ORIGINAL RESEARCH

To Assess Serum 25-Hydroxyvitamin D Levels of Apparently Healthy Children Aged 1-24 Months

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ABSTRACT

Background: Vitamin D, a fat-soluble vitamin derived from the effects of sunlight on the skin and from dietary sources, plays important roles in calcium–phosphate homeostasis and bone metabolism. The present study was conducted to assess serum 25-Hydroxyvitamin D levels of apparently healthy children aged 1-24 months.

Material & Methods: The present retrospective study was carried out in the Department of Paediatrics over a period of one year. The retrospective data of 140 apparently healthy children aged 1 to 24 months were extracted and reported from the records. Serum 25(OH)D (vitamin D) was assayed. Data was analyzed using SPSS (version 20: IBM Corporation). The prevalence for each vitamin D groups as recommended by Endocrine Societywas determined. A p value of less than 0.05 was considered statistically significant.

Results: Out of 140 children, 62(44.28%) children had deficient levels of Serum 25-Hydroxyvitamin D and 46 (32.85%) children had insufficient levels of Serum 25-Hydroxyvitamin D. Only 22.85% children had sufficient levels of Serum 25-Hydroxyvitamin D. The levels of Serum 25-Hydroxyvitamin D were deficient in 22.85%males and 21.42% females. The levels of Serum 25-Hydroxyvitamin D were insufficient in 18.57% males and 14.28% females. The levels of Serum 25-Hydroxyvitamin D were sufficient in 12.14% males and 10.71% females. Males were having deficient levels of Serum 25-Hydroxyvitamin D than females. In 1-6months children (14.28%) and 19-24months(12.85%) children, maximum children had deficient levels of Serum 25-Hyroxyvitamin D. In 7-12months (7.14%) children and 13-18 months children, maximum children had insufficient levels of Serum 25-Hyroxyvitamin D.

Conclusion: The study concluded thatout of 140 children, 44.28% children had deficient levels of Serum 25-Hydroxyvitamin D and 32.85% children had insufficient levels of Serum 25-Hydroxyvitamin D. Males were having deficient levels of Serum 25-Hydroxyvitamin D than females. In 1-6months children and 19-24 months children, maximum children had deficient levels of Serum 25-Hyroxyvitamin D.

Keywords: Serum 25-Hydroxyvitamin D, deficient levels, insufficient levels, children.

INTRODUCTION

Vitamin D is a vital steroid hormone.[1]Vitamin D is a fat-soluble vitamin, and it can be stored in adipose tissue for use when necessary. This ability allows vitamin D to extend its total half-life in the body for approximately 2 months.[2] Vitamin D_3 (cholecalciferol) comes from 2 sources: exposure to UV-B rays in natural sunlight and dietary intake (including supplements). Because few foods contain vitamin D precursors,[3] sunlight exposure is the primary determinant of vitamin D status in humans.[4,5] Earlier, vitamin D was only considered to be important for the prevention of rickets in children, but the recent biomedical and epidemiological research show that vitamin D is essential for the overall health and well-being of individuals. Research shows that insufficient levels of vitamin D are associated with elevated risk of developing numerous skeletal and non-skeletal diseases like colon cancer, prostate cancer, various other types of cancer, type-1 diabetes mellitus, multiple sclerosis, rheumatoid arthritis, depression, schizophrenia, cardiovascular diseases, Obesity, infectious diseases, and various other diseases.[6]It is generally accepted that serum 25-hydroxyvitamin D (25(OH)D) is a reliable measure of an individual's vitamin D status. Serum total 25(OH)D concentration is the sum of the

$25(OH)D_3$ and $25(OH)D_2$ concentrations. Various methods such as Radioimmunoassay (RIA), Chemiluminescence immunoassay, Enzyme-Linked Immunosorbent Assay (ELISA), and protein binding assays are used for measurement of 25(OH)D concentrations.[7] The present study was conducted to assess serum 25-Hydroxyvitamin D levels of apparently healthy children aged 1-24 months.

MATERIAL AND METHODS

The present retrospective study was carried out in the Department of Paediatricsover a period of one year. Before the commencement of the study ethical clearance was taken from the ethical committee of the institute. The retrospective data of apparently healthy children aged 1 to 24 months were extracted and reported from the records.The subjects were 140 apparently healthy children (with no known chronic medical conditions like HIV, sickle cell anaemia, severe malnutrition etc.) aged 1-24 months who were brought for immunization, minor surgery (such as circumcision and herniorrhaphy) or who accompanied sick siblings were included in the study. Children who were taking drugs known to affect vitamin D metabolism (such as phenytoin, phenobarbitone, carbamazepine, clotrimazole, rifampicin and dexamethasone) or who had received vitamin D supplements or cod liver oil in the six weeks preceding enrollment into the study were excluded from the study.Three milliliters of peripheral venous blood was collected from each of the recruited children into a plain tube and allowed to clot at room temperature. The clotted blood sample was then centrifuged and the serum separated into another plain tube using a Pasteur pipette. The serum was transported on dry ice packs to the pathology laboratory where samples were stored at -20 °C until analysis.Serum 25(OH)D (vitamin D) was assayed using commercial vitamin D ELISA kit.[8] Data was analyzed using SPSS (version 20: IBM Corporation). The prevalence for each vitamin D groups: Deficiency (serum 25(OH)D concentration < 50 nmol/l), insufficiency (serum 25(OH)D concentration 50-75 nmol/l), and sufficiency (serum 25(OH)D concentration > 75 nmol/l) as recommended by Endocrine Society[9]was determined. A p value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Distribution of children according to vitamin D status

Serum 25-Hydroxyvitamin D Levels	N(%)
Deficiency (< 50 nmol/l)	62(44.28%)
Insufficiency (50-75 nmol/l)	46(32.85%)
Sufficiency (> 75 nmol/l)	32(22.85%)
Total	140(100%)

In the present study,140 apparentlyhealthy children aged 1-24 months were selected. Out of 140 children, 62(44.28%) children had deficient levels of Serum 25-Hydroxyvitamin D and 46 (32.85%) children had insufficient levels of Serum 25-Hydroxyvitamin D. Only 22.85% children had sufficient levels of Serum 25-Hydroxyvitamin D.

Table 2: Mean Serum 25-Hyroxyvitamin D Levels according to Gender

Serum 25-Hydroxyvitamin D Levels	Male n(%)	Female n(%)
Deficiency (< 50 nmol/l)	32(22.85%)	30(21.42%)
Insufficiency (50-75 nmol/l)	26(18.57%)	20(14.28%)
Sufficiency (> 75 nmol/l)	17(12.14%)	15(10.71%)
Total	75(53.57%)	65(46.42%)

The levels of Serum 25-Hydroxyvitamin D were deficient in 22.85%males and 21.42% females. The levels of Serum 25-Hydroxyvitamin D were insufficient in 18.57% males and 14.28% females. The levels of Serum 25-Hydroxyvitamin D were sufficient in 12.14% males and 10.71% females. Males were having deficient levels of Serum 25-Hydroxyvitamin D than females.

Table 3: Serum 25-Hyroxyvitamin D Levels according age group

Age group	Mean Serum 25-Hyroxyvitamin D Levels		
	Deficiency (< 50 nmol/l)	Insufficiency (50-75 nmol/l)	Sufficiency (> 75 nmol/l)
1-6 months	20(14.28%)	15(10.71%)	14(10%)
7-12 months	9(6.42%)	10(7.14%)	8(5.71%)
13-18 months	15(10.71%)	16(11.42%)	7(5%)
19-24 months	18(12.85%)	5(3.57%)	3(2.14%)
Total	62(44.28%)	46(32.85%)	32(22.85%)

In 1-6months children (14.28%) and 19-24months(12.85%) children, maximum children had deficient levels of Serum 25-Hyroxyvitamin D. In 7-12months(7.14%) children and 13-18 months children, maximum children had insufficient levels of Serum 25-Hyroxyvitamin D.

DISCUSSION

Ultraviolet B (UVB) (290-320 nm) radiation from sunlight plays the most crucial role in the production of vitamin D_3(cholecalciferol) in the human body. Cutaneous exposure of UVB is channelized through numerous Individual factors such as skin pigmentation (melanin concentration in the skin), clothing behavior, use of sunscreen creams, sun avoidant lifestyle, etc. [6]Out of 140 children, 62(44.28%) children had deficient levels of Serum 25-Hydroxyvitamin D and 46 (32.85%) children had insufficient levels of Serum 25-Hydroxyvitamin D. Only 22.85% children had sufficient levels of Serum 25-Hydroxyvitamin D. The levels of Serum 25-Hydroxyvitamin D were deficient in 22.85%males and 21.42% females. The levels of Serum 25-Hydroxyvitamin D were insufficient in 18.57% males and 14.28% females. The levels of Serum 25-Hydroxyvitamin D were sufficient in 12.14% males and 10.71% females. Males were having deficient levels of Serum 25-Hydroxyvitamin D than females. In 1-6months children (14.28%) and 19-24months(12.85%) children, maximum children had deficient levels of Serum 25-Hyroxyvitamin D. In 7-12months (7.14%) children and 13-18 months children, maximum children had insufficient levels of Serum 25-Hyroxyvitamin D. Akeredolu FD et al measured and described 25-hydroxyvitamin D levels of apparently healthy young Nigerian children and found that the mean 25-Hydroxyvitamin D level was 58.6 ± 30.5 nmol/l (range: 6.5-146 nmol/l). Only 31 (27.7%) of the children had 25-hydroxyvitamin D levels above 75 nmol/l, while 35 (31.3%) had insufficient (50-75 nmol/l) and 46 (41.0%) had deficient (< 50 nmol/l) serum vitamin D levels. There was no significant difference with regard to sex, age, nutritional and socioeconomical status between the groups.[10]Mansbach JM et al determined determined the serum levels of 25-hydroxyvitamin D (25[OH]D) in a nationally representative sample of US children aged 1 to 11 years. During the 2001–2006 time period, the mean serum 25(OH)D level for US children aged 1 to 11 years was 68 nmol/L (95% CI: 66 –70). Children aged 6 to 11 years had lower mean levels of 25(OH)D (66 nmol/L [95% CI: 64 –68]) compared with children aged 1 to 5 years (70 nmol/L [95% CI: 68 –73]). Overall, the prevalence of levels at <25 nmol/L was 1% (95% CI: 0.7–1.4), <50 nmol/L was 18% (95% CI: 16–21), and <75 nmol/L was 69% (95% CI: 65–73). The prevalence of serum 25(OH)D levels of <75 nmol/L was higher among children aged 6 to 11 years (73%) compared with children aged 1 to 5 years (63%); girls (71%) compared with boys (67%); and non-Hispanic black (92%) and Hispanic (80%) children compared with non-Hispanic white children (59%).[11]Mustafa A et al conducted first national-level study that analyzes the deficiency and concentration of serum 25-Hydroxyvitamin D [25(OH)D)] among Indian children and adolescents with respect to various demographic and socioeconomic characteristics. The study found that the mean serum 25(OH)D concentration level was found to be 19.51 ± 8.76, 17.73 ± 7.91, and 17.07 ± 8.16 ng/ml in age group 0–4 years, 5–9 years and 10–19 years respectively. 49.12% of the children aged 0–4 years were having insufficient level of vitamin D. Prevalence of vitamin D deficiency was comparatively higher among female adolescents (76.16%), adolescents living in rural region (67.48), Sikh individuals (0–4 years: 76.28%; 5–9 years: 90.26%; 10–19 years: 89.56%), and adolescents coming from rich households. North-Indian individuals were having substantially higher odds of vitamin D deficiency in all the three age groups.[6]

CONCLUSION

The study concluded thatout of 140 children, 44.28% children had deficient levels of Serum 25-Hydroxyvitamin D and 32.85% children had insufficient levels of Serum 25-Hydroxyvitamin D. Males were having deficient levels of Serum 25-Hydroxyvitamin D than females. In 1-6months children and 19-24 months children, maximum children had deficient levels of Serum 25-Hyroxyvitamin D.

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