

Determining Awareness of Vitamin D Necessity, Deficiency and its Appropriate Attainment among Medical undergraduate students of a private medical college: A Descriptive cross-sectional study

ISMAIL MAZHAR¹, MIR MUHAMMAD RAI², QUDSIA UMAIRA KHAN³, MIRANTI DEWI PRAMANINGTYAS⁴, KURRAT UL AAIEN⁵, ROBASS ZIA⁶

^{1,2,5,6}4th Year MBBS Student, Affiliation: CMH Lahore Medical College and Institute of Dentistry, Lahore, Pakistan

³Associate Professor Physiology Department, CMH Lahore Medical College

⁴Department of Physiology, Faculty of Medicine, Universitas Islam Indonesia, Sleman, Yogyakarta, Indonesia

Correspondence to Ismail Mazhar, Email: ismailmazhar8899@gmail.com, Phone: +92 345 8329979

ABSTRACT

Aim: To assess the awareness of the necessity, deficiency of vitamin D, and knowledge about its appropriate attainment among the medical students at Combined Military Hospital Lahore Medical College (CMH LMC)

Methods: The study undertaken was an observational cross-sectional one conducted among the medical students of CMH LMC. A structured questionnaire was distributed among the medical students from first-year to fifth-year levels. The questionnaire consisted of two parts. The first part was based on socio-demographic information like age, sex, nationality, and the second half were based on questions regarding awareness of the benefits, deficiency and, attainment of Vitamin D.

Results: The results were likely to highlight the mean awareness score with poor and good awareness identified among medical students. The questionnaire evaluated awareness regarding the main source and dietary source of vitamin D like milk, cheese, and fish; factors that affect vitamin D manufacture; the influence of vitamin D on health, and effects of its deficiency on body health; identifying high-risk groups; and significance of supplements in overcoming deficiency.

Practical implication: The study would help increase and improve awareness of vitamin D necessity and deficiency issues among medical students. The awareness in the new generation of professionals can impact the evolution of future health education programs, policy development, the construction of social rules, and views about health and health-endorsing attitudes.

Conclusion: The study concluded that the respondents were more aware of the necessity of vitamin D ($M = -.05$) and less aware of the deficiency and attainment level of vitamin D. ($M = -.32$; $M = -.36$) respectively.

Keywords: Vitamin D, awareness, deficiency, attainment, medical students, health

INTRODUCTION

Vitamin D is a fat-soluble vitamin or sunshine vitamin with antirachitic activity. It is Vitamin D3 which could be produced endogenously. About 90% of the needed Vitamin D is synthesized in the skin by exposure to the sun's UV light. But this process is influenced by factors like latitude, solar angle, atmospheric pollution, ozone layer, and melanin pigmentation¹. Vitamin D has been an essential component for maintaining and establishing body function. It could be obtained from dietary supplements like fatty fish² with 1000 IUs being the required daily intake for the prevention of any deficiency³.

Vitamin D deficiency is a very common under-diagnosed state that gained attention worldwide. Vitamin D deficiency affects most body functions and bone health, calcium metabolism, bone growth⁴, and prevention of diseases⁵. Hence, vitamin D deficiency could cause multiple diseases and disorders like rickets which is a skeletal disorder caused by the defect in mineralization affecting bone growth. It affects the pediatric group showing that children being breastfed do not receive the required vitamin D because breast milk is deficient in it⁶. Osteomalacia is the softening of bones, mainly weight-bearing bones, and might lead to fractures which usually affect the elderly group⁷.

Studies show an association between vitamin D deficiency and multiple chronic diseases. One of them proposes that vitamin D deficiency could be a promoting factor for cardiovascular diseases, including hypertension, ischemic heart disease, and heart failure⁸. Type 2 diabetes mellitus also has an association with vitamin D deficiency by altering insulin synthesis and secretion. Vitamin D deficiency is avoidable through skin exposure to ultraviolet radiation and through foods rich in vitamin D, including oily fish, orange juice, beef liver, cheese, and egg yolks.

Fortification of the diet with vitamin D is a well-accepted fact, but the confusion on the type of vitamin D to be used, D2 or D3, has further delayed any significant solution⁹. Nutritional disorders and inappropriate nature-based exposure to the source of vitamin

D like sunlight can cause vitamin D deficiency which is increasing as an epidemic worldwide. A research study showed that vitamin D deficiency could promote cardiovascular and chronic diseases like autoimmune diseases, diabetes mellitus, and cancers¹¹. Another research inquired 310 females about knowledge of vitamin D deficiency and found that only twenty-five percent of females were familiar with vitamin D⁵. Another study conducted on undergraduate medical students concluded that the awareness about epidemic vitamin D deficiency was only among 17.8% of students¹⁰.

Thus, on becoming vitamin D deficient, many body functions could be disturbed like a decrease in absorption of intestinal calcium and phosphorous, a drop in serum ionized calcium levels, and stimulation in the production of parathyroid hormone¹¹. Therefore, an increase in plasma PTH is found to be essential to maintain serum calcium to the normal range by increasing renal production of 1,25(OH)₂D, which increased bone turnover by accelerating bone loss¹². So, maintenance of bone health requires a proper amount of vitamin D.

Relevant researchers found an understanding that vitamin D attained from sunlight lasts for a longer period in the blood than with vitamin D consumed from the diet, but many students did not know about the attainment of Vitamin D through sun exposure^{13,14,15}. However, very limited outdoor activities due to urbanization, air pollutants, and negative presumptions of people towards sunlight with wide-ranging use of sunscreens for a much fairer skin results in the high occurrence of vitamin D deficiency. Still, Vitamin D supplements, which may serve as an alternative to the sunlight source, can reduce age-related bone degeneration and serve as treatment for rickets, especially the nutritional variant¹⁶. Thus, ample knowledge about Vitamin D deficiency could decrease the disease by driving a positive attitude and change among people^{17,5}.

However, there was still a dearth of research on awareness, necessity, deficiency, and attainment of vitamin D in high-risk areas like Pakistan. The information related to vitamin D is essential to help policymakers in scheming proper plans for the Pakistani context. Moreover, early awareness about vitamin D in the medical profession would benefit health and create a health-

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related attitude by increasing knowledge as future medical professionals who would help in the dispersal of the awareness to the public. The study undertaken was one of the initial studies to assess the awareness of medical students about vitamin D deficiency, prevention, and sources of its proper attainment. The literature review suggested that the awareness of vitamin D deficiency among medical students in CMH, medical college Lahore was never attempted. Thence, the study undertaken was initiated to fill this gap in research.

METHODS

This quantitative study used a descriptive survey design. The study was conducted at CMH, Lahore Medical College from July 2022 to August 2022. Medical students from all the years of CMH Lahore Medical College comprised the population for the study. The inclusion criteria were medical students and the exclusion criteria were nonmedical students. Random sampling technique was used for the research. Medical students from 1st to 5th year, irrespective of age and other demographic requirements, studying in CMH Lahore Medical College were asked to fill out the questionnaire. The sample size was calculated by the following formula:

$$n = \frac{\left(\frac{Z \alpha}{2}\right)^2 P(1-P)}{e^2}$$

The sample size was estimated to be 245, using a z value of 1.96 for a 95% confidence level, P Prevalence of covering face of 0.801, and e^2 margin of error of 5%. The key article used was by Tariq A, Khan SR, Basharat A, about assessment of knowledge, attitudes and practice towards Vitamin D among university students in Pakistan. The study subjects responded to the structured questionnaire after written informed consent. A separate survey was administered to find out the demographic characteristics of the sample. Age, gender, study level, skin color, and questions about head covering among female participants. There were 3 sections of the Survey questionnaire:

- Section A comprised 5 items about the necessity of Vit. D
- Section B comprised 5 items about deficiency of Vit. D
- Section C comprised 5 items about the attainment of Vit. D

The questionnaire was adapted from published research¹⁸ which marks its validity. A mail has been sent for consent from the said research scholars to use the questionnaire. Additionally, the validity of the research tool was identified by administering the tool to about 10 students who would not be included in the sample. Moreover, for validity, the questionnaire was also checked by experts in the field:

Dr. Aliya Ayub, Professor, Education Department, Sardar Bahadur Khan Women's University, Quetta, email: aliaaslam54@yahoo.com and by Dr. Qudsia Umaira Khan, CMH, Lahore, email: drqudsia@yahoo.com The reliability of the questionnaire was measured by applying Cronbach alpha. The analysis was conducted in 02 steps

1. Responses of the sample were described in terms of frequency and %ages.
2. Responses were compared in terms of demographic profile

Table 1: Comparison of responses on the basis of gender

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F		T	df	Sig. (2-tailed)	Mean Difference
Necessity	Equal variances assumed	9.258		-.405	261	.686	-.03030
Deficiency	Equal variances assumed	.757		.640	262	.522	.06818
				.640	261.825	.522	.06818
Attainment	Equal variances assumed	1.878		-2.779	262	.006	-.22727
				-2.779	255.928	.006	-.22727

The analysis depicted a significant difference in the awareness of the necessity of Vitamin D, $t(261) = -3.663$, $p = .000$, but there was no significant difference in the respondent's views of the deficiency and attainment level of the vitamin D, $t(262) = .180$, $p = .857$, $t(262) = 1.675$, $p = .095$ respectively. The analysis showed no significant difference in the respondent's views on the necessity

by applying one-way ANOVA.

Ethical approval was obtained from the ethical committee of the medical college. Each participant was explained the aim of the study and written informed consent will be sought. The study will maintain the privacy of responses. The responses were shared among the investigators only.

RESULTS

The data analysis showed that there was no significant difference in the respondent's views on the necessity and deficiency of Vitamin D on the basis of gender, $t(261) = -.405$, $p = .686$, $t(262) = .640$, $p = .522$ respectively. But there was a significant difference in the awareness of the attainment of Vitamin D among male and female respondents, $t(262) = -2.779$, $p = .006$.

The differences in skin color ranged from Fair or Pale, Fair to Beige, Light Brown, and Dark Brown. The results through data analysis indicated that there were no significant differences in respondent's views on the necessity, deficiency, and attainment of the vitamin D, $F(3, 259) = .079$, $p = .971$, $F(3, 260) = .849$, $p = .468$ and $F(2, 263) = 1.791$, $p = .149$ respectively on basis of belonging to any specific group of skin color.

Additionally, the questionnaire inquired about awareness of the under-discussed topic among male and female students and analyzed the responses. The mean of female responses was high for the awareness of the necessity of vitamin D ($M = .100$) as compared to males' awareness ($M = -.03$), while females and males were equally aware of the deficiency level of vitamin D ($M = -.30$; $M = -.29$) respectively. For attainment awareness, females were more aware than males ($M = -.25$; $M = -.47$). The data analysis further showed that the respondents were more aware of the necessity of vitamin D ($M = -.05$) and less aware of the deficiency and attainment level of vitamin D. ($M = -.32$; $M = -.36$) respectively.

DISCUSSION

This research has conducted the determination of the awareness level of medical students, as they are future doctors. If they are aware of the value of vitamin D, they could guide their patients in the future. The demographic data of the respondents presented an equal number of males (132) and females (132), there were 58% of respondents belonged to the age group 21-25 and 41.7% were from the age group 18-20. Among the participants, most of the respondents consumed vegetables and food other than vegetables (204). So, 47% preferred non-vegetation food, and only 13% preferred vegetation. The sample consisted of a large number (75) of the population from the 5th year of medical students, 63 from 1st year, 54 from 3rd year, 50 from 2nd year, and a little number of students belonging to 4th year (22). Further, for skin color choice, a large number (107) of students opted for light brown skin color, 89 showed the Fair to Beige skin color, 58 had Fair to Pale skin color, and only 10 were with dark brown skin color. Analysis as presented in Table 1 below was conducted by comparing the respondents' views for an in-depth awareness of the problem.

and deficiency awareness for Vitamin D, $t(261) = -.405$, $p = .686$, $t(262) = .640$, $p = .522$ respectively. But a significant difference appeared in the awareness of attainment of the Vitamin D among male and female respondents, $t(262) = -2.779$, $p = .006$.

The data was analyzed regarding food preferences and the results indicated that there was no significant difference in

respondents' views of the necessity, deficiency, and attainment of the vitamin D, $F(2, 260)=.305, p=.738, F(2, 261)=.646, p=.525$ and $F(2, 261)=.033, p=.967$ respectively.

There were significant differences in the respondents' views enrolled in different years of study for the necessity, deficiency of the vitamin D, $F(4, 258)= 3.359, p = .011, F(4, 259) = 2.389., p = .051$. However, there was no significant difference in their views on the attainment of vitamin D, $F(4, 259) = .912, p= .457$ respectively.

The data analysis further indicated that there were significant differences in the respondent's views enrolled in different years of study for the necessity, deficiency of the vitamin D, $F(4, 258)=3.359, p=.011, F(4, 259) = 2.389., p=.051$. But there was no significant difference in their views on the attainment of the vitamin D, $F(4, 259) = .912, p = .457$ respectively.

Data differences for skin color indicated that there were no significant differences in respondent's views of the necessity, deficiency, and attainment of the vitamin D, $F(3, 259) = .079, p = .971, F(3, 260) = .849, p = .468$ and $F(2, 263) = 1.791, p = .149$ respectively. The views of males and females were also analyzed as presented in Table 2 below.

Table 2: Awareness level among male and female students

Gender		Necessity	Deficiency	Attainment
Male	Mean	-.0303	-.2955	-.4773
	N	132	132	132
	Std. Deviation	.71983	.85372	.61117
Female	Mean	.1000	-.3636	-.2500
	N	131	132	132
	Std. Deviation	.46410	.87608	.71382
Total	Mean	-.0152	-.3295	-.3636
	N	263	264	264
	Std. Deviation	.60513	.86400	.67292

The results showed that the mean of female responses was high for the necessity level of vitamin D ($M = .100$) as compared to male awareness ($M = -.03$), while females and males were equally aware of the deficiency level of vitamin D ($M = -.30; M = -.29$) respectively. For attainment awareness, the females were more aware than the males ($M = -.25; M = -.47$). This research study was conducted to determine awareness on three parameters, necessity, deficiency, and attainment of vitamin D as depicted in Table 3.

Table 3 depicted a comparison of awareness levels for necessity, deficiency, and attainment of vitamin D.

Descriptive Statistics					
	N	Min.	Max.	Mean	Std. Deviation
Necessity	263	-2.00	2.00	-.0152	.60513
Deficiency	264	-2.00	2.00	-.3295	.86400
Attainment	264	-1.00	1.00	-.3636	.67292
Valid N (list wise)	263				

The results highlighted that the participants were more aware of the necessity of vitamin D ($M=-.05$) and less aware of the deficiency and attainment level of vitamin D ($M=-.32; M=-.36$) respectively.

CONCLUSION

This research was conducted to determine the awareness of vitamin D among the medical students enrolled in all semesters. The results of the study indicated that female responses were high for necessity and attainment level of vitamin D which showed that females need more vitamin D to work effectively. The results also indicated that 3.8% of the participants showed a chronic deficiency of vitamin D, while 55% of the respondents represented some deficiency level of vitamin D as they have a skin color from fair to pale and fair to beige. 40% did not show vitamin deficiency in terms of skin color. From the results of the study, it was concluded that there was a need to create awareness among the people for the value of vitamin D for their effective daily routine life. It is also

concluded that most of the respondents were more aware of the necessity of vitamin D, but there were less aware of the deficiency and attainment level of vitamin D. Negative signs showed very little mean value of the responses for necessity, deficiency, and attainment level. So, an orientation program should be organized to enhance awareness of the value of vitamin D.

Recommendations:

- As data showed that males were less aware than females of the necessity and the attainment level of vitamin D, it is recommended that an orientation program should be organized for them.
- Vitamin D is made in the body naturally, so it is recommended that the focus of the orientation program should be on its natural building process like the time and duration of sitting in the sunlight.
- Results of the study also indicated that the respondents did know how to measure vitamin D deficiency and the need for their body, so training and orientation programs are suggested.

Conflict of interest: Nil

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