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**KNOWLEDGE ATTITUDE PRACTICES SURVEY OF PRESCRIPTION OF
VITAMIN D AMONG MEDICAL PRACTITIONERS – A CROSS-SECTIONAL
STUDY**

Type of Study: Original Research Article

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*doi: 10.33472/AFJBS.6.13.2024.4334-4345***ABSTRACT:****Background**

The use of vitamin D supplements has increased substantially in recent years. The role of vitamin D supplementation, and the optimal vitamin D dose and status, is always a subject of debate. The guidelines for vitamin D supplementation change every few years and proper education of both patients and the medical community about the benefits of vitamin D and the importance of its proper provision according to the updated guidelines is of great importance.

Methodology

A Cross-sectional, Observational, Questionnaire-based survey was conducted after obtaining the approval of the Institutional ethics committee. Practitioners including Diploma holders and general practitioners, a total of 100 were invited to fill out the survey form. Descriptive statistics were used to analyze questions.

Results

Of 66 respondents, 36.36% reported that up to 10 % of their tested patients showed vitamin D deficiency. 69.7 % answered that people over 65 years of age were at high risk of deficiency. 72.73% of the participants believed that daily exposure to direct sunlight at peak UV times would help in the prevention of deficiency. 51.52% of participants felt that people required about 30 min of direct sunlight. The most common query regarding Vitamin D was about the sources of Vitamin D at 62.12%. 50% advised their patients who are at risk of deficiency to not always use sun protection in summer. 34.84% believed that a person of average sun sensitivity required about 10 min of direct sun exposure during a summer day in peak UV time. 60.61% of participants expressed greater concern about vitamin D deficiency than skin cancer. 96.97% of participants believed clear clinical guidelines would be useful.

Discussion and Conclusion

In India, studies have reported vitamin D deficiency in as high as 70%–100% of healthy individuals. Our results suggest there is some confusion among practitioners regarding the amount of UV exposure time in summer and winter necessary for sufficient vitamin D. Testing less number of patients for Vit. D deficiency was noted. The participants felt they had insufficient information and resources to provide advice to their patients.

Keywords: Vitamin D deficiency, Prevention, UV exposure, Vitamin D supplements, Skin cancer

1. INTRODUCTION

Humans get vitamin D from exposure to sunlight, from their diet, and from dietary supplements. (Holick, 2007) The epidemic scourge of rickets in the 19th century was caused by vitamin D deficiency due to inadequate sun exposure. It resulted in growth retardation, muscle weakness, skeletal deformities, hypocalcemia, tetany, and seizures. The main source of vitamin D is usually endogenous synthesis from skin exposure to ultraviolet-B (UV-B) of the sun. (Holick, 2006) The 7-DHC (7-dehydrocholesterol, provitamin D₃) -in the lipid bilayer of the epidermis is converted to pre-vitamin D₃ on exposure to sunlight ultraviolet B (UV-B wavelengths 290–315 nm). (Webb AR et al., 1988) This pre-vitamin D₃ undergoes conformational changes in the lipid bilayer of the skin to convert into vitamin D₃ (cholecalciferol) at body temperature. It is ejected from the plasma membrane into extracellular space. Synthesis of vitamin D is affected by: environmental factors such as latitude, season, day and night, time of the day, the solar zenith angle (SZA), amount of cloud, ozone and aerosols, atmospheric pollution, UV index, and personal factors such as dress code, skin pigmentation (Indians come under the skin category-type V), age (the reduced ability of skin capacity with age), minimal erythemal dose (MED) and application of sun protection factor. The SZA becomes more oblique in winter and few UVB photons penetrate the earth's surface. (Webb AR et al., 1989; Harnarayan CV et al, 2013; Bikle DD, 2014) The SZA is also more oblique in the early morning and afternoon which is why even in India very little vitamin D is produced in the skin before 10 a.m. and after 3 p.m. The intensity of UVB from sunlight varies according to season and latitude, so the further one lives from the equator, the less time of the year one can rely on solar exposure to produce D₃ (Webb AR et al, 1988). Diet is also a source of Vitamin D. Most foods contain little vitamin D except for fatty fish. Food needs to be fortified to contain enough Vitamin D. The vitamin D in fish is D₃, whereas that used for fortification is often D₂ (ergocalciferol). (Slemenda CW et al, 1997). The peak bone mass (bone density) at the end of the growth period is attained with adequate vitamin D and calcium intake (Johnston CCJr et al, 1992, Jones G, Dwyer T, 1998). Nutrition and adequate physical activity are considered necessary to attain good bone growth. Vitamin D and calcium status correlate with bone density. They can potentially increase the peak bone mass and effectively prevent osteoporosis at a late age. Vitamin D levels < 20 ng/ml and >30 ng/mL (to convert ng/mL to nmol/mL multiplied by 2.5) are considered as 'normal'. Levels between 20 and 30 ng/mL are 'insufficiency'. (Lips P, 2001)

The use of vitamin D supplements has increased substantially in recent years. The role of vitamin D supplementation, and the optimal vitamin D dose and status, is always a subject of debate as large interventional studies could not show a clear benefit. On the other hand, studies have indicated that Vitamin D deficiency has reached epidemic proportions among the population in general. Vitamin D receptors were found in many tissues in the body, and vitamin D deficiency was linked to various extra-skeletal manifestations. It was found to be associated with an increased risk of many common cancers, type 1 diabetes, multiple sclerosis, Crohn's disease, rheumatoid arthritis, osteoarthritis, hypertension, and cardiovascular heart disease (Antico A et al., 2012) To prevent skin cancer as well as cases where the patient is sensitive to sunlight the advice is to use the sun protection methods like sunscreens and protective clothing and hats, etc.,

About 85% of the Indian population is deficient in Vitamin D. It has been shown that the 25(OH)D levels inversely correlate with latitude ($r = -0.48$; $P < 0.0001$) from the various studies in the country. (Harinarayan CV et al, 2013)

The guidelines for vitamin D supplementation change every few years based on the newest research. Proper education of both patients and the medical community about the benefits of vitamin D and the importance of its proper provision according to the updated guidelines is of great importance. A meta-analysis published in 2007 showed that vitamin D supplementation was associated with significantly reduced mortality (Autier P, Gandini S, 2007). As an immune modulator, vitamin D3 is a factor in the prevention and reduction of several types of cancer including breast, ovarian, colorectal, oral, small-cell lung, and prostate cancers. (Aggarwal A et al, 2018; AlFaris NA et al, 2018, Baunmann M et al, 2018) Various studies in different parts of India have reported widespread prevalence of vitamin D deficiency in all age groups. It is estimated that the prevalence of deficiency is 62–95.7% in new-borns and breast-feeding groups (0–6 months), 46–80% in 6–60 months of age, and 37.8–97.5% in 5–20-year-old children (Surve S et al, 2017)

There is widespread concern regarding direct sun exposure increasing the risk of relatively benign and nonlethal squamous and basal cell cancers. Chronic excessive exposure to sunlight and sunburning experiences during childhood increases the risk of nonmelanoma skin cancer (Kennedy C et al, 2003). Melanoma is considered a sun-induced skin cancer. However, most melanomas occur in the least sun-exposed areas, and it has been reported that occupational exposure to sunlight decreases the risk of melanoma. The 30-year campaign to recommend reduced sun exposure has not stemmed the increase in skin cancer incidence (Bonevski B et al, 2011)

The present study aimed to evaluate the knowledge, practices, and attitudes of medical practitioners towards vitamin D supplementation. This study did not distinguish between types of vitamin D dietary supplements (D2 or D3). This study also aims to know the self-education efforts of the practitioners about Vitamin D.

2. METHODOLOGY

A Cross-sectional, Observational, Questionnaire-based survey was conducted after obtaining the approval of the Institutional ethics committee (Approval Letter No. IEC7/70). Practitioners including Diploma holders and general practitioners, a total of 100 were invited to fill out the survey form as a hard copy or Google form whichever was convenient at that time.

Questionnaire

A questionnaire was developed after an online literature search of previously done similar studies and literature regarding the importance of Vitamin D in Australia and New Zealand (NZ) (Bonevski B et al, 2012, Reeder, A.I., et al, 2012). The questionnaire was adapted from these studies. The development of the instrument of these studies included a review of content by skin cancer experts, dermatologists, vitamin D specialists, endocrinologists, behavioral scientists, and members of a local general practice research group and testing among 20 randomly selected GPs. This survey instrument was adapted for Indian conditions but not further tested for validity. The questionnaire contained 25 questions divided into five parts: The demographic data like age, and sex was part of the questionnaire and entered as Categorical values. There are 10 Questions for the evaluation of Knowledge. These were - sources of knowledge, causes of deficiency, groups that require supplementation, benefits and time of exposure to sunlight, and what advice they were giving to their patients. There are 5 questions regarding the information about sun protection advice given to their patients. There is one question with 9 subparts related to attitude towards Vitamin D supplementation and the answers to these were sought on a Likert scale from strongly agree (4) to strongly disagree (1). The questions on their regular practice were on the number of patients they were seeing and how many were being prescribed Vitamin D supplementation.

Reliability Analysis and Statistical Analysis

The questionnaire was adapted from a study that was already pilot-tested. Descriptive statistics was used to describe demographic and work characteristics and practice questions. The questions were analyzed using mainly descriptive statistics.

3. RESULTS

The form was distributed to 100 practitioners of them only 66 had filled the form. The demographic data is depicted in Table 1. Almost half, 51.12% of them were graduates. 45.45% of participants had been practicing for over 20 years and 54.55% were seeing patients for 10 hours or more per week. Only 18 were seeing > 100 patients per week.

Tables 2 and 3 summarize the main results from two knowledge items relating to vitamin D deficiency prevention measures and groups at high risk of vitamin D deficiency. 72.73% of the participants believed that daily exposure to direct sunlight at peak UV times of the day would help in the prevention of deficiency. 59.09 % agreed that taking Vitamin D fortified food and adequate physical activity would prevent the development of Vitamin D deficiency. 69.7 % answered that people over 65 years of age were at high risk of deficiency.

Almost half, 51.52% of participants believed that people required about 30 min of direct sunlight. 34.84% believed that a person of average sun sensitivity required about 10 min of direct sun exposure during a summer day in peak UV time and 2 (3.03%) said that up to 5 minutes of exposure to sunlight was enough. Only one participant believed that one hour of sun exposure was necessary.

44(66.67%; 95% CI 55.29 – 78.04) reported being somewhat confident with their vitamin D knowledge one was not at all confident and 21(31.82%; 95% CI 20.58 – 43.06) were very confident.

A large proportion (42.42%; 95%, CI 30.50 –54.35) of respondents reported receiving the same amount of vitamin D information in the last 12 months. The three most common sources of vitamin D related information were their medical training (68.18%; 95% CI 56.94 –79.42), next were journals (40.91%; 95% CI 29.05 – 52.77), and professional guidelines 39.39% (95% CI 27.61 – 51.18). Just 30.6%; 95% CI 13.90 – 34.58 of respondents said they received their vitamin D related information from training programs

As depicted in Table 4, the most common query regarding Vitamin D that they received from the patients was about the sources of Vitamin D at 62.12% next was the time to be spent in sun to prevent deficiency at 60.61%. Almost half of the participants (53.03%) reported that they received requests for serum vitamin D level tests

Participants generally expressed greater concerns about vitamin D deficiency than skin cancer (Table 5) as 60.61% disagreed that it was more important to stay out of the sun than it is to get enough vitamin D. Also, there is a necessity for clear guidelines regarding the prevention, diagnosis, and management of vitamin D deficiency.

Most respondents reported that vitamin D information they had received within the last 12 months (42.42%; 95% CI 30.50 –54.35) caused them to recommend less sun protection during winter and 34.84%; 95% CI 23.35% - 46.34%, said that the information had not caused them to change the sun protection advice they gave patients.

For patients who are at high risk of deficiency, half of the participants, 50%; 95% CI 51.0–59.8 advised their patients to not always use sun protection during peak UV time in summer, and 39.39%; 95% CI 22.2–29.9 advised their patients to use sun protection most of the time but to receive some direct sunlight during summer peak UV times. 4 (6.06%) advised their patients to always use sun protection.

In the general advice by the practitioners during summer, 66.67% said they will advise their patients to use sun protection during the peak UV times and to get direct sunlight during that time, whereas in winter only 46.97% will give that advice. 28.79% of participants said they would not advise their patients to use sun protection during summer and in winter 33(50%) will advise not to use sun protection.

96.97% expressed that clear clinical guidelines for the prevention, diagnosis, and management of vitamin D deficiency would be useful and 60.61% were more concerned about skin cancer than vitamin D deficiency (Table 5).

As seen in Figure 1, 35% of the practitioners had sent at least 5 – 20 patients for testing the serum levels of Vitamin D.

As seen in Figure 2, 24(36.36%) reported that up to 10 % of their tested patients showed vitamin D deficiency or insufficiency. 17(25.76%) of the participants mentioned that up to 39% of their tested patients turned out to be Vitamin D insufficient or deficient.

Table 1: Demographic data of the participants

Gender	n(%)
Male	36 (54.55%)
Female	30 (45.45%)
Highest Qualification	
Graduates	34 (51.12%)
Graduate Diploma	23 (34.84%)
MD, PhD	9 (13.64%)
Practice years	
Over 20 years	30 (45.45%)
11 - 20 years	18 (27.27%)
5 - 10 years	9 (13.64%)
less than 5 years	9 (13.64%)
Hours of Practice	
1 - 3 Hrs.	10 (15.15%)
4 - 6 Hrs.	5 (7.58%)
7 - 9 Hrs.	15 (22.73%)
10 or more Hrs.	36 (54.55%)
Average number of patients in a week	
0 - 20	20 (30.3%)
21 - 40	10 (15.15%)
41 - 60	7 (10.61%)
61 - 80	2 (3.03%)
81 - 100	9 (13.64%)
> 100	18 (27.27%)

Table 2: Knowledge Questions - prevention of deficiency of Vitamin D

Which of the following do you believe may <u>prevent</u> vitamin D deficiency in the general population?	%	95%CI
Daily vitamin D supplements	33.33	21.96 - 44.71
Adequate intake of vitamin D-fortified foods	59.09	47.23 - 70.95

Adequate physical activity	59.09	47.23 - 70.95
Daily exposure to direct sunlight at peak UV times of the day	72.73	61.98 - 83.47
Daily exposure to artificial UV light	3.03	0 - 7.17
Daily calcium supplements	15.15	06.50 - 23.80
Restrict sun protection (eg, sunscreen, long sleeve shirts, hats) use summer or winter	12.12	04.25 - 20
Restrict sun protection use during winter	22.73	12.62 - 32.84
There is no effective way to prevent vitamin D deficiency	1.52	0 - 4.46
Not sure	0	0
Other	0	0

Table 3: Knowledge question regarding the group at high risk for Vitamin D deficiency

Which of the following groups do you believe are at <u>increased risk</u> of vitamin D deficiency	n(%)	95% CI
People aged over 65 years	46 (69.7%)	58.61 - 80.78
People with bone diseases	39(59.1%)	47.23 - 70.95
People with skin diseases	12 (18.18%)	8.88 - 27.49
Women in general	29 (43.94%)	31.97 - 55.91
Pregnant or breastfeeding women	33 (50%)	37.94 - 62.06
People who wear veils for cultural or religious reasons	30 (45.45%)	33.44 - 57.47
Obese people	12 (18.18%)	8.88 - 27.49
Children in general	18 (27.27%)	16.53 - 38.02
People with restricted mobility	35 (53.03%)	40.99 - 65.07
People with intellectual disabilities	4 (6.06%)	0.30 - 11.82
People in institutionalised care	19 (28.79%)	17.86 - 39.71
None of the above	0	
Not sure	0	

Table 4 : Percent of participants who received common inquiries regarding vitamin D

What is/are the most common vitamin D related patient inquiries you receive	n(%)
Information about sources of vitamin D	41 (62.12%)
Advice regarding how much time they should spend out in the sun	40 (60.61%)
Requests for serum vitamin D level tests	35 (53.03%)
Requests for complementary and alternative therapies for vitamin D deficiency	24 (36.36%)
Advice regarding the use of sun protection and effects on vitamin D	13 (19.7%)
Information about vitamin D following media reports	11 (16.67%)
Not applicable – do not receive patient inquiries regarding vitamin D	4 (6.06%)

Table 5: Respondents' attitudes toward vitamin D and sun protection

Attitude regarding Vit D	Agree + Strongly agree	Disagree + Strongly Disagree
Clear clinical guidelines for the prevention, diagnosis, and management of vitamin D deficiency would be useful	64 (96.97%)	2 (3.03%)
I am concerned that my patients may not be getting enough vitamin D	59 (89.39%)	7 (10.61%)
My patients' vitamin D status influences the sun protection advice I provide them	59 (89.39%)	7 (10.61%)
Information about vitamin D is not readily available for GP patients	57 (86.36%)	9 (13.64%)
My patients need to spend more time in the sun to get enough vitamin D to be healthy.	56 (84.84%)	10 (15.16%)
Vitamin D reduces the risk of cancer	52 (78.79%)	14 (21.21%)
Skin cancer prevention messages to cover up in the sun contribute to the development of vitamin D deficiency	49 (74.24%)	17 (25.76%)
Information about vitamin D is not readily available for GPs	45 (68.18%)	21 (31.82%)
It is more important to stay out of the sun than it is to get enough vitamin D	26 (39.39%)	40 (60.61%)

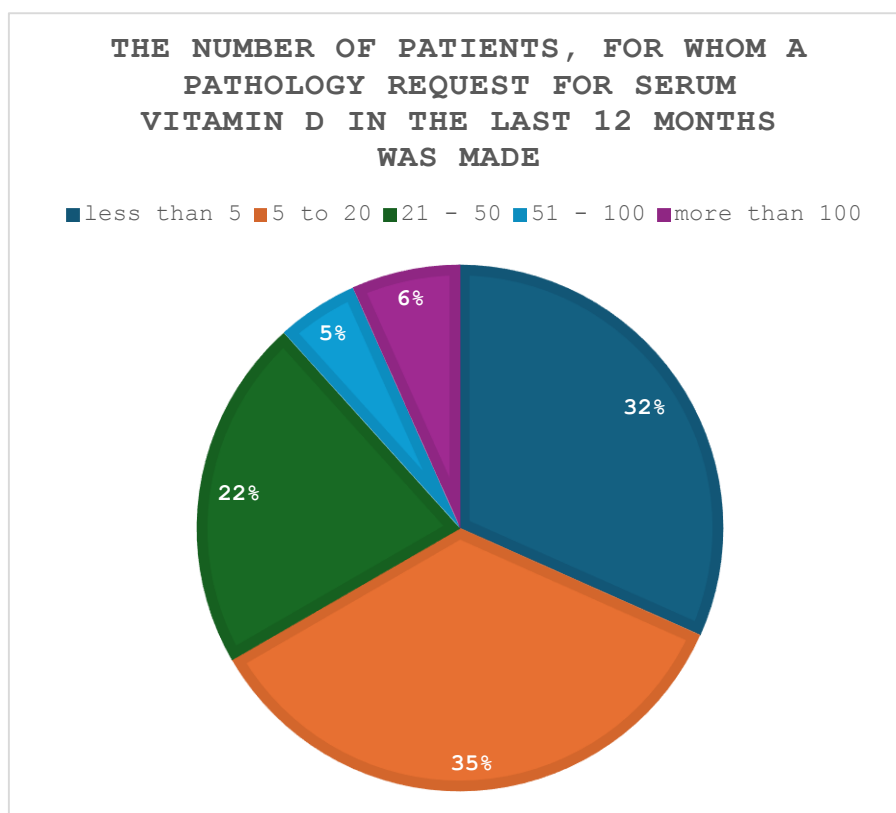


Figure 1: Requests for Serum Vitamin D levels by the practitioners

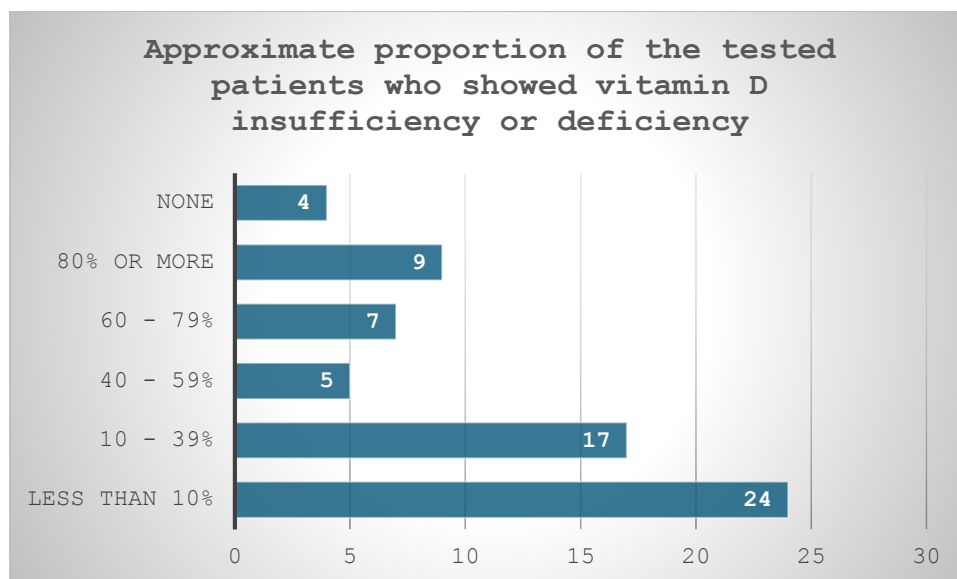


Figure 2: Proportion of the tested patients (on the y-axis) who showed Vitamin D deficiency or Insufficiency (n = number of participants on the x-axis)

4. DISCUSSION

Countrywide studies have reported vitamin D deficiency in as high as 70%–100% of healthy individuals. (G, Ritu et al., 2014). hence there is a necessity to address this problem at the root level.

Our results suggest there is some confusion in practitioners regarding the amount of UV exposure time in summer and winter necessary for sufficient vitamin D. 50% of GPs said that they advised less sun protection in winter. In the Australian study (Bonevski B et al., 2012), more than half of the GPs advised their patients to always use sun protection during peak UV in summer. Although practitioners said they had received more information about vitamin D in the previous 12 months than usual, their advice regarding sun protection has not changed. Same as the Australian study. Practitioners in this study were more concerned about vitamin D deficiency than skin cancer in contrast to the Australian (Bonevski B et al., 2012) and NZ studies (Reeder, A.I., et al, 2012).

Most of the participants said they were somewhat confident about their knowledge of Vitamin related issues. The use of sun protection measures such as long-sleeved shirts and pants, hats, sunglasses, sunscreen, and shade limits direct skin exposure to UV–B and vitamin D synthesis. Sun protection measures during peak UV times in summer are important for the prevention of skin cancer. (Green AC et al., 2011). Although it may not be necessary in winter. In this study, 66.67% of the participants, advised their patients to not always use sun protection during peak UV time in summer, almost like the NZ study in which 70% and less in an Australian study (55%) advised ‘to use sun protection at all times during peak UV’). This is good since the Indian skin type is III and IV of the Fitzpatrick Skin Types. For people with darker skin and those with low sun sensitivity, the mean time of sun exposure is 27 minutes. 22% of Australian GPs were reported to consider 30 minutes during peak UVR would be required for a person of average sun sensitivity to achieve adequate vitamin D, and 51.52% in the current study said they recommend the same. According to the NZ guidelines, before 10 am, after which hour recommended routine sun protection when the UVI is ≥ 3) to obtain adequate vitamin D was approximately 15 minutes. There are no Indian guidelines for the evaluation, treatment, and prevention of vitamin D deficiency. There is also a necessity to educate the practitioners

regarding the different Indian skins and their requirements instead of following the international guidelines. This requires that national guidelines be made taking into consideration the differences in the latitudes and sun exposure of the Indian subcontinent, and differences in the seasons as perceived in Northern and Southern states, which are completely different from the Australian and NZ studies on which the present study is based.

For patients at increased risk of vitamin D deficiency, 50 % of participants of the present study said they advised their patients to not always use sun protection during peak UV time in summer, whereas 24% of the NZ GPs and 33% of the Australian GPs would give this advice. The survey identified some gaps in GP knowledge about vitamin D, its prevention, and high-risk groups. The strategy selected by most GPs to prevent vitamin D deficiency for the general population was daily exposure to sunlight.

Vitamin D plays an important role in bone health, but the evidence regarding the other possible health benefits of vitamin D remains inconclusive. In the present study, 60.61% of the practitioners were more concerned regarding skin cancer than deficiency, in contrast to the Australian study in which GPs were more concerned about their patients' vitamin D status than the risk of skin cancer. Many participants (97%) indicated that clinical guidelines for the prevention, diagnosis, and management of vitamin D deficiency would be useful. 39.1% of doctors in a Polish study recommended vitamin D supplementation to the majority of their patients regardless of their deficiency (Zgliczyński WS et al., 2021). In the present study, 65.15% of the participants said they prescribe supplements when there is a deficiency. Vitamin D is a commonly prescribed vitamin in recent times with both advantages and disadvantages. Knowing the prescription practices of Vitamin D helps to analyze the prevalence of deficiency among the general population and get an idea regarding the necessity of guidelines for prescription. The survey identified some gaps in GP knowledge about vitamin D, its prevention, and high-risk groups. Interventions, which include regular workshops and more research in the Indian states might help provide the required evidence for making the guidelines. Guidelines are likely to be beneficial in increasing awareness of the actual role Vitamin D plays in public health. Another way to address the problem of Vitamin D deficiency is by fortification of food. In a recent review, fortification via wheat flour has also been proposed as an alternative to milk. (Babu US, Calvo MS, 2010). At present there is no regulation or fortification of other food products with vitamin D in India. Only a few foods are a good source of vitamin D. The best way to get additional vitamin D is through supplementation. (Nair R, Maseeh A, 2012) The Endocrine Society of Clinical Practice, ESCP, recommends screening for Vitamin D deficiency in individuals at risk for deficiency and not for patients who are not at risk. (Holick MF et al, 2011)

A weakness of the study is the sample size. The researcher found it difficult to reach out to more practitioners, which would have made this more robust.

5. CONCLUSION

In conclusion, this survey shows that practitioners in this study were sending less number of patients for testing for vitamin D status which can be increased considering the prevalence of deficiency. Even of the tested patients only up to 10% were turning out to be positive. They are managing vitamin D deficiency and providing advice regarding sun exposure and sun protection for sufficient vitamin D. Respondents indicated they have insufficient information and resources to provide their patients with the required advice. Since the results suggest an attitudinal shift towards vitamin D concerns over skin cancer concerns, further research is needed to know if this is valid.

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Conflict Of Interest

The author declares no conflict of interest

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