

HYPOVITAMINOSIS D IN HEALTHY STUDENTS OF A MEDICAL COLLEGE

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ABSTRACT

OBJECTIVE: To determine the degree of hypovitaminosis D in healthy medical college students.

METHODS: This institution based cross-sectional study was conducted at Peshawar Medical College, Peshawar. One hundred and four healthy students were included in the study. Those who were taking vitamin D supplements, having any chronic disorder or having signs and symptoms of vitamin D deficiency were excluded from the study. A semi structured questionnaire was administered to all the participants to know about their demographic details, daily milk consumption and approximate duration of daily sunlight exposure. Five milliliter of blood was collected from the participants for determination of vitamin D levels.

RESULTS: The mean age of the sample was 23.26 ± 0.98 . There were 65 (62.5%) girls and 39 (37.5%) boys. The mean vitamin D level was 11.88 ± 0.41 ngm/mL in male and 10.02 ± 0.42 ngm/mL in female students. Vitamin D deficiency was observed in 99 (95.19%) cases. A total of 3(2.88%) students had mild deficiency, 19 (18.26%) were having moderate deficiency, and 77(74%) were having severe deficiency. Regarding the daily milk consumption, 70 (67.30%) students didn't consume even a single cup of milk per day & 29(27.88%) used to take 1 cup of milk per day. Sun exposure of > 120 minutes was observed in 84.6% of boys and 12.3% of girls and <60 minutes was observed in 55.4% of girls & 5.2% of boys.

CONCLUSION: Vitamin D deficiency is highly prevalent among healthy medical college students. The main contributing factors are low dietary intake of vitamin D and limited sunlight exposure.

KEY WORDS: Vitamin D Deficiency (MeSH), Adolescent (MeSH), Medical Student (MeSH).

THIS ARTICLE MAY BE CITED AS: Khushdil A, Ullah S, Ali S, Khan I, Awan T. Hypovitaminosis D in healthy students of a medical college. *Khyber Med Univ J* 2015; 7(4): pp. *Khyber Med Univ J* 2015; 7(4): 162-164.

INTRODUCTION

Vitamin D is very important in childhood and adolescent life for calcium absorption and normal growth and normal turnover of bones. It not only prevents the development of rickets in children and osteomalacia in adults but also provides protection against diabetes mellitus, cancer, multiple sclerosis and hypertension.¹⁻³ Nutritional rickets caused by the deficiency of vitamin D in children is among the 5 most prevalent diseases in developing countries, though

it is now rarely seen in developed nations.⁴

There are two major forms of vitamin D namely vitamin D2 (ergocalciferol) obtained from yeast and plant sources and vitamin D3 (cholecalciferol) which is produced in the skin after exposure to the sunlight and is also found in some foods, such as milk, fish, meat, and eggs.⁵

Vitamin D deficiency was once considered to be rare in the sub-continent but various studies done in last two decades have shown that vitamin D deficiency is

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Date submitted: March 31, 2015

Date revised: October 22, 2015

Date accepted: October 26, 2015

highly prevalent in the sub-continent as well. Various studies from Pakistan have shown that vitamin D deficiency is highly prevalent in different areas of Pakistan.⁶⁻⁸ Studies from other neighboring countries have shown similar results,^{9,10} showing high prevalence of vitamin D deficiency.

Most of the studies done so far have shown the levels of vitamin D either in children or adult population. To our knowledge after thorough search of the literature, no study has been conducted to know the level of vitamin D in healthy adolescent medical college students in Pakistan. So we planned this study in order to determine the levels of vitamin D in healthy medical college students.

METHODS

This cross sectional institution based study was conducted from April to October 2013. A total of 104 healthy students of Peshawar Medical College, Peshawar Pakistan participated in the study. Students having signs and symptoms of vitamin D deficiency like unexplained body aches and pains, bony deformities/tenderness, proximal muscle weakness, history of any endocrine disorder, hepatic and renal disease, malabsorption syndrome or history of gastrointestinal surgery, chronic diarrhea, diabetes mellitus, and those with history of taking calcium and vitamin D supplements were excluded from the study.

After obtaining clearance from the college ethical committee, the objective of the study was explained to the participants of the study. A questionnaire was

administered to each participant to know about the age, gender, weight, height, daily milk consumption and approximate duration of daily sunlight exposure. Written informed consent was taken from all participants of the study.

Five milliliter of blood was collected from the participants and sent to the laboratory where it was centrifuged and serum isolated and stored at -20 degree. Samples were then analyzed for vitamin D levels by using Electrochemiluminescence method from a well reputed laboratory of Lahore. According to the reference values provided by the laboratory, vitamin D levels were classified into deficient (less than 20ng/mL), insufficient (21-30 ng/mL) and desirable (31-100 ng/mL). Vitamin D deficiency was further classified as mild (15-20 ng/mL), moderate (10-14 ng/mL) and severe(less than 10 ng/mL).

Data was entered in SPSS version 17 for analysis. The quantitative variables like age, and amount of milk intake per day were expressed as mean and standard deviation. The qualitative variables like gender, and sunlight exposure were presented as frequency and percentages.

RESULTS

A total of 104 healthy students with mean age of 23.26+0.98 years with an age range of 21 to 26 years were included. There were 65 (62.5%) girls and 39 (37.5%) boys. Out of all 104 students, 3(2.88%) had mild deficiency, all being boys, 19(18.26%), of which 14 were girls and 5 were boys were having moderate deficiency while 77(74%) had severe vitamin D deficiency. In the severe vitamin D deficiency group, 50 were girls while 27 were boys. Only 5(4.80%) of the study subjects had normal vitamin D levels. In this group, only 1 was girl while 4 were boys. Thus the total number of study subjects having vitamin D deficiency was 99 (95.19%). Regarding the daily

milk consumption 70 (67.30%) students didn't consume even a single cup of milk per day, 29(27.88%) used to take 1 cup of milk per day, 3(2.88%) were taking 2 cups and 3(2.88%) were taking more than 2 cups per day.

Among our sample subjects, boys spent significantly greater time in sunlight than girls averaging 123±101 minutes/day, as compared to 50±48 minutes/day in girls.

Below is the Table I showing number and frequency of girls and boys and the duration of their exposure to sunlight.

DISCUSSION

Our study revealed that vitamin D deficiency is highly prevalent in healthy medical college students of an area where there is abundance of sunlight throughout the year. About 95% of those screened for vitamin D levels were found to have different levels of deficiency. Similar results are shown by many other local and regional studies.⁷⁻¹⁰ India, China, Iran, Turkey and Saudi Arabia have prevalence ranging from 44-95%. In some of these studies, low levels of vitamin D was associated with duration of sunlight exposure,⁷ dietary factors,¹¹ and excessive covering of the body for religious or social reasons.^{12,13} Intake of dietary milk was the most important factor determining the vitamin D levels in our study subjects. Dietary milk is an important source of vitamin D but 67.30% of the students did not take even a single cup of milk per day and may be one of the reasons for such a high prevalence of vitamin D deficiency. Again none of the study participants were taking any vitamin D or calcium supplement. Also, the exact amount of vitamin D and calcium intake in diet could not be ascertained because of the unavailability of the exact vitamin D and calcium contents of routine diet In Pakistan. Mahmood K. et al found the same relationship between low dietary

vitamin D intake and low serum levels of vitamin D.⁸ However, some other studies did not show any such association.^{9,14}

Sunlight exposure was another important determinant of the serum vitamin D levels. Although the study area has abundant sunlight throughout the year, the majority, 95.19%, of the students in the study had low vitamin D level. This could be due to many factors including the amount of time spent in sunlight, the extent of body exposed to direct sunlight, the time of day this exposure took place and the degree of environmental pollution, as all these has been shown to affect the vitamin D production. In our study 41/104(39.42%) students reported more than 120 minutes/day of sunlight exposure. Majority, i.e 33(80.48%) of these were boys and 8(19.51%) were girls. About 24% (n=25) students reported sunlight exposure of 60-120 minutes/day, 21/25(84%) of these were girls and 4/25(16%) were boys. Importantly 38/104(36.53%) students spent less than 60 minutes/day in sunlight and most of them, 36(94.73%) were girls. This less duration of sunlight exposure in girls of our study could have accounted for the more prevalent vitamin D deficiency in girls (64/99, 64.6%) as compared to boys (35/99, 35.3%) of our study. This; however, does not explain the extent of overall vitamin D deficiency in our study group as 39.4% and 24% of students in our study had sunlight exposure of more than 120 minutes and 60-120 minutes respectively even then majority of our cases had low vitamin D level. This is likely to be due to the extent of body exposed to direct sunlight and although a length of time was spent in the sunlight because of the fact that only face and hands was exposed, which accounts for only 5-7% of body surface area, ultimately did not produce optimal level of vitamin D. This factor of extent of body exposure to sun light probably also partly explains the more prevalent vitamin D deficiency

TABLE I: SUNLIGHT EXPOSURE

Duration of sunlight exposure	Boys (n=39)		Girls (n=65)	
	Frequency of boys exposed	%age boys exposed	Frequency of girls exposed	%age of girls exposed
More than 120 minutes	33	84.6	8	12.3
60-120 minutes	4	10.2	21	32.3
Less than 60 minutes	2	5.2	36	55.4

among girls of our study as compared to boys as girls were more likely to have used excessive covering of the body for religious and social reasons than boys. Avoidance of sunlight for religious and cultural reasons has been described as a risk factor for vitamin D deficiency in other studies as well.¹⁵⁻¹⁷ Additionally, the environmental pollution, preventing the ultraviolet B rays of sunlight, needed for production of vitamin D,¹⁸ could have accounted for the low level of vitamin D though the time spent in sunlight by these students was satisfactory.

CONCLUSION

We concluded that vitamin D deficiency is highly prevalent in healthy medical college students. The main contributing factors are low dietary intake of vitamin D and limited sunlight exposure.

LIMITATIONS

Since this was a pilot study in medical college students, the study sample was small; there is a need for further studies in order to determine the vitamin D levels in healthy medical college students.

We could not ascertain the exact amount of vitamin D taken by the study subjects. The study was conducted during the summer months, in which the sunlight is more abundant and the degree of vitamin D deficiency would have been more severe if the study had been conducted in winter. We could not determine levels of calcium, parathyroid hormones and alkaline phosphatase because of limitation of resources.

RECOMMENDATIONS

We recommend that determination of serum vitamin D levels may be included in the routine pre-admission medical checkup of medical college students so that the deficiency can be picked up early and appropriate measures can be taken.

REFERENCES

1. Holick MF. Vitamin D: a millennium perspective. *J Cell Biochem* 2003; 88: 296-307.
2. Giovannucci E. The epidemiology of vitamin D and cancer incidence and mortality: A review (United States). *Cancer Causes Control* 2005; 16: 83-95.
3. Holick MF. Vitamin D: important for prevention of osteoporosis, cardiovascular heart disease, type I diabetes, autoimmune diseases, and some cancers. *South Med J* 2005; 98: 1024-7.
4. Petifor JM, Daniels ED. Vitamin D deficiency and nutritional rickets in children. In: Feldman D, Glorieux FH, Pike WJ, eds. *Vitamin D*. San Diego, CA: Academic Press; 1997: 13-32.
5. Ray AJ, Meikle AW, D Light: Vitamin D and good health. *MLO [Med Lab Obs]*. 2010; 32: 32-7.
6. Baig A, Anjum P, Khani MK, Islam N, Rehman A. Pattern of serum vitamin D in OPD patients. *Pak J Surg* 2007; 23: 145-9.
7. Javed R, Malik SY, Yaqub S, Ghafoor F, Asim M. Levels of 25-OH Vitamin D in Healthy Asymptomatic Adults: Pilot Study. *Pak J Med Res*. 2012; 51(3): 82-7.
8. Mahmood K, Akhtar ST, Talib A, Haider I. Vitamin-D status in a population of Healthy adults in Pakistan. *Pak J Med Sci* 2009; 25(4): 545-50.
9. Hashemipour S, Larijani B, Adibi H, Javadi E, Sedaghat M, Pajouhi M. Vitamin

D deficiency and causative factors in the population of Tehran. *BMC Public Health* 2004; 4(1): 38.

10. Du X, Greenfield H, Fraser DR. Vitamin D deficiency and associated factors in adolescent girl in Beijing. *Am J Clin Nutr* 2001; 74: 494-500.
11. Alagol F, Shihadeh Y, Boztepe H. Sunlight exposure and vitamin D in Turkish women. *J Endocrinol Invest* 2000; 23: 173-77.
12. Gannage-Yared MH, Chemali R, Yaacoub N, Halaby G. Hypovitaminosis D in a sunny country: relation to lifestyle and bone markers. *J Bone Miner Res* 2000; 15: 1856-62.
13. Zargar AH, Ahmad S, Masoodi SR, Wani AI, Bashir MI, et al. Vitamin D status in apparently healthy adults in Kashmir Valley of Indian subcontinent. *Postgrad Med J* 2007; 83: 713-16.
14. Mishal AA. Effects of different dress styles on vitamin D levels in healthy young Jordanian women. *Osteoporos Int* 2001; 12: 931-35.
15. Hatun S, Islam O, Cizmecioglu F, Kara B, Babaoglu K, Berk F, et al. Sub clinical vitamin D deficiency is increased in adolescent girls who wear concealing clothing. *Am Soc Nutr Sci* 2005; 135: 218-22.
16. Das G, Crocombe S, McGrath M, Berry JL & Mughal MZ. Hypovitaminosis D among healthy adolescent girls attending an inner city school. *Arch Dis Child* 2006; 91: 569-72.
17. Puri S, Marwaha RK, Agarwal N, Tandon N, Agarwal R, et al. Vitamin D status of apparently healthy schoolgirls from two different socioeconomic strata in Delhi: relation to nutrition and lifestyle. *Br J of Nutr* 2008; 99: 876-82.
18. Juzeniene A, Moan J. Beneficial effects of UV radiation other than via vitamin D production. *Dermatoendocrinol*. 2012; 4(2): 109-17.

CONFLICT OF INTEREST

Authors declared no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE

NIL

AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

- AK:** Acquisition of data, drafting the manuscript, critical revision, final approval of the version to be published.
SU: Conception and design, acquisition of data, final approval of the version to be published.
SA, IK & TA: Acquisition & analysis of data, drafting the manuscript, final approval of the version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.