

**ORIGINAL RESEARCH****IMPORTANCE OF VITAMIN D, AWARENESS AND PREVENTION OF ITS DEFICIENCY AMONG FEMALE MEDICAL STUDENTS****Roohi Sharma<sup>1</sup>, Ruhi Mahajan<sup>2</sup>, Pavan Malhotra<sup>3</sup>**

<sup>1</sup>Assistant Professor, Department of Pharmacology and therapeutics, ASCOMS and Hospital, Sidhra Jammu, J & K, India;

<sup>2</sup>Assistant Professor, Department of Biochemistry, ASCOMS and Hospital, Sidhra Jammu, J & K, India;

<sup>3</sup>Professor and Head, Department of Pharmacology and therapeutics, ASCOMS and Hospital, Sidhra Jammu, J & K, India

**Corresponding author:** Dr. Ruhi Mahajan

**ABSTRACT:****Background:**

Vitamin D popularly known as sunshine vitamin is both vital and indispensable for human beings. Vitamin D deficiency is a common nutritional disorder that has assumed epidemic proportion. Its deficiency is a common nutritional disorder. One of the major reasons for the worldwide spread of this disorder has been deficient awareness about the importance of vitamin D, its benefits on health, and prevention of deficiency state across different populations & the prevalence being higher in females. This study was conducted to assess the awareness of female medical students regarding the importance of vitamin D and the prevention of its deficiency among them.

**Methods:** This cross-sectional study was carried out in 100 female MBBS students. A self-administered questionnaire consisting of two components was developed. The first section of the questionnaire was designed to assess the participants' socio-demographic profile, such as age, domicile, religion, income, and dietary preferences. The second part consisted of 11 multiple-choice questions on vitamin D knowledge (like source, effects of vitamin D deficiency, prevention and management of deficiency, etc.). The questionnaires were distributed to the students in the presence of the researcher during a lecture schedule.

**Results:** The study's findings revealed that the majority of participants were knowledgeable with the primary source of vitamin D (97 percent), its dietary sources (78 percent), and the location of synthesis (89 percent). They were also well-versed with the effects of vitamin D on bone health (84 percent), the identification of high-risk groups (72 percent), and the usefulness of supplements in insufficiency therapy (69 percent). However, they had insufficient awareness on certain other aspects as well, such as just 21% knowing about appropriate serum levels, 19% knowing about recommended daily dosage, 8% knowing about enough sun exposure, and 4% knowing about the dangers of excess vitamin D.

**Conclusion:** The present study showed that there are some gaps in awareness about vitamin

D, its benefits, and management of deficiency among female medical students. Majority had inadequate knowledge about the epidemic state of VDD, RDA, sun exposure time/duration, and other deficiency symptoms were unknown to the majority.

**Keywords:** Knowledge vitamin D female medical students.

**Received:** 04-06-2022

**Accepted:** 25-06-2022

**Published:** 28-06-2022

## I. INTRODUCTION

Vitamin D is essential for calcium balance and bone health. The primary function of vitamin D is to improve calcium absorption from the small intestine. Calcium absorption is greatest when 25-hydroxyvitamin D (25[OH] D) levels exceed 32 ng/ml. Vitamin D also improves phosphorus absorption from the distal small intestine. Adequate calcium and phosphorus absorption from the gut is required for optimal bone mineralization. The role of vitamin D in the development of osteoclasts, which resorb calcium from the bones, is the second primary function of vitamin D.<sup>1</sup>

Vitamin D is a fat-soluble vitamin (sunshine vitamin), known for its antirachitic activity. Vitamin D, in general, refers to Vitamin D3 which can be synthesized endogenously. Around 90% of the required Vitamin D is synthesized in the skin under sun exposure.<sup>2-4</sup> Synthesis of vitamin in skin on exposure to UV-B is affected by many factors that include latitude, solar zenith angle, atmospheric pollution, ozone layer, and melanin pigmentation.<sup>5,6</sup> When an individual becomes vitamin D deficient, intestinal calcium and phosphorous absorption decrease, serum ionized calcium levels drop, and synthesis of parathyroid hormone (PTH) is stimulated. Increased plasma PTH maintains serum calcium in the normal range by enhancing renal production of 1,25(OH)2D, increasing bone turnover, accelerating bone loss, and promoting tubular calcium reabsorption and phosphate excretion.<sup>7-9</sup> Increased 1,25(OH)2D induces intestinal calcium and phosphorus absorption and stimulates osteoclast activity, thereby increasing calcium and phosphorous availability in the blood.<sup>10,11</sup> Thus, vitamin D is very important in maintaining bone health. In addition, recent evidence suggests that vitamin D is also an important in promoting cardiovascular health and preventing chronic diseases (diabetes mellitus, autoimmune disorders, and various cancers).<sup>12,13</sup>

One of the major reasons for the worldwide spread of this nutritional disorder has been deficient awareness about the importance of vitamin D, its benefits on health, and prevention of deficiency state across different populations.<sup>14,15</sup> Vitamin D deficiency (VDD) develops due to insufficient knowledge and practice towards vitamin D, as well as environmental, biological and socioeconomic factors resulting in sun-avoidance behaviour, sedentary indoor lifestyle, increased screen-based activities.<sup>16</sup> Although, it is expected that medical professionals and students would be more aware regarding the importance of vitamin D, but the huge academic and professional burden allows for little sun exposure or exercise and thus putting them at a higher risk for developing Vitamin D deficiency (VDD). Medical students are the future healthcare providers of the community and should therefore be the target for inducing some long-term changes in it.<sup>17</sup> If awareness is created among them this next generation professionals could influence the progression of future health education programs, policy development, formation of social norms and beliefs about health and health promoting behaviours.<sup>1</sup>

There is no precise definition of vitamin D deficiency, however a 25OHD concentration more than 30 ng/ml (75 nmol/l) is considered normal. Sometimes the phrase "vitamin D deficiency" is used, and it is defined as a 25OHD concentration of 20 to 30 ng/ml (50 to 75 nmol/l). A 25OHD level of less than 20 ng/ml (50 nmol/l) indicates vitamin D insufficiency.<sup>2</sup> Vitamin D insufficiency in children may cause rickets, which is characterised by leg bending.<sup>3</sup> It has always been linked to rickets in children and osteomalacia in adults, but recent research has suggested a link to a variety of illnesses, including multiple sclerosis, coronary artery disease, type 1 and 2 diabetes, rheumatoid arthritis, hypertension, Alzheimer's disease, and several types of cancer.<sup>4</sup> Maternal vitamin D levels during pregnancy were also thought to have long-term effects on the baby, with levels below the normal resulting in lower bone density, increased asthma incidence, and susceptibility to type 1 diabetes.<sup>5</sup> Resolving the underlying cause of vitamin D deficiency by increasing vitamin D intake and sunlight exposure should be prioritised while treating the condition. There are a variety of vitamin D and metabolite formulations to choose from. 'Replacement doses' of the vitamin are needed when there is a nutritional shortfall. For certain patients with gastrectomy, malabsorption, or liver disease, substantial doses may be necessary. Treatment with calcitriol or alfacalcidol is advised in situations with defective 1 $\alpha$ -hydroxylation. Testing for hypercalcaemia should include monitoring of alkaline phosphatase and renal function in the bloodstream. Alkaline phosphatase normalisation is a good sign of healing.<sup>8</sup> Vitamin D deficiency is widely prevalent among females (94.4%) was much higher as compared to males (76.6%).<sup>9</sup> Not much research work has been done so far in this part of the country to understand the knowledge, attitudes and practice of female students regarding this nutrient. Hence, this study was conducted to assess the awareness of female medical students regarding the importance of vitamin D and the prevention of its deficiency among them

## II. METHODS AND MATERIALS

This cross-sectional research was conducted on female medical students. This research involved 100 female students of MBBS. With the support of previously completed research but relevant to the local environment, a self-administered questionnaire consisting of two components was developed.<sup>9</sup> The first section of the questionnaire was designed to assess the participants' socio-demographic profile, such as age, domicile, religion, income, and dietary preferences. The second part consisted of 11 multiple-choice questions on vitamin D knowledge (like source, effects of vitamin D deficiency, prevention and management of deficiency, etc.). The questionnaires were handed to the students in the presence of the researcher during a lecture schedule. The use of a phone or access to the internet was not permitted. Following the collection of the questionnaires from the participants, the right responses were conveyed to them in the form of a lecture, followed by a group discussion to expand their understanding of the "sunshine" vitamin. To describe the study population, descriptive statistics were employed. To determine the participants' knowledge of vitamin D, frequency tables were created and presented as percentages.

### III. RESULTS

The sociodemographic profile of study population are given in Table 1.

**Table 1: Socio demographic profile of students**

Parameter	Number	Percentage
<b>Age (yrs)</b>		
below 21	66	66
above 21	34	34
<b>Religion</b>		
Hindus	50	50
Muslim	40	40
Sikh	5	5
Others	5	5
<b>Area</b>		
Rural	52	52
Urban	48	48
<b>Family status</b>		
Lower class	13	13
Middle	47	47
Upper class	40	40

Nearly two-thirds of the participants (66 percent) were under the age of 21, while just 34 percent were beyond the age of 21. Participants from rural regions made up 52 percent of the study population, while those from urban areas made up 48 percent. Hindus were the most numerous religious group (50 percent), followed by muslims (40 percent). The majority of the family belonged to the middle class.

The study's findings revealed that the majority of participants were knowledgeable with the primary source of vitamin D (97 percent), its dietary sources (78 percent), and the location of synthesis (89 percent). They were also well-versed with the effects of vitamin D on bone health (84 percent), the identification of high-risk groups (72 percent), and the usefulness of supplements in insufficiency therapy (69 percent). However, they had insufficient awareness on certain other aspects as well, such as just 21% knowing about appropriate serum levels, 19% knowing about recommended daily dosage, 8% knowing about enough sun exposure, and 4% knowing about the dangers of excess vitamin D. (Table 2).

**Table 2: Knowledge of the participants regarding vitamin D, its benefits and management of deficiency**

Questions	% correct response
Main sources of vitamin D	97
Dietary sources	78
Site of synthesis	89
Importance-Main	84
RDA	19
Sun exposure (time/duration)	4

Vitamin D deficiency-main effects/others	81
High risk groups	72
Serum levels-sufficiency	21
Management of deficiency	69
Effects of vitamin D excess	8

## Discussion

Vitamin D insufficiency, a widespread but underdiagnosed illness, is gaining popularity throughout the globe.<sup>10</sup> The current study is one of the first to measure female medical students' understanding of the relevance of vitamin D and the prevention of its insufficiency, since very little research has been undertaken in this region of the globe. The study's findings revealed that the majority of participants were knowledgeable with the primary source of vitamin D (97 percent), its dietary sources (78 percent), and the location of synthesis (89 percent). They were also well-versed with the effects of vitamin D on bone health (84 percent), the identification of high-risk groups (72 percent), and the usefulness of supplements in insufficiency therapy (69 percent). However, they had insufficient awareness on certain other topics as well, such as just 21% knowing about appropriate serum levels, 19% knowing about recommended daily dosage, 8% knowing about enough sun exposure, and 4% knowing about the dangers of excess vitamin D.

A study conducted among medical students (both males and females) in Delhi, India discovered similar levels of awareness regarding the effects of deficiency on bone, other effects of deficiency, identification of high risk groups, use of supplements in deficiency management, and the region's status as an epidemic.<sup>9</sup> However, varying degrees of knowledge were identified in this research about the main/dietary sources of the vitamin and appropriate sun exposure. The current findings are also consistent with another study conducted among science (biotechnology) students, which discovered that while the majority of students knew that sunlight was the main source of Vitamin D, they were unaware of the required minimum daily intake of Vitamin D or the time/duration of sun exposure.<sup>11</sup>

The current study's findings revealed that participants had strong understanding of certain areas while having low knowledge of others. The current research, like the previous one, reveals significant gaps in fundamental understanding about vitamin D, its advantages, and deficient therapy.<sup>9</sup> Despite being a sun-drenched nation, the frequency of VDD is relatively high. Sun exposure, the best natural source for prevention and treatment of vitamin D deficiency, is underutilized due to a variety of sociocultural and dietary factors, limited outdoor activity due to urbanization, air pollutants, and negative attitudes toward sunlight, all of which contribute to the high prevalence of vitamin D deficiency.<sup>12-14</sup> A lack of awareness will exacerbate the issue, but appropriate understanding of VDD and its prevention might result in a possible reduction in disease burden by bringing about a positive shift in people's attitudes. This highlights the necessity of sensitizing medical students early in their training of vitamin D, its relevance, and the prevention and treatment of insufficiency.

Awareness regarding vitamin D at the beginning of a medical career would not only benefit their personal health, but would also instill a shift in health-related behavior and boost their

understanding as future medical professionals, who would then help disseminate the awareness in the community.<sup>15</sup>

### Conclusion

The present study showed that there are some gaps in awareness about vitamin D, its benefits, and management of deficiency among female medical students. The majority of participants had adequate knowledge about main source/dietary source of vitamin D, the site of synthesis, effect of vitamin D on bone health, main effects of deficiency on bone health, identification of high-risk groups and importance of supplements in management of deficiency. However, majority had inadequate knowledge about the epidemic state of VDD, RDA, time /duration of sun exposure and other effects of deficiency. Thus, the need of the hour is to create more awareness to educate medical students regarding deficiency and its serious outcomes. It would not only benefit their own but community health and wellbeing as well.

### References

1. Heaney RP, Dowell MS, Hale CA, Bendich A. Calcium absorption varies within the reference range for serum 25-hydroxyvitamin D. *J Am Coll Nutr.* 2003;22(2):142–6. <https://doi.org/10.1080/07315724.2003.10719287>
2. Vitamin D Testing [cited 2013 Nov 12]. Available from: [www.mayomedicallaboratories.com](http://www.mayomedicallaboratories.com)
3. Karrar ZA. Vitamin D deficiency rickets in developing countries. *Ann Trop Paediatr.* 1998;18(Suppl. 1):S89–92. <https://doi.org/10.1080/02724936.1998.11833490>
4. Chai B, Gao F, Wu R, Dong T, Gu C, Lin Q, et al. Vitamin D deficiency as a risk factor for dementia and Alzheimer's disease: an updated metaanalysis. *BMC Neurol.* 2019;19(1):284. <https://doi.org/10.1186/s12883-019-1500-6>
5. Christie FT, Mason L. Knowledge, attitude and practice regarding vitamin D deficiency among female students in Saudi Arabia: a qualitative exploration. *Int J Rheum Dis.* 2011;14(3):e22–9.
6. Kumar P, Clark M. *Kumar & Clark clinical medicine.* 7th ed. Philadelphia, PA: Saunders Elsevier, 2009.
7. AL-Otaibi HM, AL-Jurayyan M, Nasir A, Mohamed S, Salih MA. Osteomalacia in adolescents presenting as proximal myopathy. *Curr Pediatr Res.* 2012;16(1):57–60.
8. Ardawi MS, Sibiany AM, Bakhsh TM, Qari MH, Maimani AA. High prevalence of vitamin D deficiency among healthy Saudi Arabian men: relationship to bone mineral density, parathyroid hormone, bone turnover markers, and lifestyle factors. *Osteoporos Int.* 2012;23(2):675–86.
9. Lhamo Y, Chugh PK, Gautam SR, Tripathi CD. Epidemic of Vitamin D deficiency and its management: awareness among indian medical undergraduates. *J Env Public Heal.* 2017;2017.
10. Hossein-nezhad A, Holick MF. Vitamin D for health: a global perspective. *Mayo clinic proceedings.* Elsevier. 2013;88(7):720-55.
11. Arora H, Dixit V, Srivastava N. Evaluation of knowledge, practices of vitamin D and attitude toward sunlight among Indian students. *Evaluation.* 2016;9(1):308.

12. Gorham ED, Garland CF, Garland FC, Grant WB, Mohr SB, Lipkin M, et al. Vitamin D and prevention of colorectal cancer. *J Steroid Biochem Molecular Biol.* 2005;97(1-2):179-94.
13. Deschasaux M, Souberbielle JC, Partula V, Lécuyer L, Gonzalez R, Srour B, et al. What do people know and believe about vitamin D?. *Nutrients.* 2016;8(11):718.
14. Gupta A. Vitamin D deficiency in India: prevalence, causalities and interventions. *Nutrients.* 2014;6(2):729-75.
15. Nilsson M, Ohlsson C, Odén A, Mellström D, Lorentzon M. Increased physical activity is associated with enhanced development of peak bone mass in men: a five-year longitudinal study. *J Bone Mineral Res.* 2012;27(5):1206-14.