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VITAMIN D;

EXPLORING LOW VITAMIN D STATUS REGARDING AGE & SEX FACTORS AMONG SCHOOLS STUDENTS IN HAZARA.

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ABSTRACT... Background: Present study was designed by keeping in view the importance of vitamin D in adolescents' age group. **Objectives:** To explore the cases of low vitamin D status (<50 nmol/l) with respect to age & sex factors in school students. **Study Design:** Observation cross-sectional study. **Setting:** Department of Biochemistry faculty of Health Sciences, Hazara University Mansehra, Ayub Medical College and Teaching Hospital Abbottabad. **Period:** June 2014 to June 2015. **Subject & Methods:** We recorded daily intake of vitamin D of each individual and measured serum 25 hydrxoy vitamin D in a school based cross sectional sample of adolescents girls (n=93) and boys (n=96) students. **Results:** Results of this study reflected that, out of total boys and girls students, 16% and 39% of the sample respectively showed low serum vitamin D status(<50 nmol/l). Number of cases had low vitamin D level increased with age in girls and decreased with age in boys. Serum vitamin D concentration was decreased with increase in age of girls and found significantly low (p=0.0087) in higher age group (>13-≤16). No significant difference (p=0.29) was noted regarding daily intake of vitamin D between lower & higher age. **Conclusion:** It is concluded that, age and sex might be contributory factors in the occurrence of low vitamin D status.

Key words: Contributory Factors, Daily Intake, Lower & Higher Age, Students, Sex, Vitamin D.

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INTRODUCTION

Vitamin D is a secosteroid and found as ergocalciferol and cholecalciferol. Both the forms are called as calciferol'. Most animals form pre vitamin D3 through 7 dehydrocholesterol in the presence of solar radiation which is then isomerizes into cholecalciferol.[2] Pre vitamin D is change into calcidiol with the help of 25 hydroxylase enzyme.[3] In the kidneys, calcidiol is converted into calcitiol which is the most biological active form of vitamin D. Approximately twelve days under room temperature are require for the conversion of pre vitamin D3 to vitamin D3.[4] Vitamin D is also found in fish, animal meat, and eggs., and in mushroom which is plant origin.[6] Sufficient vitamin D is necessary for metabolic process especially in pubertal stage of growing phase.[7] In adolescents age vitamin D need is increase in relation to growth velocity and foods intake.[8] Vitamin D3 deficiency has become current health issue worldwide.[9] In lights of vitamin D importance, purpose of this study was to explore low vitamin D level in different age groups of boys and girls adolescent's students.

SUBJECT & METHODS

This study was designed through the approval of Biochemistry & Heath sciences Department Hazara University Mansehra and Ayub Medical College & Teaching Hospital Abbottabad. This observation cross sectional study was conducted in schools of geographically different locations of Hazara. Study was started after the consent of student's parents and permission of their schools' administration. Over all number of boys participants was 96(50.80%) and girls was 93(49.20%). Boys and girls students willingly participated and were fulfilling the inclusion criteria of the study.

All participants in the study were eleven to sixteen years of age. On the basis of age, boys

and girls were divided into five different groups, ≥11-12,>12,>13,>14,>15-≤16 years and then further subdivided into lower (11-≤13) and higher (>13-≤16) age groups. Self prepared data form was given to each and every individual and asked about mentioning of daily taken foods over the periods of one month. Average daily intake of vitamin D (iu) was calculated through their total foods of one month. None of the students was on vitamin D supplementation. Blood sample was taken from each participant by expert registered medical technician. After collection of blood it was transferred immediately to centrifuge tube. To analyze sample, serum was obtained by centrifuging blood for 5 minutes. Each serum sample was appropriately labeled and analyzed by using Enzymatic Protein Binding Assay for biochemical investigation of vitamin D level (nmol/l). Serum vitamin D concentration less than 50nmo/l was considered low level. Statistically mean ±standard deviation, percentage and p value were used for the analysis of data. Minitab 11 software was used for statistical analysis. Probability value <0.05 was considered significant difference and >0.05 as non significant difference.

RESULTS

Nutritional intakes of boys and girls participants of all age groups in the study area were low and less than recommended level. Out of 93 girls and 96 boys, low vitamin D level was found in 39% girls and 16% boys respectively. Frequency of low vitamin D level was seen significantly more in 36(39%) girls' participant as compared to 15(16%) boys. Age wise frequency of cases with low vitamin D level (<50 nmol/l) in girls were found in the order of 3%, 6%, 19%, 28%, 44% and in boys, 73% and 27% cases.

In girls the frequency of cases significantly increased with age while decreased in boys. Out of 36 girls of low vitamin D status, the age wise contribution of cases in 11-12 years was 01(3%), in 12-13 years 02(6%), in 13-14 years 07(19%), in 14-15 years 10(28%) and in 15-16 years age group 16(44%). Frequency of cases significant more 16(44%) in 15-16 years than other age groups of girls. In boys (15) with low vitamin D level, 11(73%) cases were found in 11-12 years of age and 4(27%) in 12-13 years age group. All 15(100%) boys cases of low vitamin D status were found in lower age group (11-≤13) and none of the boy had low vitamin D level (<50 nmol/l) in higher age group(>13-≤16). In girls, 3(8%) had low vitamin D level (<50 nmol/l) of age ≥11 to ≤13 years and 33(92%) of age >13-≤16. Frequency of girl's cases in higher age group was found significantly more as compared to lower age groups. Over all 18(35%) cases of both gender suffered with low vitamin D level in lower (11-≤13) and 33(65%) of higher age group (>13-≤16) (Table-I). Lowest level of vitamin D was found 24.50±5.34 nmol/l in girls of 15-16 years and 30.82±4.69 nmol/l in boys' of age 11-12 years. Serum vitamin D level of girls in lower age (11-≤13) was noted 29.33±0.57 nmol/l and 26.54±5.40 nmol/l in higher age group (>13-≤16) with significant difference (p=0.0087). Serum Level of vitamin D in lower age group of boys was noted 31.40±4.87 nmol/l and in girls 29.33±0.57 nmol/l. Statistically no significant difference was noted between the serum level of vitamin D in boy and girl cases (p=0.13). Among boys of lower age group, low vitamin D serum level was measured 30.82±4.69 nmol/l for 11-12 years and comparatively more level 33.00± 5.72 nmol/l in >12-13 years of age with non significant difference (p=0.53). In girls, low vitamin D serum level was measured 29±0.00 nmol/l and 29.50±0.70 nmol/l of lower age group and 29.00±5.16 nmol/l, 28.10±4.86 nmol/l, 24.50±5.34 nmol/l in higher age groups. Average lowest serum vitamin D level 24.50±5.34 nmol/l was noted in girls (Table-II). Daily intake of vitamin D in lower age group of girls was 25.00±3.61 iu and in higher group 28.06±2.29 iu with no significant difference (p=0.29). Both genders of lower age group were taking almost same amount of vitamin D on daily basis 27.53±2.13 iu and 25.00±3.61 iu with non significant difference (p=0.36) (Table-III).

DISCUSSIONS

Our study is the first to examine the Influence of age and sex on vitamin D status. Low serum level of vitamin D was noted in both boys and girls gender in study areas.

Gender/Age	Vitamin D ≥50nmol/l	Vitamin D <50nmol/l						Total
		11-≤13 Years		>13-≤16 Years			Total	
		11-12	12-13	13-14	14-15	15-16		
Boys	81(84)	11 (73)	4 (27)	-	-	-	15 (100)	96(100)
		15 (100)		-	-	-		
Total (%)		15(16)						
Girls	57(61)	1 (3)	2 (6)	7 (19)	10 (28)	16 (44)	36 (100)	93(100)
		3 (8)		33 (92)				
Total (%)		36 (39)						

Table-I. Age wise boys & girls cases with low vitamin D status (<50 nmol/l).

Gender	11- ≤13 years		>13-≤16 years			P-Value
	11-12 Years	12-13 Years	13-14 Years	14-15 Years	15-16 Years	
Boys	30.82±4.69	33.00± 5.72	-	-	-	P=0.53
Total	31.40±4.87		-			-
Girls	29±0.00	29.50±0.70	29.00±5.16	28.10±4.86	24.50±5.34	-
Total	29.33±0.57		26.54±5.40			P=0.0087
P value	P=0.13		-			-

Table-II. Serum vitamin D level <50 nmol/l in boys and girls students of different age groups.

Gender	11-≤13 Years		>13-≤16 Years			P-Value
	11-12 Years	12-13 Years	13-14 Years	14-15 Years	15-16 Years	
Boys	27.00±2.23	29.00±0.81	-	-	-	P=0.026
Total	27.53±2.13		-			-
Girls	22±0.00	26.50±3.54	26.57±2.22	27.90±1.19	28.81±2.58	-
Total	25.00±3.61		28.06±2.29			P=0.29
P value	P=0.36		-			-

Table-III. Daily intake of vitamin D (iu) in cases with vitamin D level <50 nmol/l.

Over all contribution of cases with low vitamin D level were seen in each age group of girl's gender. Serum vitamin D deficiency is a common problem of all age groups and gender from India, other countries of South and East Asia and different parts in the world.[10,11,12] Present data shows that the number of cases with low vitamin D level (<50 nmol/l) was consistently increased in girls and decreased in boys with the increase of their ages. Serum vitamin D level was found significantly low in higher age group of girls than lower age group. Among both gender of low vitamin D status, high frequency of cases and average lowest serum vitamin D level was noted in the girls of age group >15-≤16 years. Relations of low vitamin D level with age and sex along with sunshine and nutritional factors might not be under estimated. In Quebec Study, it was found that the Prevalence of vitamin D deficiencies increased with age in both male and female.[13] One study in girls aged 4-8 years reported an inverse relation between age and 25(OH)D concentrations in blacks but not in whites.[14] Study on school children showed that during both seasons, girls had lower vitamin D levels than boys[15], 2001). Age and season were the most important determinants for Serum 25-OHD concentration.[16] Previously noted lower vitamin D status with increasing age in children with steroid sensitive nephrotic syndrome and in the healthy comparison group.[17] Change in serum level of biochemical parameters was not dependent on age, sex, no matter what's their religion and cast.[18] A study conducted in France showed that age and gender had no impact on vitamin D concentration in the blood.[19] Findings of other study indicated variations in mean serum 25-OHD levels in various seasons no matter what are their age and sex.[20] The synthesis of

vitamin D by skin has been found decreased in healthy African Americans due to Dark pigment but regardless of their age.[21] Our observation revealed that, the low vitamin D level was found in 39% and 16% of girls and boys participant respectively. Prevalence of low vitamin D level <50 nmol/l has been reported in 36% otherwise healthy young adults of 18–29 years age.[22] A study supported a higher prevalence of vitamin D deficiency in girls than boys.[23] In North India, 91% of healthy school girls were found to have hypovitaminosis D.[24] Participants of present study were taking less amount of vitamin D in their daily foods than proposed recommendation and no one was on vitamin D supplementation.

South America is a sun richer area where sunlight activity may not be blocked due to their clothing style, but vitamin D deficiency is still becoming a major public health problem. Inadequate daily intakes can lead to vitamin D deficiency in the summer and in the autumn despite sufficient sunlight exposure.[9] The vitamin D levels did not show any significant difference between genders, skin pigment or dietary intake.[25] The age-related decrease in vitamin D status was not attributable to decreased vitamin D intake.[26] More number of cases having low vitamin D level (<50 nmol/l) were seen in Adolescents girls students of higher age group On the other hand more number of cases having low vitamin D level (<50 nmol/l) were seen in Adolescents boys students of lower age group. Gender wise, girls students (female) were affected more as compared to boys students (male) regarding vitamin D level (<50 nmol/l).

CONCLUSION

Low vitamin D status is a potentially serious public health problem among school students of Hazara. Cases of low vitamin D status increase in girls and decrease in boys with the increase in their ages. Age and sex might be the contributory factors in the occurrence of low vitamin D status.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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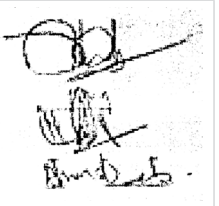
1	Tanveer Hussain Shah	Study design, Conception and interpretation, Principal investigator, Data collection and analysis, conclusion.	
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