

Vitamin D Deficiency among Well Nourished and Malnourished Children of School Going age at District Tharparkar

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ABSTRACT

Objective: The most frequent type of nutrient shortage is Vitamin D deficiency, which affects about of half of the world's population. Vitamin D deficiency responsible for numerous acute and chronic conditions not only in malnourished children but also in well-nourished children. Our objective was to determine vitamin D levels among malnourished and well-nourished school going children at district Tharparkar Pakistan.

Design: Cross-sectional study

Setting: This study was conducted in Mithi, District Tharparkar among school age-children (between 10-18 years). Vitamin D was estimated by Cobas e411 analyzer Roche (made in Japan). Results were described as mean \pm SD. Students t test was used to find out the significant of results. A 0.05 or lower p-value was judged as meaningful.

Results: 300 children were divided in malnourished and well-nourished groups. Vitamin D deficiency affected 74% of school age children. Boys accounted for 30% of the group, while girls made up 44%. We noticed that 4 girls had severe vitamin D deficiency.

Conclusion: Vitamin D deficiency is more prevalent in school going children. Even well-nourished girls are more vitamin D deficit than boys. Children are seen as important members of society and are regarded as the country's future architects. As a result, investing in children's health is the most important factor in improving Pakistan's economic, political, and social conditions, because malnutrition has a significant impact on mental and physical inadequacy.

Keywords: Vitamin D, Malnutrition, school going children

INTRODUCTION

Vitamin D deficiency is the most prevalent kind of nutrient deficiency, affecting almost the 50% of the total world population. [1] 58% of total Pakistan population facing this problem and among them it was reported highest 62.15% in Sindh province. [2] Deficiency of vitamin D results in insufficient calcium absorption and mobilisation from the bones for maintaining normal levels, adults experiences bone mineral deficiency and osteomalacia, whereas children develop rickets.. [3] Studies reported that up to 60% total children of South Asia suffering from vitamin D deficiency. [4]

Vitamin D insufficiency is related to a variety of acute and chronic illnesses in children, including viral illness, asthma, and allergies, but low vitamin D levels are also a concern in the adolescent age range, owing to vitamin D's impact in calcium homeostasis and skeletal growth.[5] Differences in the quantity of solar exposure, dietary vitamin D consumption, and usage of supplemental vitamin D in adults might be the cause. [6] In older children, a lack of vitamin D supplementation, dietary and lifestyle changes, minimal sunlight exposure, and spending less time performing physical activities are all probable causes. In one study they discovered that the risk of vitamin D insufficiency rises with age. This research suggests that as people get older, disparity between consumption of nutrients and needs develop. Vitamin D insufficiency is frequent not just among malnourished children, but also among otherwise healthy school-aged children. [7]

Recent studies observed that deficiency of vitamin D is typical feature both in malnourished and well-nourished children. Another research looked at the vitamin D concentration of healthy school-aged Delhi's girls in connection to their diet and way of life, and discovered that 90.8% of the girls had low vitamin D. Their research emphasizes the relevance of lifestyle consideration such as outside time and exposure to sunshine in determining vitamin D levels in healthy school-aged girls. [8]. Vitamin D deficiency is connected with decrease bone marrow density in healthy school going children demonstrated by another study. [9] A study done on normal adult population of Hyderabad region of Pakistan also show decrease levels of vitamin in apparently healthy individuals. [10]

The aim of this study was to determine vitamin D levels among malnourished and well-nourished school going children at district Tharparkar Pakistan.

METHODS

After gaining clearance from the Institutional Ethical Committee Institute of Biochemistry University of Sindh Jamshoro, this cross-sectional study was done among school-aged children (ages 10 to 18) in Mithi, District Tharparkar, from January to December 2016. Permission was also granted by the school officials and the district education officer of Tharparkar to gather data and samples from various schools.

A total of 300 boys and girls from various government and private schools were chosen for the study. Participants were separated into two groups: malnourished and well-nourished. The criteria for the definition of well-nourished and malnourished children were described previously. [11] Students with any infectious, autoimmune, or chronic conditions (asthma, allergy issues, tuberculosis, etc.), gastritis, malaria, typhoid fever, or previously verified various kinds of anaemia, as well as on any medication, were not permitted to participate in the study. 500 children were given informed written consent forms, with 300 returning completed consent forms. Following the permission process, a in person intervention for predicted dietary intake and a general physical assessment was performed.

Following the implementation of all preventive aseptic international procedures, we drew a 05 mL sample of blood taken intravenously with a disposable syringe, transferred it to vacutainer, and left it at room temperature until it clotted. After centrifuging the blood samples for 20 minutes at 3000 rpm, the serum was extracted and kept at -40°C until analysis. Roche's Cobas e411 analyzer was used to calculate vitamin D levels (made in Japan). The mean \pm standard deviation was used to express the findings. The students t-test was used to measure the significance of the findings. Significant is defined as a p value of 0.05 or less.

RESULTS

There were 150 males and 150 girls were included. The mean age of boys was 15 \pm 0.8 and girls were 14 \pm 1.3 years. Those children

were divided into malnourished and well-nourished groups according to estimated nutrient intake. Those whose intake meets recommended daily allowance (RDA) were considered as well-nourished and those whose intake were below recommended daily allowance (RDA) were considered as malnourished. When we compare life style of children most of the girls (60%) were physically active as compare to boys (46%). Majority of children were belonging to lower class families. Table 2 shows that estimated nutrient intake in girls and boys were significantly lower than daily allowance suggested. In terms of gender estimated nutrient intake was significantly low in boys as compared to girls. Results of vitamin D shows significant decrease in malnourished group as compare to well-nourished group. In girls vitamin D deficiency was more significant as to boys. Results of vitamin D shows significant decrease in malnourished group as compare to well-nourished group. In girls vitamin D concentration was more significantly low as compare to boys. Table 3 demonstrates that 74 percent of school-aged children are deficient in vitamin D. There were 30% males and 44 %girls among them. We observe that 4 girls had severe vitamin D deficiency. Only 56% of girls had enough vitamin D levels, whereas 70% of boys had adequate vitamin D levels.

Table 1: Comparison of Sociodemographic characteristics in school going children at District Tharparkar, Pakistan

Demographic characteristics	Boys 150 (50%)	Girls 150 (50%)
Mean Age range (Years)	15±0.8	14±1.3
Life Style (%)	70 (46.66)	90 (60)
Physically Active	80 (53.33)	60 (40)
Sedentary	35 (23.33)	40 (26.66)
Family profession (%)	45 (30.00)	30 (20.00)
Govt.Job	20 (13.33)	28 (18.66)
Shopkeeper	50 (33.33)	52 (34.66)
Land lord	70 (46.66)	85 (56.66)
Labor	50 (33.33)	35 (23.33)
Social class (%)	30 (20.00)	30 (20.00)
Lower		
Middle		
Upper		

Table 2: Comparison of Calorie intake and Vitamin D in malnourished and well-nourished groups of school going children

	Malnourished Group N= 150		Well-nourished Group N= 150	
	Girls N= 104 Mean ± SD	Boys N= 101 Mean ± SD	Girls N= 46 Mean ± SD	Boys N= 49 Mean ± SD
Energy intake (Cal)	1288±194	1219±121	1751±151	1743±92*
Vitamin D (ng/ml)	11.81±5.08	18.58±6.05	37.45±6.75	38.41±6.57*

*P value < 0.05

Table 3: Gender-wise status of vitamin D in school going children

Variables	Girls 150	Vitamin D Mean ± SD	Boys 150	Vitamin D Mean ± SD
< 05 ng/ml Severe deficiency	04	4.51±0.54	00	00
06-10 ng/ml Mild to moderate deficiency	28	7.89±1.54	15	7.39±2.34
11-20 ng/ml Insufficiency	34	13.55±2.42	30	13.22±2.16
21-60 ng/ml Sufficiency	84	25±2.52	105	33.93±8.65
61-100 ng/ml Excess	00	00±00	00	00±00
Above 150 ng/ml Intoxication	00	00±00	00	00±00

DISCUSSION

Despite the fact that vitamin D is important for calcium and phosphate metabolism and helps to preserve skeletal stability in

children, its status is not well characterized. Vitamin D deficiency emerging as worldwide problem especially in developing countries. Children suffers more vitamin D deficiency due to their inappropriate dietary habits. Malnutrition is a major preventable factor to avoid deficiency of vitamin D in poor countries. To the best of our knowledge, this is the first research to test vitamin D status in school-aged children in Pakistan's District Tharparkar.

When comparing the lifestyles of school-aged children, we discovered that the majority of females (60%) have an active lifestyle whereas only 40% lead a sedentary one. On the other hand, the majority of males (53%) live a sedentary lifestyle, while just 47% live an active lifestyle. But we observed that vitamin D status were significantly higher in boys as compare to girls which might be due to nutritional intake. In contrast to our findings, Al-Othman et al. discovered that vitamin D levels were considerably lower in physically inactive people compared to active people.[12] Malnutrition is wreaking havoc on the majority of children throughout the world, according to mounting evidence. Children under the age of 15 are considered the primary victims of malnutrition. It's linked to a slew of etiological factors, including poor eating habits, a lack of fruits and vegetables, and a lack of exercise. Nutritional inadequacy is at an all-time high in South Asia, with Pakistan, India, and Bangladesh accounting for half of the affected children. The estimated nutritional intake (ENI) of boys and girls was considerably lower than the recommended daily amount for calories, carbs, proteins, iron, and zinc. Intake of fats, on the other hand, was non-significantly lower than RDA values in both boys and girls. Only a few boys have a typical daily energy intake, whereas the majority of girls have a lower consumption. Malnutrition affects girls more than boys due to their natural carelessness and lack of knowledge about their health. It has been shown that girls are more energy deficient than boys in the majority of malnourished children [13, 14]. Our findings were likewise comparable to those reported studies.

Our study Studies observed that 73% of school going age children were having vitamin D deficiency which was in accordance with previous studies done on children and adolescents in low- and middle-income countries show vitamin D deficiency varying from 28 to 62% [15, 16]. Rickets was observed in 33.6% of extremely malnourished children in research by Ejaz et al. in Pakistan.[17]. We observed that vitamin D deficiency is common in even well-nourished children which is in accordance with other studies [18, 19]. It might be due to subjects may have darker skin as compare to studies done in other part of the world.

CONCLUSION

In conclusion, malnutrition and associated vitamin D deficiency were frequently found in school going children. Children of low socioeconomic apparently well-nourished also vitamin D deficit. In comparison to males, estimated nutritional intake for calories, carbohydrates, proteins and calcium are much lower in girls. More long-term cohort studies are needed to analyze the effects of food consumed and the development of malnutrition in school-aged children accompanied by a decrease in quality of life, as well as to address appropriate international standards for malnutrition diagnosis and management.

Limitations & Recommendations: This is cross-sectional research with a small sample size. More large-scale study findings supporting their appraisal are eagerly sought. Long-term nutritional status is not observed in the current study, nor is the quality of life assessed; consequently, prospective studies are required to address this issue.

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