



KNOWLEDGE, ATTITUDES, AND PRACTICES ASSOCIATED WITH VITAMIN D MISUSE AMONG GENERAL POPULATION DURING COVID-19 (NORTHERN KSA)

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ABSTRACT

Vitamin D (VD) insufficiency is becoming an important problem among Saudi nationals. This population will probably keep suffering from vitamin D deficiency because there is a lack of understanding about lifestyle changes that can prevent Vitamin D insufficiency. The aim of the study to assess the level of knowledge, attitudes, and practices associated with Vitamin D among the adult residents of Arar in the Northern Border region of Saudi Arabia. A descriptive cross-sectional study was done among the general adult population in Arar city using a well-structured and well-designed questionnaire. The study finding showed that over two-thirds (69.6%) of respondents reported a high level of vitamin D knowledge on the scale of respondents' attitudes toward vitamin D. Considering the respondents' attitude scale about vitamin D, 75 percent of them showed a moderate level, and the level of practices of vitamin D use show that over forty percent have a moderate level. This study showed that the participants had a high level of vitamin D knowledge and attitudes. Although most participants were aware of the sources, benefits, and risks of a vitamin D overdose, most of them did not take part. The majority of them spent most of their time indoors due to cultural considerations, which reduce the production of vitamin D.

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Introduction

Vitamin D (VD) is a fat-soluble vitamin found in a few foods and is mostly produced internally from direct sunlight exposure [1]. VD has attracted a lot of attention since its discovery as an important vitamin [2]. It is necessary for overall human development throughout one's life [3]. VD is well known to enhance calcium absorption from the digestive system, which helps to maintain proper serum calcium and phosphate levels in the blood [4]. In the absence of VD, only 10%–15% of dietary calcium and approximately 60% of phosphorus are absorbed [5, 6]. As a result, it is recognized as being among the most important components required for musculoskeletal growth and bone density [7]. Sun exposure provides 90% of the body's VD requirements, with diet providing the remaining 10 % [8].

Vitamin D insufficiency is considered a worldwide health problem affecting both children and adults and is regarded as an epidemic [9]. The deficiency of VD has aroused much interest among the medical community [10]. Many research projects have been undertaken around the world to establish VD awareness in relation to the increased prevalence of VD insufficiency [11-13]. Vitamin D deficiency is quite common in Saudi Arabia, affecting more than two-thirds of the population [13].

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According to a study conducted in Saudi Arabia, there is a lack of knowledge and awareness regarding the sources and importance of VD [3, 12, 14]. The majority of the world's population, including Saudis, was put on lockdown due to the COVID-19 pandemic [15]. As a result of the absence of direct sunlight exposure at this time, there was an increased requirement for VD [16]. The current research aims to assess the level of knowledge, attitudes, and practices associated with VD among adult residents of Arar in the Northern Border region of Saudi Arabia.

Materials and Methods

Study Setting and Design

A descriptive cross-sectional study was done among the adult general population in Arar City (the capital of a northern region of Saudi Arabia) during the period from June 1, 2022, to December 31, 2022.

Sample Size

The sample size was determined by the Epi Info software program version 7.2.4.0 based on the following assumptions: 95% confidence interval, 5% margin of error, and 40% expected awareness [12], with an estimated sample size of 368.

Sampling Tool

An Arabic-structured, well-designed questionnaire was created through an extensive literature review of the relevant research. Two independent experts (in family medicine and internal medicine) reviewed and approved the questionnaire. Also, two independent specialists translated the questionnaire into Arabic, then back into English, and then into Arabic.

The research proposal was divided into four sections.

1. The first section includes questions regarding socio-demographic information such as age, gender, and educational level.
2. The second section includes a question about VD knowledge.
3. The third section involves questions about attitudes toward VD.
4. The fourth section includes questions about VD practices.

Questionnaire Reliability and Validity

Cronbach's alpha coefficient was determined to measure the stability of the study tool. The results reveal that the values of Cronbach's alpha for knowledge were 0.77, attitudes were .78, and practices were .84, with an overall reliability of .799, indicating that the tool has a high level of reliability.

Content validity was conducted by two specialists (internal medicine and family medicine).

Internal validity for the questionnaire was done, and the results reveal that there are significant correlations between each item and the total degree of the axis to which it belongs, indicating that the tool has a high degree of internal consistency (P- value less than 0.05).

A pilot study was done with a sample size of 30 participants to assess the ambiguity of the question and the time that may be needed to complete it. The researchers excluded the participants from the pilot study.

Knowledge, Attitude, and Practice Scale

1. To determine the degree of the respondents' knowledge of VD, their responses were divided into three categories according to the theoretical range (13–26 degrees), and these categories are Low, moderate, and high levels of knowledge, as in **Figure 1**.
2. To assess the level of participants' attitudes towards VD, the responses of the participants were divided into three categories according to the theoretical range (8–40 degrees), and these categories are low, moderate, and high levels of attitudes, as in **Figure 2**.
3. To measure the level of practice related to VD use, the responses of the respondents were divided into three categories according to the theoretical range, which ranges between 4 and 8 degrees), and these categories are low, moderate, and high levels of practice, as shown in **Figure 3**.

A pilot study was done with a sample size of 30 participants to assess the ambiguity of the question and the amount of time that may be needed to complete it. The researchers excluded the participants from the pilot study.

Sampling Method

We collected data from participants using an online technique utilizing numerous social media platforms (Whats App, Facebook, and Telegram), after stating the research purpose and getting written informed consent.

Statistical Analysis

Data were collected, entered, cleaned, and analyzed using SPSS version 22. The qualitative data were reported as frequency and percentage, and the chi-squared test was employed to determine statistical significance. Quantitative data was analyzed, and findings were presented as mean and standard deviation. A statistical criterion of significance of 5% was used.

Inclusion Criteria

Healthy subjects who are over the age of 18 years.

Exclusion Criteria

1. People younger than the age of 18 years
2. People with a history of cancers
3. People with calcium metabolic diseases
4. People with the Bone disease

Results and Discussion**Table 1.** Participants' socio-demographic characteristics

		No	%
		Mean= 32.3±11.5	
Age group in years	≤20	43	11.7
	20-30	151	40.8
	30-40	90	24.4
	40-50	56	15.2
	≥ 50	29	7.9
Sex	Female	253	68.6%
	Male	116	31.4%
Marital status	Married	213	57.7%
	Single	146	39.6%
	Divorced	7	1.9%
	Widowed	3	0.8%
Education level	Intermediate school	14	2.8%
	High school	54	14.6%
	University	270	73.2%
	Postgraduate study	31	8.4%
Employment status	don't work	95	25.7%
	Student	108	29.3%
	Employee	139	37.7%
	Retired	22	6.0%
	Other	5	1.4%

Table 1 Depicts the distribution of the contributors' demographic characteristics. Among the 369 participants, slightly over 40% were in the age group 20 to 30 years, almost two-thirds (68.6%) were females, more than half (57.7%) were married, over 70% had completed university education, and more than one-third were employees.

Table 2. The distribution of respondents' knowledge of vitamin D

Items	No		Yes	
	No	%	No	%
Do you stay mainly indoors away from sunlight?	73	19.8	296	80.2
Do you like to have contact with the sun	201	54.5	168	45.5
Do you think you have enough exposure to sunlight	276	74.8	93	25.2
Do you use sunscreen products containing SPF > 15?	236	64.0	133	36.0
Have you ever heard of VD?	7	1.9	362	98.1
VD builds Bone and teeth	21	5.7	348	94.3
VD build immunity	30	8.1	339	91.9
VD Strengthen the muscle	38	10.3	331	89.7
VD Enhance calcium absorption	83	22.5	286	77.5

The source of VD is Sunlight	22	6.0	347	94.0
The sources of VD are Vegetables	120	32.5	249	67.5
The sources of VD are Dairy products	176	47.7	193	52.3
The sources of VD are Vitamin supplements	75	20.3	294	79.7

Participants' responses regarding their knowledge of vitamin D are shown in **Table 2**. Unfortunately, the majority of the participants (80.2%) stay most of the time indoors, away from the sunlight. Less than half (45.5%) prefer exposure to sunlight, and only a quarter (25.2%) believes that they get enough sunlight exposure. Almost all respondents (98.1%) mentioned they had heard of VD and about one-third (36%) use sunscreen products.

In terms of participants' knowledge of VD benefits, the study revealed that the majority (94.3%) believe VD builds bones and teeth, followed by enhancing immunity (91.9%), strengthening the muscles (89.7%), and helping calcium absorption (77.5%). Regarding the participants' knowledge of VD sources, most participants (94%) believe that sunlight is a good source, followed by; VD supplements in nearly eighty percent (79.7%), vegetables in about two-thirds (67.5%), and dairy products in slightly more than half (52.3%) [17].

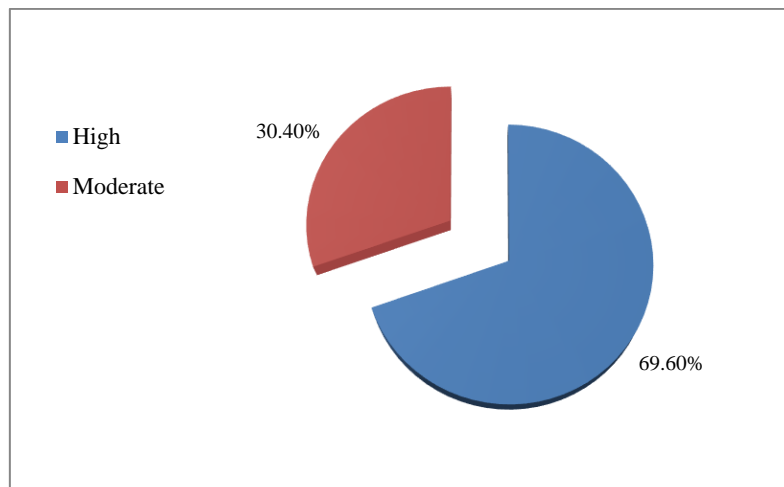


Figure 1. The level of participants' knowledge of VD

In terms of knowledge scale, over two-thirds (69.6%) of respondents reported a high level of VD knowledge, according to **Figure 1**.

Table 3. Distribution of participants' attitudes towards VD

	Strongly Disagree		Disagree		Undecided		Agree		Strongly agree	
	No	%	No	%	No	%	No	%	No	%
Large doses of VD are good for health.	148	40.1	148	40.1	34	9.2	19	5.1	20	5.4
Use of VD without a physician's prescription can be a cause of overdose of VD.	12	3.3	30	8.1%	35	9.5	141	38.2	151	40.9
The use of a short course of VD can help in making bones strong	8	2.2	106	28.7	141	38.2	87	23.6	27	7.3
Exposure to sunlight for 30 minutes can give adequate daily intake of VD.	4	1.1	24	6.5%	78	21.1	183	49.6	80	21.7
It is necessary to undergo a VD test at regular intervals.	3	0.8	13	3.5%	34	9.2	182	49.3	137	37.1
When I feel joint pains, VD helps me to get better more quickly	35	9.5	95	25.7	114	30.9	79	21.4	46	12.5
I should take VD very often to prevent getting an infection	42	11.4	111	30.1	98	26.6	78	21.1	40	10.8
VD is recognized as an important means of prevention of osteoporosis and fractures	7	1.9	28	7.6	61	16.5	154	41.7	119	32.2

Table 3 highlights the participants' attitudes toward VD. Most participants (80.2%) disagree that large doses of VD are beneficial to health; slightly less than 80% agree that the use of VD without a physician's prescription can result in VD overdose; approximately one-third believe that use of a short course of VD can help make bones strong. Over two-thirds agree that 30 minutes of sunlight exposure can provide an adequate daily intake of vitamin D; the majority agree (86.4%) that regular

investigation of vitamin D is necessary; and one-third agree to use vitamin D for complaining of bone aches and for infection prevention. Approximately two-thirds of respondents agree that taking VD prevents osteoporosis.

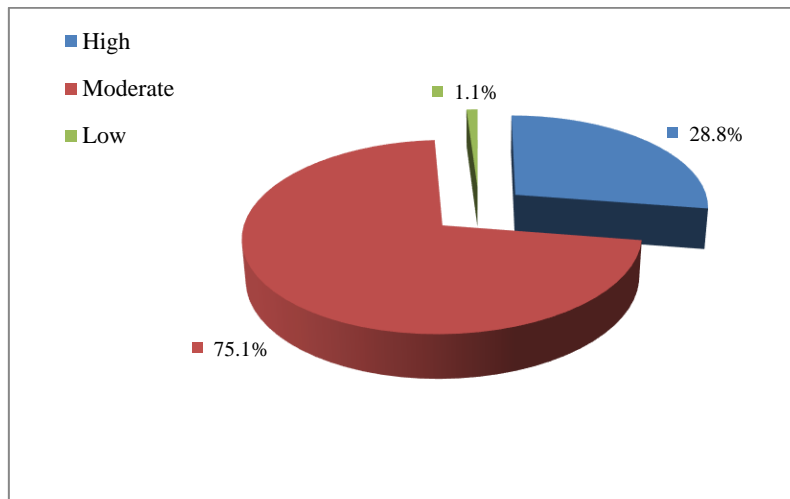


Figure 2. The level of participants' attitudes toward vitamin D

Considering the respondents' attitude scale about vitamin D, 75 percent of them indicated a moderate level as shown in **Figure 2**.

Table 4. Distribution of respondents' responses to practices of vitamin D

Items	no		yes	
	No	%	No	%
Did you take a VD supplement during the coronavirus outbreak	241	65.3%	128	34.7%
Did you take VD supplements whenever you get any sickness?	295	79.9%	74	20.1%
Do you get blood tests done for VD level	104	28.2%	265	71.8%
Do you buy VD in the dose previously given by the doctor?	61	16.5%	308	83.5%

The distribution of respondents' responses on their VD practices is shown in **Table 4**; According to the study findings, slightly more than one-third (34.7%) used VD supplements during the Coronavirus outbreak, one-fifth used them while sick, more than two-thirds checked their VD levels before consuming it, and 83.5% purchased VD per the dosage recommended by a physician [18].

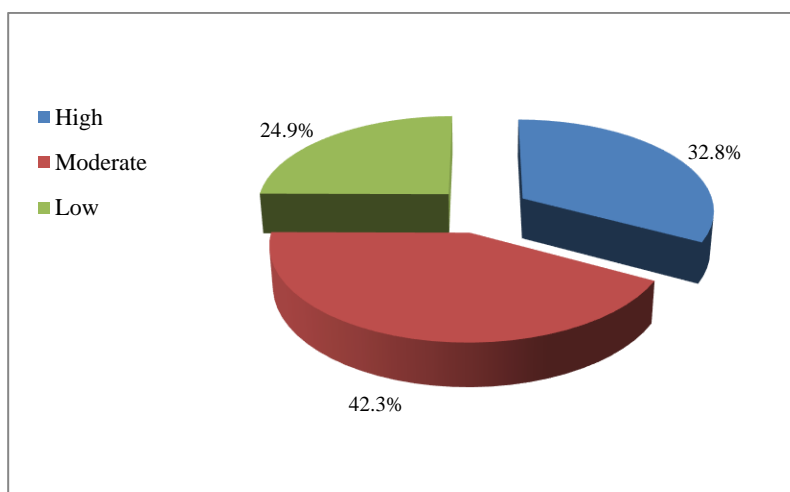


Figure 3. The level of participants' practices of Vitamin D

Figure 3 the level VD practices indicate that more than forty percent have a moderate level.

VD insufficiency has become a worldwide issue. According to the current study, there is a high level of VD knowledge. The majority of respondents had restricted sunlight exposure, which is the primary source of VD. This could be the major cause of VD deficiency among them. More than half stated that they disliked being exposed to direct sunlight, which may be attributed

to cultural norms and Saudis' primarily indoor lifestyle [19]. A Chinese survey indicated that 62.3% of respondents disliked being exposed to sunlight [20].

Sunscreen was found to be used by more than one-third of the participants. In our study, this might have limited the skin's ability to produce VD. A study conducted in the United Arab Emirates (UAE) by Ibrahim *et al.* (2019), found that 37% of the participants used sunscreen [21]. Holman *et al.*'s study in the United States of America showed that 20% of the studied population believed that using sunscreen regularly prevents them from acquiring adequate VD [22].

Most participants believe that VD is necessary for healthy teeth and bones, as well as for improving immunity, muscle strength, and calcium absorption. This agrees with a related study carried out in Saudi Arabia [12, 23] and Gagnon *et al.* in Australia [24]. Sun exposure is an essential source of VD [25]. Almost all the participants state that sunlight is the primary source of VD, which is consistent with similar research employed in Al-Madinah Al-Munawwarah, Saudi Arabia [26]. Findings from the UAE survey recorded that, only 21% of respondents knew that the sun was the principal source of VD [21]. Some foods naturally contain VD. Vegetables are mentioned most often as dietary sources of vitamin D, followed by dairy products. Ibrahim *et al.* in the UAE found that one-third of the respondents listed dairy products as a food source [21]. Over two-thirds of the participants have a high overall level of VD knowledge. This is consistent with similar Saudi Arabian studies [12, 26, 27].

Most of the participants agree that using VD without a prescription can result in an overdose; they disagree that an overdose is healthy; and slightly less than one-third agree that a short course will improve bone strength. These findings are critical in preventing VD overdose and toxicity, which usually arise as a result of excessive VD dosage [28]. According to Abukhelaif *et al.* in Al-Baha, Saudi Arabia, around 50% of participants are aware that excessive calcium levels in the blood are related to a variety of medical problems [14].

Most respondents think that half an hour of sun exposure is sufficient to supply the body with vitamin D for the prevention of bone diseases and osteoporosis and should be checked regularly, and just one-third agree that it can be used to prevent infection. Consistently with Abdelmuhsin *et al.* in Hail, Saudi Arabia found that 88% of the respondents think that sun exposure is essential for VD synthesis [29], De Martinis in Italy mentioned that deficiency of VD related to osteoporosis and other bone diseases [30].

Approximately one-third of the studied population received VD supplementation during the pandemic of COVID-19 [31]. Meltzer *et al.* in The USA stated that a sufficient amount of VD in serum is related to a significantly lower incidence of COVID-19 infection [32]. A study conducted in England reported that 6% of respondents took an over-the-counter VD supplement [2].

In terms of VD practices, the majority of individuals had their blood tested for VD and received VD as advised by their doctor, indicating a high degree of awareness among them about the necessity of VD [33]. According to Ibrahim *et al.* in the UAE, almost half of the population examined their blood for VD and followed up with their physician after finishing their treatment plan [21]. Furthermore, a study done in the same country found that more than three-quarters of the participants tested for VD and received VD supplements [34].

Conclusion

This study showed that the participants had a high level of vitamin D knowledge and attitudes. Even though the majority of participants were aware of the sources, benefits, and risks of a vitamin D overdose, the majority of them did not participate. However, the majority of them spend most of their time indoors due to cultural considerations, which reduce the production of vitamin D.

Recommendation

To raise awareness and close this gap regarding the benefit of sun exposure, a coordinated effort is needed from the healthcare professionals and other members of the community.

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Conflict of interest: None

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Ethics statement: The research proposal was submitted and Approved by the local bioethical committee, Northern Border University, (NBU), Saudi Arabia, decision no. 2/44/H Dated 11-09-2022. All subjects in the study provided informed consent.

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