalence of vitamin D deficiency

Gender	Total	Prevalence
Boys	200	24
Girls	160	30

Table II shows that out of 200 boys, 24 (12%) and out of 160 girls, 30 (18.7%) girls had vitamin D deficiency.

Table III Assessment of parameters

Parameters	Variables	Number	P value
Season of visit	Spring	6	0.01
	Summer	28	
	Autumn	20	
Skin pigmentation score	1	26	0.01
	2	18	
	3	6	
	4	4	
Taken Outdoor	Yes	35	0.02
	No	19	
Uses sunscreen	Yes	14	0.01
	No	40	

Table II, graph I shows that season of visit among children with vitamin D deficiency was spring in 6, summer in 28 and autumn in 20, skin pigmentation score 1 was seen in 26, 2 in 18, 3 in 6 and 4 in 4. 35 were taken outdoor and 40 were not using sunscreen. The difference was significant (P< 0.05).

Graph I Assessment of parameters

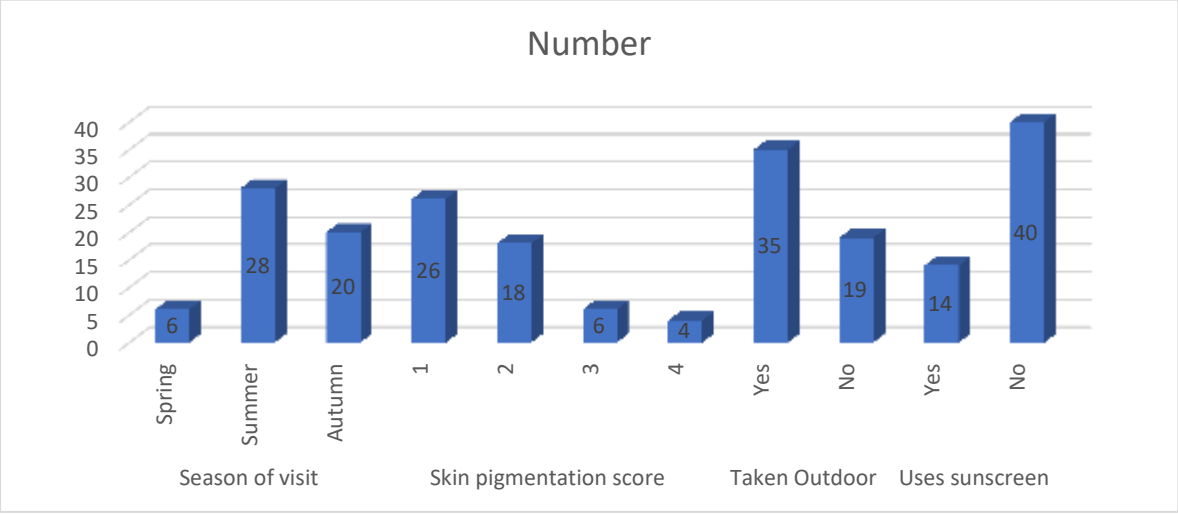

Table IV Laboratory findings

Level	Number
25 OHD, ng/ml	34.6
PTH, pg/ml	30.1
Alkaline phosphatase, U/L	315.6
Calcium, mg/dl	10.2
Magnesium, mEq/L	1.92
Phosphorus, mg/dL	5.81

Table IV shows that 25 OHD level was 34.6 ng/ml, PTH was 30.1 pg/ml, alkaline phosphatase was 315.6 U/L, calcium was 10.2 mg/dl, magnesium was 1.92 mEq/L, phosphorus was 5.81 mg/dL.

DISCUSSION

Vitamin D deficiency is considered to be the most common nutritional deficiency and also one of the most common undiagnosed medical conditions in the world. Vitamin D has evolved into a hormone that is active throughout the body not only to regulate calcium and bone metabolism but also to reduce the risk of chronic diseases including auto immune diseases, malignancies, cardiovascular and infectious diseases.[7] It has been estimated that 1 billion people worldwide have vitamin D deficiency or insufficiency. Though majority of population in India lives in areas receiving ample sunlight throughout the year, vitamin D deficiency is very common in all the age groups and both the sexes across the country.[8] The present study was conducted to assess vitamin D deficiency among children.

In present study, out of 360 children, boys were 200 and girls were 160. We found that out of 200 boys, 24 (12%) and out of 160 girls, 30 (18.7%) girls had vitamin D deficiency. Basu et al[9] in their study, serum 25 hydroxy cholecalferol (ng/ml) was analyzed in 310 children and adolescents of pediatric hospital of Kolkata, India. Serum calcium (mg/dl), phosphorous (mg/dl) and alkaline phosphatase (IU/L) data was obtained. Median 25(OH)D was 19 ng/ml. 19.2 % of population had serum 25(OH)D < 10 ng/ml (severe deficiency), 52.9 % had <20 ng/ml (deficiency), 24.5 % had 20–29 ng/ml (insufficiency) and 22.6 % had >30 ng/ml (optimum). Deficiency was highest in adolescents (86.1 %), followed by school children (61.0 %), lowest in pre-school children (41.6 %). 25(OH)D concentrations was lowest in winters ($P = 0.002$) and spring ($P = 0.03$) compared to summer. There was no correlation with calcium ($P = 0.99$), phosphorous ($P = 0.23$) and ALP ($P = 0.63$). There is high prevalence of vitamin D deficiency in children and adolescents of eastern India. Prevalence was lower in younger subjects. 25(OH)D did not correlate with bone mineral markers.

Several therapeutic regimens have been attempted for deficiency of vitamin D. Short term administration of vitamin D2 or D3 2000 units daily or vitamin D2 50,000 units weekly has yielded equivalent outcomes in the treatment of hypovitaminosis D in young children.[10] Common recommendations include vitamin D 1000- 5000 units/day for several weeks or single IM injection of 6 lakh units (Stoss therapy) or 50,000U of vitamin D2 weekly for 8 weeks. The total dose of vitamin D has been reported to be more predictive of vitamin D sufficiency rather than the frequency of dosing (daily, weekly or monthly). Therefore, treatment regimens for a given patient can be individualized to ensure compliance, since no difference in the efficacy or safety was reported in these common treatment regimens.[11]

We found that season of visit among children with vitamin D deficiency was spring in 6, summer in 28 and autumn in 20, skin pigmentation score 1 was seen in 26, 2 in 18, 3 in 6 and 4 in 4. 35 were taken outdoor and 40 were not using sunscreen. We observed that 25 OHD level was 34.6 ng/ml, PTH was 30.1 pg/ml, alkaline phosphatase was 315.6 U/L, calcium was 10.2 mg/dl, magnesium was 1.92 mEq/L, phosphorus was 5.81 mg/dL. Gordan et al[12] found that the prevalence of vitamin D deficiency (≤20 ng/mL) was 12.1% (44 of 365 participants), and 146 participants (40.0%) had levels below an accepted optimal threshold (≤30 ng/mL). The prevalence did not vary between infants and toddlers or by skin pigmentation. There was an inverse correlation between serum 25OHD and parathyroid hormone levels. In multivariable models, breastfeeding without supplementation among infants and lower milk intake among toddlers were significant predictors of vitamin D deficiency. In vitamin D–deficient participants, 3 participants (7.5%) exhibited rachitic changes on radiographs, whereas 13 (32.5%) had evidence of demineralization.

CONCLUSION

Authors found that the girls had higher prevalence of vitamin D deficiency as compared to boys.

REFERENCES

1. Misra M, Pacaud D, Petryk A, et al. Vitamin D deficiency in children and its management: review of current knowledge and recommendations. Pediatrics. 2008;122:398–417.
2. Zhu Z, Zhan J, Shao J, Chen W, Chen L, Li W, et al. High prevalence of vitamin D deficiency among children aged 1 month to 16 years in Hangzhou, China. BMC Public Health. 2012;12:126–32.
3. Muhairi SJ, Mehairi AE, Khouri AA, Naqbi MM, Maskari FA, et al. Vitamin D deficiency among healthy adolescents in Al Ain, United Arab Emirates. BMC Public Health. 2013;13:33–9.
4. Marwaha RK, Tandon N, Reddy DHK, Agrawal R, Singh R, Sawhney RC, et al. Vitamin D and bone mineral density status of healthy school children in northern India. Am J Clin Nutr. 2005;82:477–82.
5. Ekbote VH, Khadilkar AV, Mughal MZ, Hanumante N, Sanwalka N, Khadilkar VV, et al. Sunlight exposure and development of rickets in Indian toddlers. Indian J Pediatr. 2010;77(1):61–5.
6. Harinarayan CV, Ramalakshmi T, Prasad UV, Sudhakar D. Vitamin D status in Andhra Pradesh: a population based study. Indian J Med Res. 2008;127(3):231–8.
7. Wagner CL, Greer FR. Prevention of rickets and vitamin D deficiency in infants, children, and adolescents. Pediatrics. 2008;122(5):1142–52.
8. Abrams SA. Vitamin D requirements in adolescents: what is the target? Am J Clin Nutr. 2011;93(3):483–4. 15. Holick MF, Vitamin D. Status: measurement, interpretation, and clinical application. Ann Epidemiol. 2009;19(2):73–8.

9. Basu S, Gupta R, Mitra M, Ghosh A. Prevalence of vitamin d deficiency in a pediatric hospital of eastern India. Indian Journal of Clinical Biochemistry. 2015 Apr 1;30(2):167-73.
10. Holick MF. Resurrection of vitamin D deficiency and rickets. J Clin Invest. 2006;116:2062–72.
11. Bailey DA, Martin A, McKay H, Whiting S, Mirwald RL. Calcium accretion in girls and boys during puberty: a longitudinal analysis. J Bone Miner Res. 2000;15:2245–50.
12. Gordon CM, Feldman HA, Sinclair L, Williams AL, Kleinman PK, Perez-Rossello J, Cox JE. Prevalence of vitamin D deficiency among healthy infants and toddlers. Archives of pediatrics & adolescent medicine. 2008 Jun 2;162(6):505-12.