

Assessing the Knowledge on Vitamin 'D' Deficiency among Adults in Nellore (Andhra Pradesh)

Smitha PM¹, Katari Kantha²

1. Associate Professor, Dept of Mental Health Nursing, and 2. Associate Professor, Dept of Community Health Nursing,
both at Narayana College of Nursing.

Vitamin D is known as the sunshine vitamin. Phytoplankton, zooplankton and most plants and animals that are exposed to sunlight can produce vitamin D. It is an essential steroid involved in bone metabolism, cell growth, differentiation, and regulation of the minerals in the body. Vitamin D is unique in terms of its metabolism and physiological features and the human reliance on both endogenous production (exposure to UV light) and exogenous sources (diet mainly fortified foods) to meet biological requirements. Vitamin D deficiency (VDD) is epidemic in India despite plenty of sunshine.

Vitamin D maintains blood calcium level in normal range, which is vital for normal function. Breast milk is perfect food, since it contains all nutrients in adequate quantities including vitamin D and calcium. Exclusive breastfeeding is recommended up to six months of age with all its beneficial effects on child survival globally.

Approximately 1 billion individuals worldwide, nearly 15 percent of the world population, are vitamin D deficient or insufficient (< 20 ng/ml or between 20-30 ng/ml, respectively).

Recent studies have revealed that 65-70 percent Indians are vitamin D deficient and another 15 percent are insufficient. For starters, vitamin D is not a simple vitamin. It is a steroid hormone that impacts virtually every cell in the body. It is synthesised in the skin on exposure to sunshine and is needed to absorb calcium and for bone health.

In our country, availability, acceptability and cost of these dietary products limits their widespread use by the general population. This complex interplay between lack of adequate sun exposure, deficient intake and effective food fortification strategies makes Asian Indian population particularly susceptible to vitamin D insufficiency/ deficiency. The study was conducted in urban and rural pregnant subjects at term alkaline phosphate parathyroid hormone, 25-hydroxy vitamin D 25 (OH) D were measured in cord blood of 117 newborns. Mean ma-

ternal serum 25 (OH) D was 14 ± 9.3 ng/ml, and cord blood 25(OH) D was 8.4 ± 5.7 ng/ml. PTH rise was about the normal range when 25 (OH) D was <22.5 ng/ml; 84.3 percent of urban and 83.6 percent of rural women had low 25 (OH) D values. Calcium intake was uniformly low although higher in urban (842 ± 459 mg/d) than in rural (549 ± 404 mg/d) subjects ($p < 0.001$); maternal blood 25 (OD) H correlated positively with cord blood 25 ($r = 0.79$, $p < 0.0001$) and negatively with $r = 3.35$, $p < 0.001$ showing high prevalence of vitaminosis. Dietary deficiency of vitamin D and calcium deficiency were common in developing countries, and associated with viral infection, growth retardation and child mortality. So, the investigator undertook a study to assess the knowledge on vitamin D deficiency among adults in Saraswathi Nagar, Nellore (AP).

Objectives

The study endeavoured to (a) assess the knowledge on vitamin D deficiency among adults, and (b) to find out the association between levels of knowledge on vitamin D deficiency among adults with selected Socio demographic variables.

Operational definitions: Assess: Evaluation of knowledge about vitamin D deficiency; *Adult*: Fully developed and mature person or organism aged from 20-60 years; *Knowledge*: Information or idea that is gained through observation or experience of education regarding vitamin D sources and deficiencies; *Vitamin D deficiency*: Vitamin D deficiency or hypovitaminosis D can result from inadequate nutritional intake of vitamin D or inadequate sunlight exposure in adults if vitamin D intake is <10 mg per day.

Assumptions: Adults may have some knowledge on vitamin 'D' deficiency.

Delimitations: The study is delimited to: (a) adults aged between 20-60 years in Saraswathi Nagar, (b) sample size of 100 adults; (c) adults who were available during the period of data collection.

Review of Literature

Akhtar S (2016) conducted a study on Vitamin D Status in South Asian Populations. The review concluded that global efforts are needed to overcome hypovitaminosis in the region. In addition, dietary diversification, supplementation and fortification of foods with vitamin D, adequate exposure to sunlight, and consumption of animal foods were suggested as viable approaches to maintain 25 (OH) D levels for optimal health.

Rachana Kapoor (2015) assessed vitamin D status of people of slums and its suburbans in Kolkata; 1058 had low vitamin D level, 232 had moderate and 660 had adequate vitamin D level.

Niwas Sanvageot (2015) determined the prevalence of vitamin D deficiency and insufficiency and related risk factors among 1432 healthy adults in Luxemburg; only 17.1 percent of population had a desirable serum 25 (OH) D level, whereas 27.1 percent had inadequate, 40.4 percent the insufficient and 15.4 percent had deficient. Inadequate vitamin D status was highly prevalent among adults in Luxemburg, and associated with specific life style factors.

Lithac R (2014) conducted a study on using mother advocacy group to enhance knowledge and home management of VDD mothers in rural community of Sokato State, Nigeria, on 150 mothers aged 18 - 47 years, with a mean age of 33 ± 7.14 years. Results showed that 90 percent of mothers were not having any knowledge on VDD, 2.5 percent had little knowledge on VDD and 7.5 percent had moderate knowledge. The study found that most of the mothers had poor knowledge regarding VDD.

Alok Sachan et al (2013) assessed prevalence of calcium and vitamin D deficiency among 207 pregnant women and 117 newborns. The result revealed a high prevalence of hypo vitamin D among pregnant women than their new born.

In a systematic study review of nutritional rickets in Ethiopia, Fischer PR et al concluded that the major cause of nutritional rickets in Ethiopian children is lack of exposure to sunshine and inadequate calcium intake. Lack of awareness and traditional beliefs are major cause for not exposing children to sunshine. There is a need for well-designed epidemiological and ecological studies. Studies are required to establish criteria for the diagnosis of clinical and sub clinical rickets, particularly in malnourished children.

The conceptual framework of the study is shown in Fig 1.

Material and Methods

The non-experimental descriptive research design was used for the study; 100 adults were selected by using non-probability convenience sampling technique. The study was conducted in Saraswathi Nagar at Nellore after formal permission from the Medical Officer, Saraswathi Nagar, Nellore (Andhra Pradesh). The purpose of the study was explained to participants in their language and informed consent was obtained from them. The structured questionnaire was administered to determine level of knowledge regarding the vitamin D deficiency among adults.

Inclusion criteria: Adults willing to participate in this study, and residing in Saraswathi Nagar, Nellore were included. *Exclusion criteria:* The people who were not present at the time of data collection.

Research variables: Knowledge on vitamin D deficiency among adults.

Demographic variables: Age, religion, education, occupation, type of diet, family income, area of living, number of children and source of information.

Study tool: The tool for data collection consisted of 2 parts: Part 1: Socio-demographic data, and Part 2: Structured questionnaire to determine level of knowledge regarding the vitamin D deficiency among adults.

Score key: The questionnaire consisted of 35 questions. Each correct answer was rewarded by one mark

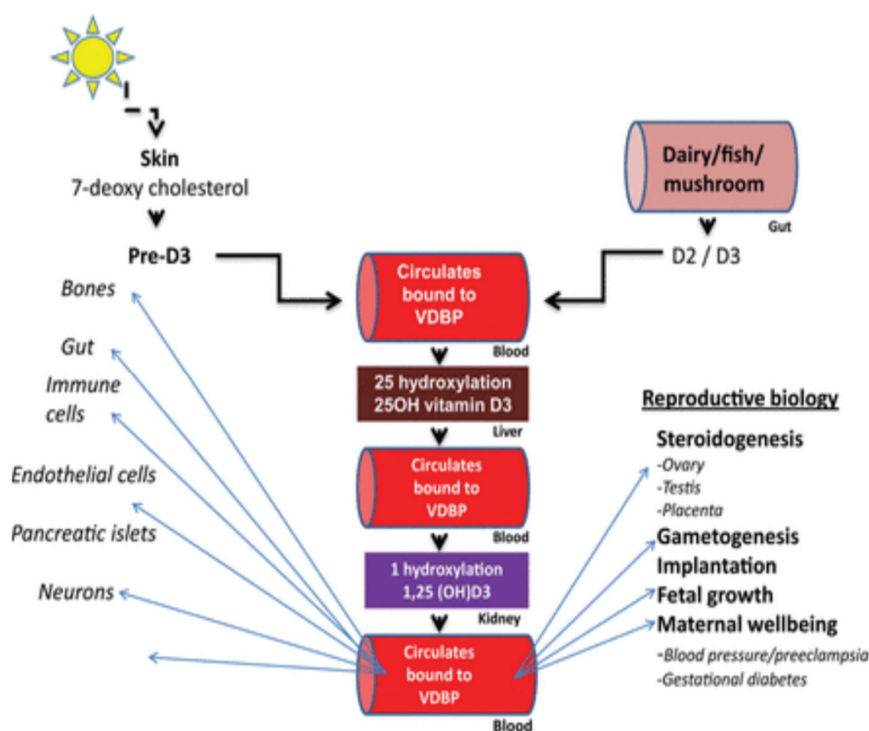


Fig 1: Study model based on Conceptual Framework for Nutrition.

and wrong answer by zero mark. Based on the score, the knowledge level was assessed (Table 1).

Table 1: Score Interpretation

Level of knowledge	Score	Percentage
A+	>33	More than 85
A	32-33	More than 75
B+	26-29	More than 65
B	22-25	More than 55
C	18-21	More than 50
D	1-17	Less than 50

Content validity: The content validity was cleared from experts. The necessary modifications were incorporated based on suggestions given. This tool was tested by the pilot study.

Reliability: The reliability of the tool was established by administering the tool to 10 adults who were not included in the pilot study and who fulfill the inclusion criteria. The reliability value is 0.98 so the tool was found reliable ($R=2r/1+r$).

Feasibility: Feasibility of tool was tested by a pilot study, which showed the tool to be feasible.

Data was collected for a period of 2 weeks from 21 to 26 March 2017 for 100 samples using non-probability convenience sampling technique with minimum of 17 samples per day from 9 am to 1 pm. Written consent was obtained from the samples by explaining the purpose and nature of study assuring anonymity. The sample size was 100 and who fulfilled the inclusion criteria were included in the study. Data was collected using structured questionnaire to assess the knowledge on Vitamin D deficiency among adults; 15 minutes was taken by the investigator for each sample. Data was analysed in terms of objectives of the study using descriptive and inferential statistics and tabulated.

Results

Table 2 shows that with regard to age of adults, 26 (26%) were between 20-30 years, 31 (31%) were between 31-40 years, 27 (27%) between 41-50 years and 16 (16%) were above 50 years. As for religion of adults, 77 (77%) were Hindu, 14 (14%) were Muslim and 9 (9%) were Christian (Table 3).

Table 4 shows that with regard to education level of adults, 14 (14%) were illiterate, 34 (34%) had primary education, 30 (30%) had secondary education and 22 (22%) were graduates. As for occupation, 17 (17%) were government employees, 26 (26%) were private employees, 32 (32%) were self-employees and 25 (25%) were unemployed (Table 5).

Considering the type of diet among adults, 18 (18%) were vegetarians, 21 (21%) were non-vegetarians and 61 (61%) were taking mixed type of diet (Table 6). Regarding family income, 6 (6%) earned upto Rs. 5000, 45 (45%) earned between Rs. 5000 - 7000, 24 (24%) between Rs.7001-10,000 and 25(25%) earned above Rs. 10,000 (Table 7).

Table 8 shows that with regard to area of living, all i.e. 100 (100%) were residing at urban area. Twelve (12%) adults had one child, 67 (67%) had two children, 17 (17%) had three children and 4 (4%) had more than three children (Table 9). Table 10 shows that with regard to source of information among adults, 6 (6%) received from friends, 62 (62%) from health care professionals, 26 (26%) from mass media and 6 (6%) received from non-governmental organisations. Table 11 shows that with regard to level of knowledge regarding vitamin D deficiency among adults 1 (1%) had 'A' grade, 20 (20%) obtained 'B+' grade, 43 (43%) secured 'B' grade, 12 (12%) scored 'C' grade and 24 (24%) had 'D' grade. Mean and standard deviation of level of knowledge regarding vitamin 'D' deficiency among adults was 19.11 and 4.685 respectively (Table 12). Table 13 shows that there is no association between the level of knowledge regarding Vitamin 'D' deficiency among adults with respect to age, religion, education, occupation, type of diet and number of children, and there is association in respect of only two parameters viz. family income and source of information.

Table 2: Frequency and percentage distribution of adults based on age (n=100)

Age	Frequency (f)	Percentage (%)
20-30 years	26	26
31-40 years	31	31
41-50 years	27	27
>50 years	16	16
Total	100	100

Table 3: Frequency and percentage distribution of adults based on religion (n=100)

Religion	Frequency (f)	Percentage (%)
Hindu	77	77
Muslim	14	14
Christian	9	9
Total	100	100

Table 4: Frequency and percentage distribution of adults based on education (n=100)

Education	Frequency(f)	Percentage (%)
Illiterate	14	14
Primary education	34	34
Secondary education	30	30
Graduates	22	22
Total	100	100

Table 5: Frequency and percentage distribution of adults based on occupation (n=100)

Occupation	Frequency (f)	Percentage (%)
Government employee	17	17
Private employee	26	26
Self-employee	32	32
Unemployed	25	25
Total	100	100

Table 6: Frequency and percentage distribution of adults based on type of diet (n=100)

Type of diet	Frequency (f)	Percentage (%)
Vegetarian	18	18
Non-vegetarian	21	21
Mixed	61	61
Total	100	100

Table 7: Frequency and percentage distribution of adults based on family income (n=100)

Family income (Rs)	Frequency (f)	Percentage (%)
<5000	6	6
5001-7000	45	45
7001-Rs.10,000	24	24
>10,000	25	25
Total	100	100

Table 8: Frequency and percentage distribution of adults based on area of living (n=100)

Area of living	Frequency (f)	Percentage (%)
Urban	100	100
Total	100	100

Table 9: Frequency and percentage distribution of adults based on number of children (n=100)

No. of children	Frequency (f)	Percentage (%)
One child	12	12
Two children	67	67
Three children	17	17
More than three children	4	4
Total	100	100

As for level of knowledge regarding vitamin D deficiency, 1 (1%) had 'A' grade, 20 (20%) obtained 'B+' grade, 43 (43%) secured 'B' grade, 12 (12%) scored 'C' grade and 24 (24%) had 'D' grade (Table 11).

Mean and standard deviation of level of knowledge regarding vitamin D deficiency among adults: the mean and standard deviation of level of knowledge regarding vitamin D deficiency among adults, mean is 19.11 with standard deviation of 4.68 (Table 12). Table 13 shows association between level

of knowledge about VDD among adults with demographic variables like age, religion, education, occupation, diet, income etc.

Discussion

Vitamin D plays an important role in the maintenance of one's physiology and health. Nevertheless, only 50 percent of patients were aware of the health implications of vitamin D status, compared with 70 percent of healthy individuals. The present study findings were similar to other studies. Previous study reported that those with more information on the sources of vitamin D were inclined to consume more vitamin D-rich foods and supplements. In this study, we found those with more knowledge were more cautious about intake of vitamin D. Public education regarding the importance of vitamin D and the risk of deficiency may increase concern on serum vitamin D titer at both the population and individual level. This awareness could lead to actions that potentially improve vitamin D levels through food, supplements, and safe sun exposure. There is a lack of studies assessing the value of educational interventions on behavioural change and vitamin D levels.

Earlier studies have relied on open-ended questions, which usually misjudged the participants' knowledge. In this study, we used a multiple-choice

Table 10: Frequency and percentage distribution of adults based on source of information (n=100)

Source of information	Frequency (f)	Percentage (%)
Friends	6	6
Health care professionals	62	62
Mass media	26	26
Non-governmental organisation	6	6
Total	100	100

Table 11: Level of knowledge regarding vitamin D deficiency among adults (n=100)

Level of knowledge regarding vitamin D deficiency	Frequency (f)	Percentage (%)
A	1	1
B+	20	20
B	43	43
C	12	12
D	24	24
Total	100	100

Table 12: Mean and standard deviation of level of knowledge regarding vitamin D deficiency among adults (n=100)

Category	Mean	Standard deviation
Adults	19.11	4.685

Table 13: Association between the levels of knowledge regarding vitamin D deficiency among adults with demographic variables (n=100)

Demographic variables	A		B+		B		C		D		Chi-square
	f	%	f	%	f	%	f	%	f	%	
Age											C=16.176 df=12 p=0.05 t=21.03 NS
a) 20-30 years	-	-	4	4	8	8	3	3	11	11	
b) 31-40 years	-	-	9	9	13	13	4	4	5	5	
c) 41-50 years	-	-	6	6	15	15	2	2	4	4	
d) >50 years	1	1	1	1	7	7	3	3	4	4	
Religion											C=9.38 df=8 p=0.05 t=15.51 NS
a) Hindu	1	1	14	14	33	33	8	8	21	21	
b) Muslim	-	-	2	2	6	6	4	4	2	2	
c) Christian	-	-	4	4	4	4	-	-	1	1	
Education											C=7.88 df=12 p=0.05 t=21.03 NS
a) Illiterate	-	-	4	4	6	6	2	2	2	2	
b) Primary	-	-	6	6	16	16	4	4	8	8	
c) Secondary	-	-	5	5	13	13	5	5	7	7	
d) Graduates	1	1	5	5	8	8	1	1	7	7	
Occupation											C=13.33 df=12 p=21.03 NS
a) Govt employee	1	1	4	4	6	6	-	-	6	6	
b) Private	-	-	5	5	9	9	5	5	7	7	
c) Self	-	-	6	6	19	19	3	3	4	4	
d) Unemployed	-	-	5	5	9	9	4	4	7	7	
Diet											C=2.51 df=8 p=0.05 t=15.51 NS
a) Vegetarian	-	-	2	2	4	4	5	5	7	7	
b) Non-vegetarian	-	-	4	4	9	9	3	3	5	5	
c) Mixed	1	1	14	14	30	30	4	4	12	12	
Family income											C=27.8 df=12 p=0.05 t=21.03 S
a) Rs.<5000	-	-	1	1	2	2	2	2	1	1	
b) Rs.5000-7000	-	-	10	10	24	24	5	5	6	6	
c) Rs.7001-10000	1	1	4	4	12	12	4	4	3	3	
d) Rs.>10,000	-	-	5	5	5	5	1	1	14	14	
Number of children											C=10.99 df=12 p=0.05 t=21.03 NS
a) One	1	1	2	2	4	4	2	2	3	3	
b) Two	-	-	13	13	30	30	6	6	18	18	
c) Three	-	-	4	4	7	7	3	3	3	3	
d) More than Three	-	-	1	1	2	2	1	1	-	-	
Source of information											C=24.99 df=12 p=0.05 t=21.03 S
a) Friends	-	-	1	1	1	1	1	1	3	3	
b) Health care professionals	-	-	14	14	36	36	7	7	5	5	
c) Mass media	1	1	4	4	3	3	3	3	15	15	
d) Non-government organisation	-	-	1	1	3	3	1	1	1	1	

Note: NS – Non-significant, T - Table value, C - Calculated value, S - Significant,

questionnaire. When participants were asked questions in this format, they showed a better knowledge of vitamin D, compared with those who were asked open-ended questions. This demonstrates that the expression of knowledge regarding vitamin D is greatly dependent on the method of questioning. This fact was spotted by Kung & Lee, who interviewed groups of Chinese women aged >50 years using either open-ended questions or prompted responses on vitamin D. They found that the type of questioning played a major role in proportionate outcome of correct responses. Previous studies have demonstrated poor knowledge about vitamin D and its sources. Our study findings establish that majority of adults have inadequate knowledge regarding vitamin D deficiency.

Implications

Vitamin D deficiency is reportedly common world-

wide and has been linked to an increased risk of a wide range of diseases. Low vitamin D status may not be clinically apparent until it is severe. There has been a tendency to recommend high blood levels of vitamin D for optimum health, and such levels can generally only be achieved with supplementation. Patients with risk factors for vitamin D deficiency should have serum 25 (OH) D levels done as part of annual preventive health maintenance.

Recommendations

The findings of this study may be used in health policy-making. Non-government organisations and social workers may collaborate with the government to educate parents and children regarding the uses and benefits of vitamin D. This will help improve overall health among the Nellore population. A study can be conducted among the sample having vitamin D deficiency in multiple settings.

Conclusion

The public should be educated to improve their knowledge, awareness, and attitudes regarding vitamin D and its sources. This information should be provided in conjunction with messages on preventative measures to ensure people do not increase their risk of skin cancer to improve their vitamin D levels through excessive sun exposure.

References

1. Sohi Darshan. Textbook of Nutrition; 2nd edn 2008; Pee Vee, pp 120-35
2. Dordcn Wardlaw. Textbook of Complementary Nutrition; 2nd edn 1994; Mosby Publication, pp 87-100
3. Swaminathan. Textbook of Dietetics; 5th edn 2007; Bangalore Printing, pp 44-49
4. Garshan Sohi. Textbook of Nutrition; 5th edn 2010; Pee Vee Publication, pp 141-74
5. Garrow JS. Textbook of Human Nutrition and Dietetics; 10th edn 2000; Churchill Livingstone, p 211
6. Kantha Katari. Spirulina the best food for future. www.scopemed.org/mno=228758 [Access: September 26, 2016]
7. Kantha Katari. Human milk banking. www.scopemed.org/mno=229095 [Access: September 26, 2016]
8. Arumugam Indira, Katari Kantha. Nutritional status of antenatal and postnatal mothers in selected rural areas at Nellore. *International Journal of Recent Scientific Research* 2015; 6(2): 2796-2800