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Knowledge, Attitude and Practices Concerning Vitamin D Deficiency among Women Residing in Lucknow City

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Knowledge, attitude, practice, Vitamin D deficiency, women, Lucknow

ABSTRACT:

Introduction: Despite abundant sunlight in India and many other nations, Vitamin D deficiency is a serious health risk. Osteoporosis, poor mineral absorption, poor metabolism of calcium and phosphorus, and other health issues are brought on by vitamin D deficiency. Vitamin D insufficiency is more common in women in India, particularly those with low socioeconomic status, living in a rural area, dress conservatively, and in extreme temperature area.

Objectives: objective of this study was to evaluate the knowledge, attitude, and practices regarding Vitamin D among women residing in Lucknow city

Methods: For this study, there is total sample size of 216 samples taken of age group of women participants from 18 years to 50 years. Their written consent for the purpose also taken by explaining everything to them

Results: As per the results, all the selected participants were less known about the deficiency of Vitamin D. Only few of the participants knew about the deficiency of Vitamin D and sun exposure but their knowledge was very limited. These results showed that the practice of Vitamin D and knowledge, attitude had created a major impact on Serum Vitamin D levels. Knowledge: 40% of women had low knowledge, 34.3% moderate, and only 6.7% high. Major differences were found between the low and both moderate/high groups. Attitude: 65.7% had a negative attitude; only 34.3% had a positive one. Positive attitudes scored significantly higher than negative ones. Practice: 68.8% had poor practices, 24.5% satisfactory, and 6.7% excellent. Most participants had low to moderate knowledge, a negative attitude, and poor implementation of Vitamin D-related practices.

Conclusions: Most participants had low to moderate knowledge, a negative attitude, and poor implementation of Vitamin D-related practices. The study suggested the need for targeted educational campaigns, behavior change interventions, and policy-level actions to improve Vitamin D awareness.

1. Introduction

From the past few years, the interest and knowledge of Vitamin D has considerably increased, mainly, when it has become the cause of several diseases. At the present time, the function of Vitamin D is mainly as a hormone in the body in wide range of pathological and physiological processes relating to numbers of human organs and systems. A basic level of Vitamin D is very necessary to have a healthy bone and its formation and it's also results into preventive effect against several bone manifestations for intestinal absorption of dietary calcium and phosphorus [2,4,11]. A lack of vitamin D has also been associated with several non-skeletal disorders including cancer, diabetes, hypertension, and autoimmune diseases. As per the findings, out of 1 billion people worldwide suffer from the deficiency of the Vitamin D [13]. Some of the global reports also shows that the deficiency of Vitamin D ranges from 20 percent to 90 percent in most of the countries like South America, India, Africa, Australia, Labanon and Turkey [5,8]. UVB

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rays are the main source of the vitamin D and it produced when skin get exposed to UVB rays. It is the primary source of several factors such as age, colour, skin and time of day, which affect the rate at which 7-dehydrocholesterol converts to vitamin [3]. Due to the perfect geographical location of India, plenty of sunshine all year round. Still subsequent reports of deficiency of Vitamin D rises in women, children and urban populations (defined as serum 25-hydroxyvitamin D (25OHD) < 20 nmol/L) [6,7]. There are two types of vitamin D available. Fungi and plant sources of vitamin D2 (ergocalciferol) and animal sources of vitamin D3 (cholecalciferol). When 7-dehydrocholesterol, the precursor of vitamin D3, is exposed to UV light (wavelengths 290–320 nm) in the skin, or when oil-rich fish is consumed, vitamin D3 is formed [4]. Maintenance of normal health and well-being largely depends on sun exposure and proper understanding of vitamin D. Several risk factors for deficiency of Vitamin D reported like gender, season, working pattern, clothing style, low socioeconomic level, etc [1,2]. Even with the major prevalence of deficiency of the vitamin D, there is negligible awareness and knowledge found in the general population. [3,10]. For the need of exposure of sunlight, Vitamin D, many initiatives now needed to increase awareness in people. For that reason, it is very important to evaluate the KAP trends of the general population for vitamin D and to evaluate and correlate blood vitamin D levels with lifestyle management, sun exposure, knowledge, attitude, and practice scores in the local community [9,12].

Objectives

The main objective of this study was to evaluate the knowledge, attitude, and practices regarding Vitamin D among women residing in Lucknow city.

2. Methods

Study Design and Sample Size

Data were gathered online and offline using a self-developed, standardized questionnaire as part of a cross-sectional study design. To identify vitamin D deficiency, participant's serum vitamin D levels were also measured. This study was basically conducted in the F&N Department (Food and Nutrition) at Era University, Lucknow, Uttar Pradesh from October 2023 to January 2023. A standardized questionnaire was administered among the respondents through both face-to-face and email communication, evaluating the general public's knowledge, attitude, and practices about Vitamin D deficiency.

Using SPSS software and the guidance of the university's statistician, the sample size for this study was determined. A total of 216 sample sizes were calculated by using Fisher’s formula which includes the current prevalence rate of vitamin D deficiency and a 95% confidence level with a 5% margin error.

Before initiating the research study, ethical approval for human subjects was assimilated from the Institutional Ethical Committee of Era University, Lucknow.

Study Populations

The inclusion criterion for the study sample was female participants residing in Lucknow city aged between 18 and 50 years. Both non-working and working women were selected for this research.

For the present study, 216 women samples were taken of age group 18 to 50 years. Their written consent for the purpose also taken by explaining everything to them. The parameters for selecting participants were the inclusion and exclusion criteria. In order to improve and increase the knowledge and importance of Vitamin D among people, a nutrition session was also held.

Questionnaires were standardized by the trained, semi-trained, and untrained experts of the Era University, Lucknow. A literature study and in-depth interviews developed a total of 36 questions of vitamin D related KAP study, which had different subscales: general information, and participants' knowledge, attitudes, and practices towards Vitamin D.

DATA ANALYSIS

In order to examine the relation between knowledge, attitude, and practice related to Vitamin D, a precise statistical analysis of the collected data was performed. Graphical representations were provided to visually support the findings.

1. Knowledge Level Analysis

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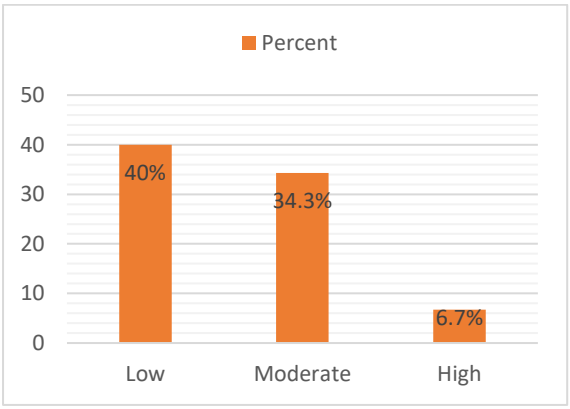

Figure 1: Participants' Knowledge of Vitamin D

The majority (**40.0%**) of participants exhibited a low level of knowledge, while **34.3%** had moderate knowledge and only **6.7%** displayed high knowledge. This indicates a considerable gap in knowledge dissemination regarding Vitamin D.

Table 1. Mean Scores and Standard Deviations Across Low, Moderate, and High Levels

Level	N	Mean	SD
Low	62	11.90	3.80
Moderate	36	14.10	3.60
High	7	15.00	3.00

The data showed mean scores across three levels (Low, Moderate, High). Participants in the **Low group (N=62)** had the lowest mean score (**M=11.90, SD=3.80**). The **Moderate group (N=36)** showed a higher mean score (**M=14.10, SD=3.60**), while the **High group (N=7)** recorded the highest mean (**M=15.00, SD=3.00**).

2. Attitude Analysis

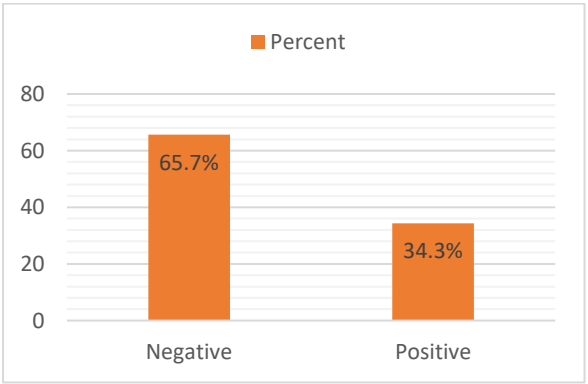

Figure 2. Participants' Attitude Towards Vitamin D

Figure 2 presents participants' attitudes toward vitamin D. The majority of participants exhibited a **Negative attitude (≈65%)**, while only about **35%** demonstrated a **Positive attitude**.

Table 2. Mean Scores and Standard Deviations by Attitude (Negative vs. Positive)

Attitude	N	Mean	SD
Negative	69	11.30	3.80
Positive	36	14.70	3.80

The results showed mean scores for two attitude groups. Participants with a **Negative attitude (N=69)** reported a lower mean score (**M=11.30, SD=3.80**) compared to those with a **Positive attitude (N=36)**, who had a higher mean score (**M=14.70, SD=3.80**).

3. Practice Analysis

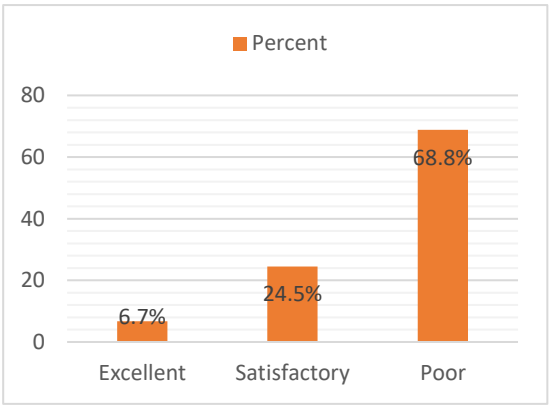

Figure 3. Distribution of Participants According to Vitamin D Practice Levels

Figure 3 illustrates the vitamin D practice levels among participants. A majority of participants reported **Poor practice (≈69%)**, indicating limited or inadequate behaviors related to vitamin D. About **25%** of participants demonstrated **Satisfactory practice**, while only a small proportion (**≈7%**) reported **Excellent practice**.

Table 3. Descriptive Statistics (N, Mean, and Standard Deviation) of Scores by Practice Level

Practice	N	Mean	SD
Excellent	7	14.90	4.40
Satisfactory	26	12.70	3.20

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Poor	72	10.70	3.90

The data revealed differences in mean scores across three practice levels. Participants with **Excellent practice (N = 7) obtained the highest mean score (M = 14.90, SD = 4.40**). Those with **Satisfactory practice (N=26)** had a moderate mean score (**M=12.70, SD=3.20**), while participants with **Poor practice (N=72)** reported the lowest mean score (**M=10.70, SD=3.90**).

Table 4: Demographic Characteristics of Participants

General Characteristics	N (216)	Percentage
Education		
Intermediate	27	12.5%
Graduate	44	20.4%
Post Graduate	85	39.4%
Ph.D	20	9.3%
Professional	34	15.7%
High School	6	2.8%
Religion		
Hindu	105	52.0%
Muslim	100	47.6%
Christian	3	1.4%
Sikh	2	1.0%
Profession		
Doctor	12	5.7%
IT Sector	12	5.7%
Faculty	21	10.0%
Banking	9	4.3%
Student	45	21.4%
Research Scholar	20	12.4%
Dietitian	12	5.7%
Other	14	6.7%
NA	65	31.0%
Monthly Income		
< 5000	5	2.4%
5000–10000	0	2.9%
10000–20000	45	21.4%
20000–50000	47	22.4%
> 50000	48	22.9%
NA	65	31.0%

Table 5: Participants' Knowledge, Attitude and Practices Regarding Vitamin D

Question	Response	N	Percent
Participants' Knowledge Toward Vitamin D			
Heard about Vitamin D?	Yes	189	87.5%
	No	12	5.6%
	Maybe	15	6.9%
Sources of Vitamin D?	Yes	125	57.9%
	No	25	11.6%
	Maybe	66	30.6%
Daily requirement of Vitamin D?	Yes	101	46.8%
	No	89	41.2%
	Maybe	26	12.0%
Participants' Attitude Toward Vitamin D			
Question	**Response**	**N**	
Visited the doctor for a Vitamin D test?	Yes	110	50.9%
	No	89	41.2%
	Maybe	17	7.9%
Heard about Vitamin D Fortified foods?	Yes	133	61.6%
	No	11	5.1%
	Maybe	72	33.3%
Does deficiency affect bone & muscle?	Yes	178	82.4%
	No	10	4.6%
	Maybe	28	13.0%
Participants' Practice Regarding Vitamin D			
Question	**Response**	**N**	

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Skin exposure (Clothing style)	Yes	75	34.7%
	No	121	56.0%
	Sometimes	20	9.3%
Prefer using sunscreen?	Yes	93	43.1%
	No	56	25.9%
	Maybe	67	31.0%
Are you taking multivitamins/supplements ?	Yes	78	36.1%
	No	56	25.9%
	Sometimes	82	38.0%
	No	121	85.8%
(N 216)			

Results and Discussion

The study showed major gaps in knowledge, attitudes, and practices (KAP) of Vitamin D, among 216 female of Lucknow. Overall, **40% had low knowledge, 34% moderate, and only 7% high knowledge**, with mean scores ranging from 11.9 to 15.0. On the other hand, **87.5% had heard of vitamin D**, but only a very few of the participants could identify its sources (57.9%) or its daily requirements (41.2%).

Additionally, **65% of the women showed negative attitudes**, and although most participants recognized health impacts (82.4%) and supported fortified foods (61.6%), fewer sought professional guidance—only half had ever tested their vitamin D levels, and 58% had never consulted a dietitian.

69% of the participants reported poor practices, 25% satisfactory, and only 6% excellent. More than half of the participants avoided sun exposure (56%), 43% used sunscreen, and cultural clothing practices further limit skin exposure. Supplement use was also inconsistent, with 36% of participants taking multivitamins daily, 26% never, and 38% taking as per requirement.

Jamil *et al.*, (2019) reviewed that office workers and medical students showed higher knowledge and better practices, whereas women of Lucknow scored a little lower.

Alfadly *et al.,* (2024) reported that cultural and environmental factors of Saudi students were also pertinent, particularly restrictive clothing, fear of getting tanned, and lifestyle limitations. On the other hand, women of Lucknow, due to work profile, religion, and income, had low sun exposure and a covered clothing style.

Dominguez *et al.,* (2021) also reported very little sun exposure among the women employees of Saudi Arabia, whereas women of Lucknow have a moderate sun exposure.

These results highlight a knowledge–practice gap: even though some of the women were aware of Vitamin D's importance. In order to cope with this there is a need for community-level education programmes, intake of fortified foods and supplements prescribed by a doctor, and culturally appropriate ways to increase safe sun exposure.

CONCLUSION

The study showed significant gaps in knowledge, attitudes, and practices regarding vitamin D among women in Lucknow. Despite moderate awareness, negative attitudes and poor practices dominate, largely influenced by cultural norms, limited sun exposure, and low use of fortified foods or supplements. Promoting awareness programs, intake of fortified diets, and encouraging sun exposure are essential to fill the gap between knowledge, attitude, and practices, hence the improvement in Vitamin D status.

FUTURE RECOMMENDATIONS

This research identifies a key knowledge, attitude, and practice gap with respect to Vitamin D among the target population. Filling such gaps through carefully crafted intervention has the potential to enhance not just individual health outcomes but also community-level nutritional and preventive health determinants.

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