

ASSESSMENTS OF BONES RELATED NUTRITIONAL STATUS IN SCHOOLS STUDENTS

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ABSTRACT

Background: Unfortunately there is no published data available about the bones related nutrition status of school students any where in Pakistan, especially in Hazara circle. **Objective:** The study was designed to measure the daily nutritional intakes of vitamin D, calcium and phosphorus and its effects on weight and height in different age groups of boys and girls schools students from different territories of Hazara. **Study Design:** Observation cross-sectional study. **Place and Duration of Study:** Faculty of Health Sciences, Hazara University Mansehra, Ayub Medical College and Teaching Hospital Abbottabad. **Subject & Methods:** Data from 189 students, 96 boys and 93 girls having age 11 to 16 years obtained who were studying in schools of different areas. Age wise the number of participants were almost same in both genders. Boys and girls were divided into to different age groups such as, 11-12 years, >12-13 years, >13-14 years, >14-15 years and >15-16 years. Daily intakes of Vitamin D, calcium and phosphorus of each student were calculated over the period of one month. **Results:** All 189 (100%) participants were receiving less amount of vitamin D, calcium and phosphorus than recommended quantity of daily intakes. In boys of different age groups, the daily intakes of vitamin D was <6%, calcium <24% and phosphorus <28% of recommended quantity. Daily intakes of vitamin D, calcium and phosphorus of girls groups was measured as <6%, <23% and <27% of per day recommended level. Weight and height was seen significantly more in boys than girls of age groups >13-16 years. None of the age group of both gender had standard weight and height. **Conclusion:** It is very astonishing that, not a single boy and girl student taking daily intake of nutrients up to the mark of recommended level. This situation is alarming to at risk factors for related sub clinical bones and health problems.

Keywords: School students, Nutritional status, Daily intakes, Foods, Vitamin D, Calcium, Phosphorus

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INTRODUCTION

Nutrition perform the most important vital role in social, mental and physical condition of human. The groups having age 11 years to 19 years between childhood and adulthood is considered as adolescent.¹ Sufficient intake of nutrients increases the mass of bone in adolescent and decreases the chances of fracture.² Maximum mass of skeleton and growth is achieved in adolescence period of life.^{3,4}

Among adolescents, the proper functioning of metabolic process is essential and can be carried through adequate nutrition.⁵ Nutrients like

vitamin D, calcium and phosphorus play a major role for the development and mineralization of bones.⁶

Vitamin D has vital effects on skeletal system of human.⁷ Intestinal absorption of calcium and phosphorus is facilitated by vitamin D.⁸ Calcium absorption is reduced when serum concentration of vitamin D is low.⁹

Mostly calcium and phosphorus of the body present in bone, which is about 99% and 85% respectively.^{10, 11} New daily intake of vitamin D is 600 IU, calcium 1300 mg and phosphorus 1250 mg

recommended for the age groups of 9 years to 18 years.^{12, 13} In developing countries the adolescent age group is more at risk of nutritional deficiencies.¹⁴

Keeping in view that, adolescent's nutrition is essential for supporting the growing body and avoiding health related problems in latter age. This study was conducted to evaluate the daily amount of vitamin D, calcium and phosphorus taken by adolescence boys and girls student from schools of different area Hazara.

METHODS

Present study was approved by Ayub Medical College & Teaching Hospital Abbottabad and Hazara University Mansehra. Before commencing this study, permission was obtained by the head of respective schools and parents of the students. Study was approved by Medical Ethics Committee. The study conducted on 189 adolescent's boys & girls students from geographically different government schools of Hazara, Pakistan. The age of participants was 11 years to 16 years. On the basis of their ages, the participants were divided into different groups, such as 11-12 years, >12-13 years, >13-14 years, >14-15 years and >15-16 years. All students included in this study were willingly participated, through the permission of their guidance. A special Performa was designed to collect the information regarding age, weight, height and daily intakes of nutrients in their foods. The performa was handed over to the guidance of participant in front of school's incharge. Each participant was asked to mention the name and quantity of eaten foods in the said performa on daily basis. This practice was repeated for one month. Daily intakes of vitamin D, calcium and phosphorus were calculated from their daily foods by using foods composition guidelines. Recommended daily intake value of vitamin D is 600 IU, calcium 1300 mg and phosphorus 1250mg. Results are represented as Mean±SD and percentage. Mean value of each nutrient was measured through their one month intakes.

Percentage of daily intake of each nutrient was calculated in its comparison with daily recommended quantities.

The p value was calculated by comparison of boys and girls parameters of different age groups through t test. The p values <0.05 and >0.05 was considered significant and non significant respectively. Analysis of data was performed by Minitab 11.

RESULTS

Daily nutritional status of 189 students were measured, of which 96 (51%) boys and 93 (49%) girls. Mean age of different groups in both gender was almost same with no significant difference (>0.05). Daily intake of vitamin D in boys is almost same as in girl's student but significantly more as compared to girls in >13 to 16 years age groups(<0.05). Significant difference was observed while taking of calcium in daily foods by both genders except age group of >12 to 14 years (>0.05). Different age groups of Boys, the phosphorus intakes were significantly more as compared to intake of girl's students (<0.05) but no differences significantly seen in the age groups of 11 to 12 years.

All 189 (100%) participants were receiving very less amount of vitamin D, calcium and phosphorus than daily recommended level proposed for adolescent's age groups. Maximum dietary intake of vitamin D in boy's gender was calculated 31.53 ± 2.35 iu in age group of >13-14 years, which is about 5.25% of total recommendation and for girls maximum (5.02%) average daily intake was 30.14 ± 2.96 iu noted in >14-15 years age group. In boys gender the average maximum calcium intake on daily basis observed 317.6 ± 31.7 mg/dl in >15-16 years age group and in girls 289.3 ± 35.2 mg/dl of >14-15 years age, which were the 24.43% and 22.25 % of recommended level respectively. The highest mean level of daily phosphorus intake in boy gender was calculated 349.9 ± 13.6 mg/dl in >14-15 years which contribute only 27.99% of required

found that, 42% boys and 10% girls had calcium daily intake above 1300 mg.¹⁷ A study from Turkey high lighted that none of the cases were taking vitamin D, calcium and phosphorus as per daily recommendation.¹⁸ Same observation was noted in our study, in which all the boys and girls students were taking daily intakes of vitamin D, calcium and phosphorus less than required level. In fourteen symptomatic rickets girls the daily intake of calcium (485 mg) less than recommended level was found, out of which nine cases had low intake of vitamin D (228 IU) less than reference level of 400 IU.¹⁹ In study from Iran on adolescents girls demonstrated that daily intake of vitamin D was (30%), calcium (30%) and phosphorus (95%).²⁰ Daily intake of calcium in girls was found less than boy's gender.¹⁷ In our study, the maximum intake of vitamin D in boys was (5.52%), calcium (24.43%), and phosphorus (29.69%). in girls, higher daily vitamin D intake was (4.95%), calcium (22.25%) and phosphorus (26.64%).

Holick found that a daily intake 600 IU of vitamin D was not sufficient in sun deprived area for three months.²¹ Commonly the recommended daily intake of vitamin D is not sufficient if sun exposure is limited.²² Low calcium intake 280 mg/d (<355 mg/day) is associated with higher risk of blood vitamin D deficiency.²³ Low calcium intake increases the needs for already deficient vitamin D.²⁴ Vitamin D deficiency has been noted in countries with abundant sun shine through out the year^{16,25} and also in cold or temperate countries.²⁶

In our study areas, the sunshine vitamin D synthesis is might be affected by the traditional and cultural concepts such as indoor activities, Islamic dress, and pardah system and also due to environmental uncertainty and cold climatic effects.

Nutritional rickets (10.8%) has been reported in north India among adolescent age 10-18 years of age¹⁶ and 9.4% in china.²³

In one study from Saudi Arabia shows that the daily intake of calcium in adolescents girls of age 11 15 years was comparatively greater than boys (<0.05) but no significant difference was noted in both gender for vitamin D intakes (>0.05).¹⁹ In our study except >13-14 years age groups, the significant difference was noted for calcium daily intake in all other groups of both sexes, and also significant difference was noted regarding vitamin D intake in both gender age groups of >13 to 16 years.

In South Asian population, female gender is not getting much more attention by their family regarding daily intake of foods, consequently low weight happened than boys.²⁷ Adolescents attain low bone mass and height due to inadequate vitamin D which is more dominantly seen in girls as compared to boys.²⁸ Low level of calcium and phosphorus has adverse effect on bone fracture.²⁹ In our observation regarding relationship of daily intakes and weight/height is based on synergetic effect of sunshine vitamin D and vitamin D intake through daily foods. The weight and height of students dependent on synergetic effect of vitamin D and its functional role on calcium absorptions. Girl's students are more affected due to less daily intake of required nutrients.

CONCLUSION

It is very astonishing that not a single boy and girl student taking daily intake of nutrients up to the mark of recommended level. This situation is alarming to at risk factors for related sub clinical bones and health problems.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author's Full Name	Contribution to the paper	Author's Signature
1	Tanveer Hussain Shah	Principal Author Conceptualization of study design, Specimen & Data collection of data Statistical analysis, Result formulation, Literature review, Discussion & Conclusion	