



# Knowledge, Attitudes and Practices Regarding Vitamin-D Deficiency amongst Adults

Baldev Negi\*, Sakshi Garg

Department of Physiotherapy, MVN University, Haryana, India

## ABSTRACT

Hypovitaminosis-D is a major health concern worldwide leading to certain musculoskeletal disorders like osteoporosis. The main dietary goal for these individuals is to obtain adequate nutrition to optimize health by maintaining the levels of vitamin-D in the body. The present study was aimed to assess the knowledge, attitude and practice regarding vitamin-D deficiency amongst adults. Individuals diagnosed with hypovitaminosis-D were recruited in the study. The participants were the residents of the Ballabhgarh area of Faridabad district in the state of Haryana. The age group of participants was in between 40 to 60 years. A total of 30 individuals were selected in which 15 were males and 15 were females. The Knowledge, Attitude and Practices (KAP) questionnaires contained three questions about knowledge about the disorder, six questions about attitudes and seven questions about practices were collected from the individuals fulfilling inclusion criteria. The result of the present study shows lack of knowledge among the participants and improper attitude as the percentage of correct responses were less. The practices followed by the hypovitaminosis-D patients were low exposure to sunlight and consuming food which were not rich in vitamin-D. They were not consuming supplements. This KAP study concludes that there is lack of knowledge regarding this disorder, adverse attitudes towards this disorder and inadequate dietary practices and lifestyle practices. Lack of awareness was also founded and inadequate exposure to the sunlight and reduced motivation to take supplements or multivitamins.

**Keywords:** Hypovitaminosis-D affected individuals; Attitudes; Knowledge; Dietary practices; Osteoporosis

## INTRODUCTION

Vitamin-D is also known as the “sunshine vitamin” and plays a crucial role in the community health [1-3]. It is necessary for the optimum growth and development of muscle throughout the life [4-7]. It aids in the prevention of cardiovascular diseases and oncologic disorders [8].

In order to prevent the deficiency of vitamin D, an individual should take 15 to 20 minutes of sunbath every day [9]. Hence, the exposure to the sunlight is the main source of vitamin D. Consumption of vitamin D rich foods like beef liver, mushrooms, fatty fish and egg yolk are also able to prevent the deficiency of this vitamin. Fortified foods or supplements can also increase the concentration of vitamin D in the body [10-13].

Besides knowing these benefits people should maintain the levels of vitamin D in the body, there are more than a billion people suffering from vitamin D deficiency or insufficiency worldwide [14]. Within a global perspective vitamin D deficiency is a major health problem and it remains endemic even with all the advancement in medical sector over the last century.

There are different factors which affects the synthesis of vitamin D in our body which includes age, use of sunscreen, clothing practices and geographical location [15]. Populations living in high latitudes have a high level of vitamin D deficiency [16]. Vitamin D deficiency is one of the common nutrition related disorder resulting from a varied range of factors including improper nutrition, reduced synthesis of vitamin D by the skin, inadequate ultraviolet radiation *via* sunlight, certain medications

**Correspondence to:** Baldev Negi, Department of Physiotherapy, MVN University, Haryana, India; E-mail: baldev.negi@mvn.edu.in

**Received:** 20-Jan-2023, Manuscript No. JNDT-23-19616; **Editor assigned:** 23-Jan-2023, PreQC No. JNDT-23-19616 (PQ); **Reviewed:** 06-Feb-2023, QC No. JNDT-23-19616; **Revised:** 05-Apr-2023, Manuscript No. JNDT-23-19616 (R); **Published:** 12-Apr-2023, DOI: 10.35248/2161-0509.23.13.242

**Citation:** Negi B, Garg S (2023) Knowledge, Attitudes and Practices Regarding Vitamin-D Deficiency amongst Adults. J Nutr Disorders Ther. 13:242.

**Copyright:** © 2023 Negi B, et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

like anti-convulsants and co-morbid diseases like coeliac spruce [17]. There are several reasons which contribute towards the development of vitamin D deficiency in the young adults. There is low intake of vitamin D in the young adults; for instance below the recommended dietary intake of 200 IU/d [18]. Young adults often spend less time in the sunlight now a days compared to young adults 10 years ago [19]. Vitamin D synthesis is constantly eliminating and decreasing due to the increase in the topical application of the sunscreen to reduce the risk of skin damage or cancer [20]. Consumption of carbonated beverages in place of milk by the young adults also leads to decrease in the intake of both vitamin D and calcium thus leading to enhanced risk of fracture. There is mounting evidence that young adults are at risk for vitamin D deficiency. There is dearth of research evidence regarding the evaluation of vitamin D status in the adults. The main objectives of the present questionnaire study seeks to assess the knowledge and attitude regarding the vitamin D deficiency amongst the adults and to assess the dietary practices towards the recommended dietary intake among the hypovitaminosis D affected individuals. This study will also evaluate the risk of hypovitaminosis D amongst adults.

## MATERIALS AND METHODS

### Study design

Questionnaire based study.

### Study center

The study was conducted at mendiratta diagnostic and rehabilitation centre, mohna road, Ballabhgarharea of Faridabad district located in the state of Haryana.

### Inclusion criteria

- 40-60 years.
- Hypovitaminosis-D diagnosed individuals.

### Exclusion criteria

Pre-existing conditions affecting vitamin-D and or calcium metabolism including:

- Liver disease.
- Kidney disease.
- Eating disorders.
- Skin diseases.
- Use of certain medications like oral corticosteroids, anticonvulsants, insulin or bisphosphonate.

### Sample size

A total of 30 participants were included in the study.

### Sampling

Convenient sampling was utilized in this study.

### Data collection

KAP (Knowledge, Attitudes and Practice) questionnaire was used. The questions in the knowledge questionnaire were closed ended. Aspects that were covered were knowledge and understanding of the topics: Vitamin D, vitamin D deficiency, sun-exposure, supplementation and fortification. Attitude was assessed using a likert scale with responses ranging from strongly agree to strongly disagree on a five point scale. Scoring shall be in a range of +2 to -2. Hypovitaminosis-D diagnosed was asked to answer the questions orally and the questionnaire will be filled based on their given answers. Practice questionnaire was open-ended. The questionnaire designed to obtain the participant response will be based on following aspects: Exposure to sunlight, dietary habits and supplementation of vitamin D.

### Tools and techniques

Three questionnaires' was utilized in this study.

**Knowledge of the hypovitaminosis D individuals:** It was assessed through knowledge questionnaire. It involves questions related to:

- Awareness regarding vitamin D.
- Knowledge regarding hypovitaminosis-D.

**Attitude of the hypovitaminosis D individuals:** It was assessed through attitude questionnaire. It comprises questions related to:

- Diet followed by such individuals.
- Pre-disposing factors assessment.

**Practices followed by the hypovitaminosis D individuals:** It was assessed through food frequency questionnaire. It will be including questions related to:

- Frequency of feeding.
- Different food groups administered.
- Exposure to the sunlight.
- Consumption of multivitamins.

Participant's responses were obtained through this questionnaire which was closed ended in the format of multiple choice questions.

The questions in the knowledge questionnaire was closed ended. Attitude was assessed using a likert scale with responses ranging from strongly agree to strongly disagree on a five point scale. Questionnaires were distributed to the participants and information was gathered. Appropriate statistical tools (calculation of mean, percentage etc.) were utilized for the analysis of the collected data.

### Procedure

All the participants were recruited based upon the inclusion and exclusion criteria. Informed consent form was signed by them. Demographic data was collected and then KAP questionnaire was filled by them. One to one interview was conducted to collect the data. Data was analyzed by appropriate statistical tools like calculation of mean, percentage etc. If the participant

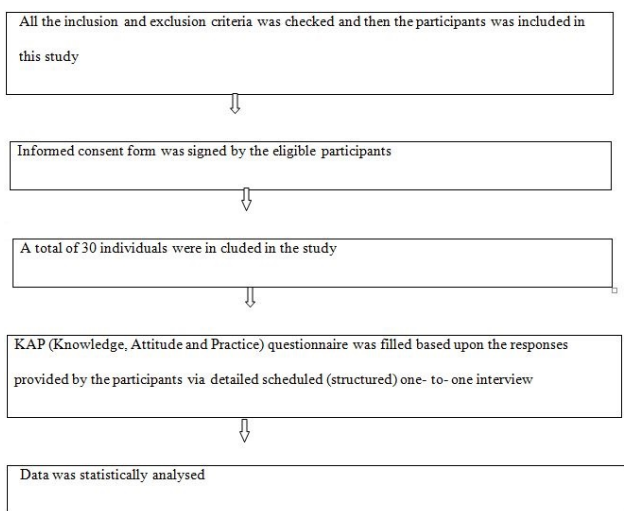
is illiterate questions were dictated in front of them and questionnaire was filled based upon their answers.

### Outcome measure

- Knowledge regarding vitamin D deficiency.
- Attitudes towards these disorders.
- Practice followed by the individuals with vitamin D deficiency.

### Variables in the study

- Nutritional habits.
- Sun-seeking habits.
- Attitude/knowledge regarding vitamin D deficiency.
- Protocol.



**Table 1:** Knowledge of hypovitaminosis-D individuals regarding this disorder.

| S. No. | Aspect                                              | Response (percentage ) |
|--------|-----------------------------------------------------|------------------------|
| 1      | Knowledge regarding vitamin-D                       |                        |
|        | (A) Yes                                             | A=10 (33.33)           |
|        | (B) No                                              | B=20 (66.66)           |
| 2      | Knowledge regarding vitamin-D deficiency            |                        |
|        | (A) Yes                                             | A=09 (30.00)           |
|        | (B) No                                              | B=21 (70.00)           |
| 3      | Knowledge regarding management of hypovitaminosis-D |                        |
|        | (A) Dietary modification                            | A=23 (76.66)           |
|        | (B) Dietary modification and lifestyle modification | B=07 (23.33)           |

### Attitude questionnaire

Table 2 summarizes the participant’s responses to the attitude questionnaire. According to the responses 00.00% (n=00) strongly disagree, 40.00% (n=12) disagree, 06.66% (n=02) have no response, 50.00% (n=15) agree, 03.33% (n=01) strongly agree

## RESULTS

### Participant’s characteristics

30 participants were recruited in the study. The mean age (SD) of participants was 48.33 years. The female participants were 50.00% (n=15) and male participants were 50.00% (n=15). Mean serum 25 (OH) D levels were 7.2 nmol/ L.

### Knowledge questionnaire

Table 1 summarizes the participant’s responses to the knowledge questionnaire. Participants reported that 33.33% (n=10) possess the knowledge regarding vitamin D and 30.00% (n=09) have the knowledge regarding the hypovitaminosis of vitamin D. 76.66% (n=23) have perception that dietary modification is essential for management of hypovitaminosis-D while 23.33% (n=07) have the perception that dietary modification along with lifestyle modification is essential for the management of hypovitaminosis-D.

regarding the fact that exposure to sunlight can help in preventing hypovitaminosis-D. 06.66% (n=02) strongly agree, 56.66% (n=17) disagree, 03.33% (n=01) have no response, 06.66% (n=06) agree, 13.33% (n=04) strongly agree regarding the fact that vitamin D deficiency can lead to a variety of musculoskeletal disorders like osteoporosis. In order to maintain

the optimal level of vitamin D, I should take sunbath, eat food rich in vitamin D like milk, cod-liver oil or omega-3 fatty acids (fish oil) the participants reported following data 00.00% (n=00)strongly agree, 50.00% (n=15) disagree, 10.00% (n=03) have no response, 33.33%(n=10.00) agree, 06.66% (n=2) strongly agree. 06.66% (n=02) strongly agree, 43.33% (n=13) disagree, 13.33% (n=04) have no response, 30.00% (n=09) agree, 06.66% (n=02) strongly agree regarding the fact that administration of multivitamins in the management of hypovitaminosis-D. 03.33% (n=1) strongly agree, 53.33% (n=16)

disagree, 16.66% (n=05) have no response, 26.66% (n=08) agree, 00.00% (n=00) strongly agree regarding the fact that vitamin D deficiency is related to ethnic background. 00.00%(n=00) strongly agree, 40.00% (n=12) disagree, 16.66% (n=05) have no response, 36.66% (n=11) agree, 06.66% (n=02) strongly agree with respect to the fact that vitamin-D deficiency can occur due to altered liver or kidney metabolism.

**Table 2:** Attitude of hypovitaminosis-D individuals regarding this disorder.

| Fact                                                                                                                                                                                 | Strongly disagree response (percentage) | Disagree response (percentage) | No response (percentage) | Agree response (percentage) | Strongly agree response (percentage) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------|--------------------------|-----------------------------|--------------------------------------|
| Exposure to sunlight can help in preventing hypovitaminosis-D.                                                                                                                       | 00 (00.00)                              | 12 (40.00)                     | 02 (06.66)               | 15 (50.00)                  | 01 (03.33)                           |
| Vitamin D deficiency can lead to a variety of musculoskeletal disorders like osteoporosis.                                                                                           | 02 (06.66)                              | 17 (56.66)                     | 01 (03.33)               | 06 (06.66)                  | 04 (13.33)                           |
| In order to maintain the optimal level of vitamin D, sunbath should be taken and food rich in vitamin D like milk, cod-liver oil omega-3 fatty acids (fish oils) should be consumed. | 00 (00.00)                              | 15 (50.00)                     | 03 (10.00)               | 10 (33.33)                  | 02 (06.66)                           |
| Administration of multivitamins in the management of hypovitaminosis-D.                                                                                                              | 02 (06.66)                              | 13 (43.33)                     | 04 (13.33)               | 09 (30)                     | 02 (06.66)                           |
| Vitamin D deficiency is related to ethnic background.                                                                                                                                | 01 (03.33)                              | 16 (53.33)                     | 05 (16.66)               | 08 (26.66)                  | 00 (00.00)                           |
| Vitamin D deficiency can occur due to altered liver or kidney metabolism.                                                                                                            | 00 (00.00)                              | 12 (40.00)                     | 05 (16.66)               | 11 (36.66)                  | 02 (06.66)                           |

Table 3 summarizes the correct response percentage regarding the vitamin D facts. The statements included in the attitude test were based on certain common beliefs, tradition, dietary facts of hypovitaminosis-D individuals. About 50.00% of vitamin D deficiency affected individuals agreed the attitude that exposure to sunlight can help in preventing hypovitaminosis-D, 36.66% agreed the statement of susceptibility of hypovitaminosis-D with altered liver or kidney metabolism, 33.33% agreed regarding the fact that sunbath, food rich in vitamin-D like milk, cod-liver oil or omega-3 fatty acids (fish oil) can help in maintaining the

optimal level of vitamin D, 30.00% agreed to statement that administration of multivitamin can help in the management of hypovitaminosis-D, 26.66% agreed to the statement of that vitamin-D is related to ethnic background. Only, 20.00% of them agreed to the statement that vitamin-D deficiency can lead to musculoskeletal disorders like osteoporosis.



**Table 3:** Common beliefs, tradition and dietary facts of hypovitaminosis-D individuals regarding this disorder.

| S. No. | Statements                                                                                                                                                         | Correct response (percentage correct ) |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| 1      | Exposure to sunlight can help in preventing hypovitaminosis-D.                                                                                                     | A 15 (50.00)                           |
| 2      | Vitamin-D deficiency can lead to a variety of musculoskeletal disorders like osteoporosis.                                                                         | A 06 (20.00)                           |
| 3      | In order to maintain the optimal level of vitamin-D, I should take sunbath, eat food rich in vitamin-D like milk, cod-liver oil or omega-3 fatty acids (fish oil). | A 10 (33..33)                          |
| 4      | Administration of multivitamins should be done to manage the hypovitaminosis-D.                                                                                    | A 09 (30.00)                           |
| 5      | Vitamin-D deficiency is related to ethnic background.                                                                                                              | A 08 (26.66)                           |
| 6      | Vitamin-D deficiency can occur due to altered liver or kidney metabolism.                                                                                          | A 11 (36.66)                           |

### Practices questionnaire

Table 4 summarizes the response of participants in dietary practices questionnaire. Participants reported drinking an average of 1.46 glass servings of milk per day. Consumption of multivitamins on daily basis was founded in 40.00% (n=12) of subjects. 36.66% (n=11) consumed an additional vitamin D supplement and 16.66% (n=05) reported the use of cod-liver oil

daily. Mean vitamin D intake of the individuals *via* milk was IU and through supplements was IU daily. Sun tanning was reported by 13.66% (n=04) of participants and sunscreen use was reported by 13.33% (n=04). 30 minutes of sun exposure daily was reported by 00.00% (n=00). Tanning booth use in the past year was reported by 13.33% (n=04).

**Table 4:** Dietary practices of hypovitaminosis is-D individuals.

| S. No. | Questionnaire                                                | Response (percentage) |
|--------|--------------------------------------------------------------|-----------------------|
| 1      | Do you take cod-liver oil or omega-3 fatty acids (fish oil)? |                       |
|        | (A) Yes                                                      | A=05 (16.66)          |
|        | (B) No                                                       | B=25 (83.33)          |
| 2      | How many servings of milk did you consume daily?             |                       |
|        | (A) 1                                                        | A=16 (53.33)          |
|        | (B) 2                                                        | B=14 (46.66)          |
|        | (C) 3                                                        | C=00 (00.00)          |
|        | (D) More than 3                                              | D=00 (00.00)          |
| 3      | Do you take vitamin-D supplements or calcium with vitamin-D? |                       |
|        | (A) Yes                                                      | A=11 (36.66)          |
|        | (B) No                                                       | B=19 (63.33)          |
| 4      | Do you take multivitamins?                                   |                       |

|   |                                                                  |              |
|---|------------------------------------------------------------------|--------------|
|   | (A) Yes                                                          | A=12 (40)    |
|   | (B) No                                                           | B=18 (60)    |
| 5 | On average, how much sun exposure have you had in the past week? |              |
|   | (A) Less than 5 minutes per day                                  | A=22 (73.33) |
|   | (B) 5-15 minutes per day                                         | B=08 (26.66) |
|   | (C) 15-30 minutes per day                                        | C=00 (00.00) |
|   | (D) More than 30 minutes per day                                 | D=00 (00.00) |
| 6 | Do you use sunscreen?                                            |              |
|   | (A) Yes                                                          | A=04 (13.33) |
|   | (B) No                                                           | B=26 (86.66) |
| 7 | Have you received a suntan in the past 12 months?                |              |
|   | (A) Yes                                                          | A=04 (13.33) |
|   | (B) No                                                           | B=26 (86.66) |

## DISCUSSION

The results of this (Knowledge, Attitude and Practice) KAP study indicates that there is lack of awareness regarding the vitamin D deficiency amongst the adults suffering from hypovitaminosis-D. The participants have more negative attitude towards the relationship between musculoskeletal disorders and hypovitaminosis-D, regarding the ethnic background as contributing factor and regarding the consumption of multivitamins. They also have improper attitude towards the sunbath, vitamin D rich foods and their contribution in maintaining optimum vitamin D level. Participants have improper attitude towards the knowledge of vitamin D deficiency and systemic illnesses and they possess mild positive attitude towards the role of sunlight in preventing hypovitaminosis-D. The practices followed by such population indicates that there is lack of consumption of multivitamins and vitamin D supplements. They did not use sunscreen. There is lack of exposure to the sunlight amongst the participants. There is lack of awareness regarding the dietary management of hypovitaminosis-D like inclusion of cod-liver oil, fatty fish in the diet. The milk servings were founded inadequate. There is lack of motivation regarding the consumption of supplements. None of the participants received sun tanning past one year.

### Limitations of the study

- This KAP (Knowledge, Attitudes and Practices) study involves a very small sample size.
- More relevant questionnaires could be used.

### Future scope of the study

- Large sample size can be taken.
- More efficient questionnaire can be used.

## CONCLUSION

The present KAP (Knowledge, Attitudes and Practices) study reveals that there is scarcity of nutrition education intervention amongst the adults suffering from hypovitaminosis-D disorder. There seems a vital need to educate that strata of society regarding the dietary modification and lifestyle modification including exposure to the sunlight because inadequate or insufficient exposure to sunlight is the main cause of hypovitaminosis-D. Supplements and multivitamins also play a crucial role in the management of this disorder. Hypovitaminosis-D can lead to osteoporosis (musculoskeletal disorder). Thus, more and more efforts should be done to create an awareness regarding this disorder.

## REFERENCES

1. Fuleihan GE. Vitamin D deficiency in the Middle East and its health consequences for children and adults. *Clinic Rev Bone Miner Metab.* 2009;7(1):77-93.
2. Holick MF. Vitamin D status: Measurement, interpretation, and clinical application. *Ann Epidemiol.* 2009;19(2):73-78.
3. Mithal A, Wahl DA, Bonjour JP, Burckhardt P, Dawson-Hughes B, Eisman JA, et al. Global vitamin D status and determinants of hypovitaminosis D. *Osteoporos Int.* 2009;20:1807-1820.
4. de Luca HF. Evolution of our understanding of vitamin D. *Nutr Rev.* 2008;66(S2):S73-87.

5. Holick MF. Vitamin D deficiency. *N Engl J Med.* 2007;357(3): 266-281.
6. Holick MF. Vitamin D: A D-lightful health perspective. *Nutr Rev.* 2008;66(S2):S182-194.
7. Naeem Z. Vitamin D deficiency-an ignored epidemic. *Int J Health Sci.* 2010;4(1):5-6.
8. Giovannucci E, Liu Y, Hollis BW, Rimm EB. 25-hydroxyvitamin D and risk of myocardial infarction in men: A prospective study. *Arch Intern Med.* 2008;168(11):1174-1180.
9. Sadat-Ali M, AIElq A. Osteoporosis among male Saudi Arabs: A pilot study. *Ann Saudi Med.* 2006;26(6):450-454.
10. Holick MF. Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. *Am J Clin Nutr.* 2004;80(6):1678S-1688S.
11. Cokkinides V, Weinstock M, Glanz K, Albano J, Ward E, Thun M. Trends in sunburns, sun protection practices, and attitudes toward sun exposure protection and tanning among US adolescents, 1998-2004. *Pediatrics.* 2006;118(3):853-864.
12. Schofield PE, Freeman JL, Dixon HG, Borland R, Hill DJ. Trends in sun protection behaviour among Australian young adults. *Aust N Z J Public Health.* 2001;25(1):62-65.
13. Lips P, Hosking D, Lippuner K, Norquist JM, Wehren L, Maalouf G, et al. The prevalence of vitamin D inadequacy amongst women with osteoporosis: An international epidemiological investigation. *J Intern Med.* 2006;260(3):245-254.
14. Holick MF, Chen TC. Vitamin D deficiency: A worldwide problem with health consequences. *Am J Clin Nutr.* 2008;87(4): 1080S-1086S.
15. Tsiaras W, Weinstock MA. Factors influencing vitamin D status. *Acta Derm Venereol.* 2011;91(2):115-124.
16. Vatanparast H, Nisbet C, Gushulak B. Vitamin D insufficiency and bone mineral status in a population of newcomer children in Canada. *Nutrients.* 2013;5(5):1561-1572.
17. Vieth R. Vitamin D supplementation, 25-hydroxyvitamin D concentrations, and safety. *Am J Clin Nutr.* 1999;69(5):842-856.
18. Gartner LM, Greer FR. Prevention of rickets and vitamin D deficiency: New guidelines for vitamin D intake. *Pediatrics.* 2003;111(4):908-910.
19. Misra M, Tsai P, Anderson EJ, Hubbard JL, Gallagher K, Soyka LA, et al. Nutrient intake in community-dwelling adolescent girls with anorexia nervosa and in healthy adolescents. *Am J Clin Nutr.* 2006;84(4):698-706.
20. Hartman JJ. Vitamin D deficiency rickets in children: Prevalence and need for community education. *Orthop Nurs.* 2000;19(1):63-70.