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Original Article

Assessment of Vitamin D Status among Children of Known Population: An Observational Study

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***ABSTRACT*:**
Background: The accelerated rate of bone development during a child's life suggests that adequate concentrations of vitamin D are an important issue in general population. Hence; we planned the present study to assess the vitamin D status in a known paediatric population. **Materials &methods:** The present study included assessment of vitamin D status among children of known population. A total of 300 children were included in the present study. Capillary blood was taken from all the subjects and was sent to laboratory for assessment of vitamin D status. Diazyme's 25-OH Vitamin D Assay was utilized for evaluation of serum Vitamin D and was expressed in terms of 25(OH)D levels. Assessment of all the results was done by SPSS software. **Results:** Most of the subjects belonged to the age group of less than 30 months. Mean serum 25(OH)D levels were higher in males in comparison to females. Also, a decrease in 25(OH)D levels was seen with advancing age. Mild deficiency of Vitamin D was evident in 48.4 percent of the paediatric population in the present study. **Conclusion:** Deficiency of vitamin D exists significantly among children.
Key words: Bone, Children, Vitamin D

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INTRODUCTION

In past few years, there has been increased focus on the benefits of vitamin D on bone health and, potentially, other disease states. Safety data of high vitamin D doses in older children and adolescents are quite limited.[1, 2] Vitamin D_3 supplementation at 1000 IU daily for 8 weeks as part of a calcium absorption study in preteen children raised the average 25OHD value above 30 ng/mL but did not result in excess.[3] Evidence in infants, children, and adolescents are sparse concerning what dose corrects vitamin D deficiency rickets.[4]
The accelerated rate of bone development during a child's life suggests that adequate concentrations of vitamin D are an important issue in general population. Although more research is needed concerning the goals of vitamin D therapy and dosing in this population, there are helpful evidence-based guidelines to direct therapy for rickets.[5, 6]Hence; we planned the present study to assess the vitamin D status in a known paediatric population.

MATERIALS & METHODS

The present study was planned in the department of paediatric of the medical institution. It included assessment of vitamin D status among children of known population. Ethical approval was obtained from institutional ethical committee and written consent was obtained from the parents/guardians of all the subjects after explaining in detail the entire research protocol. A total of 300 children were included in the present study. Children with underlying metabolic bone pathology, or any other systemic illness were excluded from the present study. We enrolled only those subjects in the present study who reported to the department of paediatrics for routine medical check-up. Complete clinical and demographic details of all the subjects were recorded. Capillary blood was taken from all the subjects and was sent to laboratory for assessment of vitamin D status. Diazyme's 25-OH Vitamin D Assay was utilized for evaluation of serum Vitamin D and was expressed in terms of 25(OH)D levels. Cut-off points used in the present study for dividing the subjects was as follows:

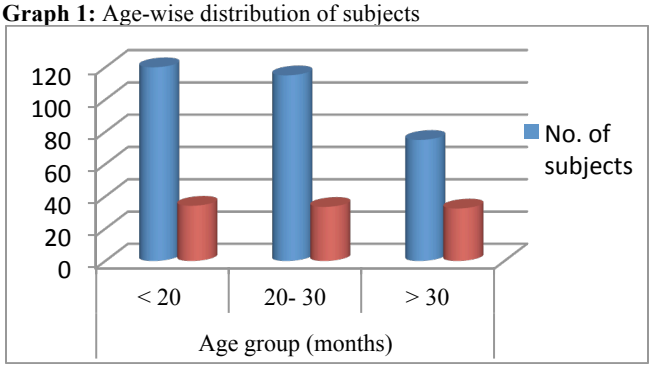
- Severely deficient: 0-12.5 nmol/L
- Moderately deficient: 12.6- 25 nmol/L
- Mildly deficient: 25.1- 49.9 nmol/L
- Sufficient: more than or equal to 50 nmol/L[8]

Assessment of all the results was done by SPSS software. For assessment of level of significance, univariate regression curve was used.

RESULTS

In the present study, majority of the paediatric subjects were males (180). Most of the subjects belonged to the age group of less than 30 months. Mean serum 25(OH)D levels were higher in males in comparison to females. Also, a decrease in 25(OH)D levels was seen with advancing age. Mild deficiency of Vitamin D was evident in 48.4 percent of the paediatric population in the present study. Only 15 percent of the subjects in the present study had sufficient levels of vitamin D.

Graph 1: Age-wise distribution of subjects



Graph 2: Gender wise distribution of subjects

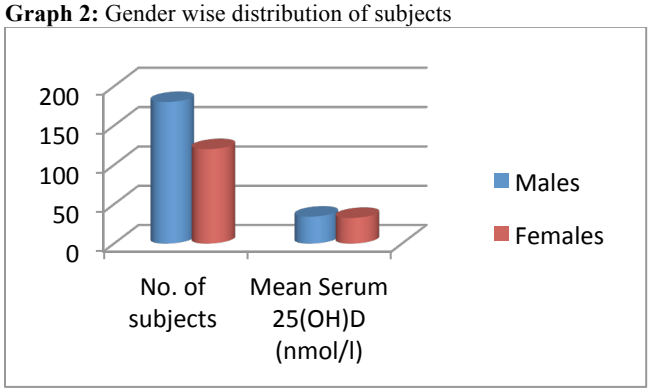


Table 1: Vitamin D status of the subjects

Parameter	serum 4(OH)D range (nmo/L)	Number of subjects	Percentage prevalence
Sufficient	≥50	45	15
Mild deficient	25.1- 49.9	145	48.4
Moderately deficient	12.6- 25	55	18.3
Severely deficient	< 12.6	55	18.3
Total		300	100

DISCUSSION

The use of calcium as well as vitamin D to treat individuals suffering depletion is a further area of contention. It is evident in vitamin D deficient adults that the use of both vitamin D and calcium shows additional benefits. However, there have been few trials with children.[9- 11]

In the present study, mean serum 25(OH)D levels were higher in males in comparison to females. Also, a decrease in 25(OH)D levels was seen with advancing age. Mild deficiency of Vitamin D was evident in 48.4 percent of the paediatric population in the present study. Only 15 percent of the subjects in the present study had sufficient levels of vitamin D.Roh YE et al investigated the prevalence and risk factors associated with vitamin D deficiency in children. They analyzed the medical records of 330 patients from the age of 6 to 12, who visited the endocrinology clinic of the Department of Pediatrics at Pusan National University Hospital, from September, 2013 to May, 2014. According to their serum 25-hydroxyvitamin D (25(OH)D) levels, the patients were grouped into either the deficiency group (25(OH)D<20 ng/mL), or the sufficiency group (25(OH)D≥20 ng/mL). The differences between the 2 groups were compared. There were 195 patients (59.1%) who had vitamin D deficiency. Their mean serum 25(OH)D level was 14.86±3.20 ng/mL. The differences in sex, age, and pubertal status between the 2 groups were not statistically significant. Weight standard deviation score (SDS), and body mass index SDS, were significantly higher in the vitamin D deficiency group (P=0.002 for each), compared to the sufficiency group. Compared with Autumn, both Spring (odds ratio [OR], 9.7; 95% confidence interval [CI], 4.3–22.0), and Winter (OR, 5.9; 95% CI, 3.5–10.0), were risk factors for vitamin D deficiency. In multiple logistic regression analysis, only seasonal differences have been confirmed to have an effect on vitamin D deficiency. Vitamin D deficiency in children aged 6 to 12 years is very common. Spring and Winter are the most important risk factors for vitamin D deficiency.[8]Savastio S et al investigated 25OHD status among children with T1DM and its relationship with insulin sensitivity and glycemic status. Of these 35 (24.8%) were migrants and 106 (75.2%) Italians (T2). We retrospectively analyzed data at the onset of the disease (T0)(64 subjects) and 12-24 months before the last visit (T1,124 subjects). Fasting glucose, glycatedhemoglobin (HbA1c), 25OHD levels and daily insulin requirement were evaluated and Cholecalciferol 1000 IU/day supplementation for the management of vitamin D insufficiency (<75 nmol/L) was systematically added. A generalized 25OHD insufficiency was found at each study time, particularly in migrants. At T0, the 25OHD levels were inversely related to diabetic keto-acidosis (DKA) severity (p<0.05). At T1 and T2, subjects with 25OHD ≤25nmol/L (10 ng/mL) showed higher daily insulin requirement (p<0.05) and HbA1c values (p<0.01) than others vitamin D status. The 25OHD levels were negatively related with HbA1c (p<0.001) and daily insulin dose (p<0.05) during follow up. There was a significant difference in 25OHD (p<0.01) between subjects with different metabolic control (HbA1c <7.5%,7.5-8%,>8%), both at T1 and T2. In supplemented subjects, we found a significant increase in 25OHD levels (p<0.0001) and decrease of HbA1c (p<0.001) between T1 and T2, but this was not significant in the migrants subgroup. Multivariate regression analysis showed a link between HbA1c and 25OHD levels (p<0.001). Children with T1DM show a generalized 25OHD deficiency that impact on metabolic status and glycemic homeostasis.[12] Chung IH et al investigated the relationship between serum vitamin D and parathyroid hormone (PTH) levels as well as to describe the prevalence and the risk factors of vitamin

D deficiency (VDD) in Korean children.The level of 25OHD was significantly lower in overweight group than in normal weight group (17.1±5.1 ng/mL vs. 19.1±6.1 ng/mL, P<0.001). Winter-spring season (odds ratio [OR], 4.46; 95% confidence interval [CI], 3.45-5.77), older age group (OR, 1.60; 95% CI, 1.36-1.88), and overweight (OR, 2.21; 95% CI, 1.62-3.01) were independently related with VDD. The PTH levels were significantly higher in VDD group compared to vitamin D insufficiency and sufficiency group (P<0.001). In normal weight children, 25OHD (β=-0.007, P<0.001) and ionized calcium (β=-0.594, P=0.007) were independently related with PTH, however, these associations were not significant in overweight children. VDD is very common in Korean children and its prevalence increases in winter-spring season, in overweight children and in older age groups. [13]

CONCLUSION

Deficiency of vitamin D exists significantly among children. Therefore for deficiency disorders, proper measures should be taken by health care institutions for increasing awareness about vitamin D among both general and paediatric population.

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