



AWARENESS AND PREVALENCE OF VITAMIN D DEFICIENCY AMONG ADULTS IN UAE

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Abstract

Introduction

Vitamin D deficiency is a growing issue around the globe and in the United Arab Emirates (UAE). Studies show that vitamin D deficiency is highest in the Middle East - North Africa region.¹In 2017, around 90% of people in the UAE experienced vitamin D deficiency, and this prevalence is continuously increasing. ²The present study is to assess to assess the awareness and prevalence of Vitamin D deficiency among adults in UAE

Objectives of the study

- 1 To assess the awareness regarding Vitamin D deficiency among adults.
- 2 To assess the prevalence of Vitamin D deficiency among adults.
- 3 To determine the association of baseline variables with awareness regarding Vitamin D deficiency.

Methods

A quantitative approach using a descriptive cross-sectional design was used for this study among 200 adults from the general population, who satisfied the inclusion criteria and were selected by convenient sampling. The tools used were Vitamin D deficiency Awareness - Consists of a series of questions related to Vitamin D deficiency

Results

Results reveal that 53% were of 18-24 years of age, 63% were females, 65% had Bachelor's degree, 46.5% were students and 42.5% were from UAE. The mean & SD awareness score was 18.74±1.97, 91.5% were aware of importance of Vit D, 49.5% spent <30 minutes outdoors in sunlight, 57.5% consumed food sources rich in Vit D few times a week, 47% did not take supplements, 20% stated weather conditions hinder people from getting adequate sunlight and 18% cultural practices (clothes). Out of 200 adults, 59.5% tested for vit D, among them 22.5% had low level of Vit D, 19% had normal values and 18% did not remember the values. There was no significant association of awareness with age, gender, education level, nationality & women. There was a significant association for occupational status at 0.001 level of significance, students had a greater awareness.

Conclusion

The present study findings have revealed good awareness regarding Vitamin D among adults. There is a need to screen for Vitamin D among the general population & educate people regarding Vitamin D deficiency, sources and the updated recommendations of Vitamin D.

Key words – Vitamin D, Awareness, Prevalence, Adults



Introduction

Vitamin D deficiency is a growing issue around the globe and in the United Arab Emirates (UAE). Studies show that vitamin D deficiency is highest in the Middle East North Africa region. Having optimal vitamin D levels is highly beneficial for overall wellbeing. Those who are vitamin D deficient tend to experience tiredness, low mood, chronic fatigue, bone pain, back pain, and have an increased risk of generalized anxiety disorder.¹ In addition, vitamin D has an essential role in supporting bone health and reducing bone loss and fractures. Moreover, studies found that those with adequate vitamin D levels had fewer airway allergies and infections and improved lung function and glucocorticoid response. On the contrary, coronary heart disease, inflammatory disease, infections, and some cancers were more prevalent among people with vitamin D deficiency. Vitamin D deficient individuals have a 50% higher chance of developing colon, prostate, or breast cancer than people with normal vitamin D levels. Additionally, vitamin D supplementation has been associated with better cognitive and nervous system health^{1,2}

In 2017, around 90% of people in the UAE experienced vitamin D deficiency, and this prevalence is continuously increasing. The sun is the primary source of vitamin D but people in the Middle East, including the UAE, typically avoid sun exposure due to the almost year-round high temperatures, as the UAE is a sunny subtropical country.² Research indicates that vitamin D deficiency occurs more in females than males.³ Research indicates that vitamin D deficiency occurs more in females than males. The higher prevalence among women can be attributed to physiological changes such as pregnancy, lactation, menopause, sedentary lifestyle, and low dietary vitamin D consumption.^{1,2}

Moreover, studies focusing on women as participants had reported that lower education levels, less sun exposure, inadequate vitamin D intake, and low physical activity performance were strongly associated with vitamin D deficiency. Furthermore, women with darker skin complexions were at higher risk since melanin lowers the efficiency of UV-B radiation reaching the skin in the photo-conversion process. Other factors include an indoor lifestyle, hot climates, culture, and a lack of social support. Some women also reported concerns over cosmetics, skin health, and skin cancer. In the UAE specifically, there are some challenges that prevent women from getting enough vitamin D through sun exposure. For instance, many Emirati women in the UAE wear traditional clothing that requires most of the body to be covered. Therefore, they are less likely to engage in outdoor activities while exposing their skin to sunlight.³

Vitamin D deficiency has emerged as a public health problem worldwide due to its important role in health and disease. Vitamin D deficiency is now recognized as a pandemic



with implications for bone health and chronic diseases⁴ Previous studies showed that Emirati people were limited in their knowledge about the consequences of vitamin D deficiency on health, vitamin D supplementation, and food fortification. They also had poor attitudes toward sun exposure^{3,4} Vitamin D deficiency is a problem in female college students due to lifestyle, and avoidance of sun exposure. Poor vitamin D status has been associated with increased risk for development of several autoimmune diseases, and other health conditions. This problem needs to be addressed, where prevention of future health consequences in this young group is still possible.⁵

A quantitative cross-sectional study, using snowball sampling, an electronic questionnaire was sent to women aged 18 years and above. Overall, 1537 women completed the questionnaire. The participants had mean scores of 49.4 ± 10.7 and 59.6 ± 14.6 for general and nutritional knowledge, respectively. Factors associated with higher scores included older age, marriage, higher educational level, and having tested their vitamin D levels. Factors associated with lower scores included the history of a chronic illness and being employed. Findings indicate that women in this study showed a low level of vitamin D knowledge specifically regarding the non-skeletal benefits of vitamin D and factors that affect vitamin D synthesis. Therefore, health education and promotion programs must be implemented across the UAE to improve overall awareness about vitamin D.¹

A study conducted in Dubai Hospital revealed that Vitamin D deficiency is a very common medical problem in Dubai, the overall prevalence was 29.5%, while 63.6% had levels below 30ng/ ml 92.8% out of over 112,000 patients. Male are substantially affected more than females. There is statistically significant difference between Emiratis and the expatriates, with higher rates in emirates population. Those results need to be taken very seriously in terms of raising the awareness about the disease and the need for further studies about any associated health consequences, which may arise if left untreated. Nonetheless, having the prevalence of over 90% could raise a question whether the international cutoff points fit our region's population or not.³

A cross-sectional study was carried out at King Fahad Medical City in Riyadh, Saudi Arabia, to examine prevalence of vitamin D deficiency among pregnant Saudi women and related risk factors. Serum 25-hydroxy vitamin D (25(OH)D) was measured by enzyme-linked immunosorbent assay in 160 pregnant women during the first trimester of pregnancy. Socio-demographic, lifestyle and maternal characteristics were collected and vitamin D intake was assessed using a 24-h dietary recall. Weight and height were measured using standardized methods. Vitamin D deficiency (25(OH)D < 50 nmol/L) and insufficiency (25(OH)D = 50-74 nmol/L) were reported in 50% and 43.8% of the study sample, respectively. Age group, educational level, sun exposure frequency and daytime and daily



practice of exercise were significantly associated with vitamin D status. Overall, vitamin D deficiency was common among pregnant Saudi women in Riyadh. Steps should be taken to address the current situation, including increased sunlight exposure, consumption of fatty fish, and vitamin D⁴

This cross-sectional study was conducted among the general population in Jeddah, Saudi Arabia, above the age of 18 years who were in 3 malls during the period of August and September 2017. A self-administrated questionnaire in paper forms was utilized and was divided into two parts to collect data. Results revealed that Out of 1022 participants, 472 (46.1%) were aged 18–28 years, 830 (82.1%) were of Saudi ethnicity, 702 (68.7%) had a university degree, 275 (26.9%) attended high school, more than half were married (55.6%), and 54.4% had children. The majority of the participants agreed that vitamin D is important in the maintenance of bone and tooth health (88.4%). It is important in the maintenance of calcium and phosphates (76.6%), and it strengthens immunity (69.4%). Of the total participants, 86.2% were aware that sunlight exposure encourages vitamin D production in the skin. The overall knowledge mean score was 5.9 ± 1.2 (39.3%). This study highlighted a high level of inadequate knowledge of vitamin D deficiency among participants. There was a significant association between knowledge level and education level. The awareness of vitamin D deficiency is high regarding its benefits. The study revealed that participants who did not have children had the highest score for benefits. Nongovernment organizations and social workers may work together with government health-care organization to teach parents and children about the uses and benefits of vitamin D.⁵

The present study is to assess to assess the awareness and prevalence of Vitamin D deficiency among adults in UAE

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Results

Description of selected Demographic Variables

Table 1: Frequency and percentage distribution selected demographic variables

(n=200)

| Personal characteristics | Number (n) | Percent (%) |
|---|------------|-------------|
| Age | | |
| • 18-24years | 107 | 53.5 |
| • 25-34years | 40 | 20.0 |
| • 35-44years | 18 | 9.0 |
| • 45-54 years | 20 | 10.0 |
| • 55 and above | 15 | 7.5 |
| Gender | | |
| • Male | 74 | 37.0 |
| • Female | 126 | 63.0 |
| Educational level | | |
| • High school or below | 45 | 22.5 |
| • Bachelor's Degree | 130 | 65.0 |
| • Master's Degree or Higher | 25 | 12.5 |
| Occupational status | | |
| • Student | 93 | 46.5 |
| • Employed | 74 | 37.0 |
| • Unemployed | 17 | 8.5 |
| • Retired | 7 | 3.5 |
| • Homemaker | 9 | 4.5 |
| Nationality | | |
| • United Arab Emirates | 85 | 42.5 |
| • Pakistan – India – Philippines- Bangladesh | 27 | 13.5 |
| • Iraq – Syria – Jordan - Lebanon | 14 | 7.0 |
| • Iran | 17 | 8.5 |
| • African | 39 | 19.5 |
| • American – European | 9 | 4.5 |
| • Bahrain – KSA - OMAN – Yemen | 9 | 4.5 |
| Only for Women –Currently | | |
| • Pregnant | 14 | 7.0 |
| • Breast feeding | 13 | 6.5 |
| • Menopause | 12 | 6.0 |
| • Neither | 87 | 43.5 |

Table 1 shows 53% were of 18-24 years of age, 63% were females, 65% had Bachelor’s degree, 46.5% were students, 42.5% were from UAE and among women 43.5% were not pregnant, feeding or menopause



Awareness regarding Vitamin D Sources among Adults in UAE

Table 2a Awareness regarding Vitamin D Sources among the studied group (n=200)

| Awareness | Number (n) | Percent (%) |
|--|------------|-------------|
| Are you aware of the importance of vitamin D for overall health? | | |
| • Yes | 183 | 91.5 |
| • No | 17 | 8.5 |
| How did you acquire your knowledge about vitamin D?(Select all that apply?) | | |
| • Medical professionals (doctors, nurses) | 66 | 33.0 |
| • Internet sources | 41 | 20.5 |
| • Social media | 41 | 20.5 |
| • Friends or family | 36 | 18.0 |
| • Workshops or seminars | 16 | 8.0 |
| Have you ever been tested for vitamin D deficiency? | | |
| • Yes | 119 | 59.5 |
| • No | 81 | 40.5 |
| If yes, what was your vitamin D level? | | |
| • Low | 45 | 22.5 |
| • Normal | 38 | 19.0 |
| • Not remember | 36 | 18.0 |

The table 2a shows 91.5% were aware of importance of Vit D, 33% acquired knowledge from medical professionals, 59.5% tested for vit D, among them 22.5% had low level of Vit D

Table 2b Awareness regarding Sunlight Exposure and Dietary Habits among the studied group.

(n=200)

| Awareness | Number (n) | Percent (%) |
|--|------------|-------------|
| On average, how many hours per day do you spend outdoors in direct sunlight? | | |
| • Less than 30 minutes | 99 | 49.5 |
| • 30 minutes to 1 hour | 67 | 33.5 |
| • 1-2 hours | 20 | 10.0 |
| • More than 2 hours | 14 | 7.0 |
| How often do you consume foods naturally rich in vitamin D? (e.g., fatty fish, egg yolks, fortified dairy products) | | |
| • Daily | 52 | 26.0 |
| • Few times a week | 115 | 57.5 |
| • Rarely | 33 | 16.5 |



| Do you take vitamin D supplements? | | |
|--|----|------|
| • Yes, regularly | 23 | 11.5 |
| • Yes, occasionally | 83 | 41.5 |
| • No | 94 | 47.0 |
| Which of the following are sources of vitamin D? | | |
| • Food | 65 | 32.5 |
| • Supplements | 34 | 17.0 |
| • Sunlight | 90 | 45.0 |
| • Water | 6 | 3.0 |
| • Air | 5 | 2.0 |
| Vitamin D can be produced/synthesized in the skin, what factors affect this vitamin D production/synthesis? | | |
| • Skin pigmentation | 56 | 28.0 |
| • Pollution | 41 | 20.5 |
| • Time of day | 25 | 12.5 |
| • Latitude | 36 | 18.0 |
| • Season | 26 | 13.0 |
| • Smoking | 7 | 3.5 |
| • Sunscreen use | 5 | 2.5 |
| • High-fat diet | 4 | 2.0 |
| What are the best food sources of vitamin D? | | |
| • Oily fish | 25 | 12.5 |
| • Egg yolks | 28 | 14.0 |
| • Fortified foods | 34 | 17.0 |
| • Red meat | 36 | 18.0 |
| • Dairy products | 20 | 10.0 |
| • Fruit | 15 | 7.5 |
| • Vegetables | 16 | 8.0 |
| • Chicken | 6 | 3.0 |
| • Nuts | 20 | 10.0 |

The table 2b shows 49.5% spent <30 minutes outdoors in sunlight, 57.5% consumed food sources rich in Vit D few times a week, 47% did not take supplements, 45 % said sunlight was a source of Vit D, reveals 28% said skin pigmentation affect vit D production and 18% said red meat was the best food for Vit D and 17% fortified foods



Table 2c Awareness regarding Barriers and Challenges among the studied group (n=200).

| Awareness | Number (n) | Percent (%) |
|---|------------|-------------|
| What factors do you think hinder people from getting enough sunlight exposure? | | |
| • Work schedule | 51 | 25.5 |
| • Cultural practices (clothing coverage) | 36 | 18.0 |
| • Weather conditions | 40 | 20.0 |
| • Lack of awareness | 39 | 19.5 |
| • Health issues or mobility problems | 34 | 17.0 |
| What challenges do you face in maintaining a diet rich in vitamin D? | | |
| • Availability of vitamin D-rich foods | 64 | 32.0 |
| • Dietary restrictions (e.g., vegetarianism) | 73 | 36.5 |
| • Lack of knowledge about vitamin D-rich foods | 43 | 21.5 |
| • Cost of vitamin D supplements or fortified foods | 20 | 10.0 |
| Are you aware of the updated vitamin D recommendations in the UAE? | | |
| • Yes | 69 | 34.5 |
| • No | 131 | 65.5 |

The table 2c reveals 20% stated weather conditions hinder people from getting adequate sunlight and 18% cultural practices (clothes) 65.5 % are not aware of updated Vit D recommendations in UAE

Table 2d Awareness of Vitamin D Deficiency (benefits) among the studied group (n=200)

| Benefits | No | | Yes | | Mean±SD |
|---|------------|-------------|------------|-------------|-----------|
| | Number (n) | Percent (%) | Number (n) | Percent (%) | |
| [Vitamin D is used to treat bone disease and rickets] | 28 | 14.0 | 172 | 86.0 | 1.86±0.34 |
| [Vitamin D is important in the maintenance of bone and teeth] | 14 | 7.0 | 186 | 93.0 | 1.93±0.25 |
| [Vitamin D helps to strengthen immunity?] | 14 | 7.0 | 186 | 93.0 | 1.93±0.26 |
| [Sun exposure encourages vitamin D production in the skin] | 7 | 3.5 | 193 | 96.5 | 1.97±0.18 |

The table 2d reveals 96.5% expressed sun exposure helps in vit D production



Table 2e Awareness of Vitamin D Deficiency (sources) among the studied group (n=200)

| Sources | No | | Yes | | Mean±SD |
|--|------------|-------------|------------|-------------|-----------|
| | Number (n) | Percent (%) | Number (n) | Percent (%) | |
| [Vitamin D is found in animal meat but not in vegetables and fruits] | 106 | 53.0 | 94 | 47.0 | 1.47±0.5 |
| [Frequent sun exposure does not lead to vitamin D poisoning] | 76 | 38.0 | 124 | 62.0 | 1.62±0.48 |
| [People residing in cloudy areas are more prone to vitamin D deficiency] | 70 | 35.0 | 130 | 65.0 | 1.65±0.47 |
| [Use of sunscreen creams maybe a cause of vitamin D deficiency] | 106 | 53.0 | 94 | 47.0 | 1.47±0.5 |
| [Dark skin is more prone to vitamin D deficiency than fair skin] | 121 | 60.5 | 79 | 39.5 | 1.41±0.49 |
| [Vegetarians are more likely to have vitamin D deficiency than nonvegetarians] | 59 | 29.5 | 141 | 70.5 | 1.71±0.45 |

The table 2e reveals 60.5% stated dark skinned people are more prone to Vitamin D than fair skinned & 70.5% stated vegetarians are more likely to have Vitamin D deficiency

Table 2f Awareness of Vitamin D Deficiency (toxicity) among the studied group (n=200)

| Toxicity | No | | Yes | | Mean±SD |
|---|------------|-------------|------------|-------------|-----------|
| | Number (n) | Percent (%) | Number (n) | Percent (%) | |
| [Vitamin D Poisoning may lead to hypercalcemia leading to calcinosis] | 51 | 25.5 | 149 | 74.5 | 1.75±0.43 |

The table 2f Reveals 74.5% stated Vitamin D Poisoning may lead to hypercalcemia leading to calcinosis



Table 2g Total mean scores for Awareness of Vitamin D Deficiency among the studied group (n=200)

| | Mean | SD |
|-----------------|-------|------|
| Benefits | 7.68 | 0.64 |
| Sources | 9.31 | 1.62 |
| Toxicity | 1.75 | 0.43 |
| Total | 18.74 | 1.97 |

The table 2g Reveals the total mean & SD awareness score was 18.74±1.97

Prevalence of Vitamin D among the studied group

Table 3 Prevalence of Vitamin D among the studied group

(n=200).

| Awareness | Number (n) | Percent (%) |
|--|------------|-------------|
| Have you ever been tested for vitamin D deficiency? | | |
| • Yes | 119 | 59.5 |
| • No | 81 | 40.5 |
| If yes, what was your vitamin D level? | | |
| • Low | 45 | 22.5 |
| • Normal | 38 | 19.0 |
| • Not remember | 36 | 18.0 |

The table 3 shows 59.5% tested for vit D, among them 22.5% had low level of Vit D

Association of awareness regarding Vitamin D with demographic Variables

Table 4 Association between demographic variables and their awareness regarding Vitamin D Deficiency

| Personal characteristics | Mean ±SD | F\ (p) |
|--------------------------|------------|------------------|
| Age | | |
| • 18-24years | 19.03±2.05 | 1.369 (0.212) |
| • 25-34years | 18.72±1.76 | |
| • 35-44years | 18.44±1.82 | |
| • 45-54 years | 17.90±1.88 | |
| • 55 and above | 18.13±1.84 | |
| Gender | | |

| | | |
|---|------------|-------------------|
| • Male | 18.83±1.95 | 0.528 (0.835) |
| • Female | 18.68±1.98 | |
| Educational level | | |
| • High school or below | 18.37±2.00 | 0.984 (0.450) |
| • Bachelor's Degree | 18.75±1.97 | |
| • Master's Degree or Higher | 18.32±1.79 | |
| Occupational status | | |
| • Student | 19.05±2.09 | 4.163 (0.001*) |
| • Employed | 18.70±1.74 | |
| • Unemployed | 17.94±1.78 | |
| • Retired | 18.14±2.54 | |
| • Homemaker | 17.77±1.85 | |
| Nationality | | |
| • United Arab Emirates | 18.56±1.87 | 0.658 (0.728) |
| • Pakistan - India - Philippines- Bangladesh | 19.44±1.98 | |
| • Iraq - Syria - Jordan - Lebanon | 19.00±1.70 | |
| • Iran | 18.64±2.54 | |
| • African | 18.28±1.90 | |
| • American - European | 19.33±1.58 | |
| • Bahrain - KSA - OMAN - Yemen | 19.44±2.29 | |
| Only for Women –Currently | | |
| • Pregnant | 18.92±1.41 | 0.412 (0.913) |
| • Breast feeding | 18.62±1.54 | |
| • Menopause | 18.24±1.19 | |
| • Neither | 18.35±1.71 | |

***Significant (P<0.05).**

F= NOVA test

The table 2 reveals no association of awareness with age, gender, education level, nationality & women, there was a signification association for occupational status at 0.001 level of significance, students had a greater awareness

Discussion

Findings related to Demographic Variables

The present study shows 53% were of 18-24 years of age, 63% were females, 65% had Bachelor's degree, 46.5% were students, 42.5% were from UAE and among women 43.5% were not pregnant, feeding or menopause. In a similar study conducted among the general population in Jeddah, Saudi Arabia, results revealed that out of 1022 participants, 472 (46.1%) were aged 18–28 years, 830 (82.1%) were of Saudi ethnicity, 702 (68.7%) had a university degree, 275 (26.9%) attended high school, more than half were married (55.6%), and 54.4% had children.⁵



Awareness regarding Vitamin D Sources among Adults in UAE

The present study shows the total mean & SD awareness score was 18.74 ± 1.97 . The study revealed 91.5% were aware of importance of Vit D, 33% acquired knowledge from medical professionals, 49.5% spent <30 minutes outdoors in sunlight, 57.5% consumed food sources rich in Vit D few times a week, 47% did not take supplements, 45 % said sunlight was a source of Vit D, reveals 28% said skin pigmentation affect vit D production and 18% said red meat was the best food for Vit D and 17% fortified foods. Twenty percent stated weather conditions hinder people from getting adequate sunlight and 18% cultural practices (clothes) 65.5 % are not aware of updated Vit D recommendations in UAE, 96.5% expressed sun exposure helps in vit D production, reveals 60.5% stated dark skinned people are more prone to Vitamin D than fair skinned & 70.5% stated vegetarians are more likely to have Vitamin D deficiency, 74.5% stated Vitamin D Poisoning may lead to hypercalcemia leading to calcinosis.

In a similar study conducted among the general population in Jeddah, Saudi Arabia, majority of the participants agreed that vitamin D is important in the maintenance of bone and tooth health (88.4%). It is important in the maintenance of calcium and phosphates (76.6%), and it strengthens immunity (69.4%). Of the total participants, 86.2% were aware that sunlight exposure encourages vitamin D production in the skin. The overall knowledge mean score was 5.9 ± 1.2 (39.3%). This study highlighted a high level of inadequate knowledge of vitamin D deficiency among participants.⁵

Similar studies focusing on women as participants had reported that lower education levels, less sun exposure, inadequate vitamin D intake, and low physical activity performance were strongly associated with vitamin D deficiency. Furthermore, women with darker skin complexions were at higher risk since melanin lowers the efficiency of UV-B radiation reaching the skin in the photo-conversion process. Other factors include an indoor lifestyle, hot climates, culture, and a lack of social support. Some women also reported concerns over cosmetics, skin health, and skin cancer. In the UAE specifically, there are some challenges that prevent women from getting enough vitamin D through sun exposure. For instance, many Emirati women in the UAE wear traditional clothing that requires most of the body to be covered. Therefore, they are less likely to engage in outdoor activities while exposing their skin to sunlight.³

Prevalence of Vitamin D among the studied group

The present study revealed that out of 200 adults 59.5% tested for vit D, among them 22.5% had low level of Vit D, 19% had normal values and 18% did not remember the values. A study conducted in Dubai Hospital revealed that Vitamin D deficiency is a very common medical problem in Dubai, the overall prevalence was 29.5%, while 63.6% had levels below 30ng/ ml 92.8% out of over 112,000 patients. Male are substantially affected more than females. There is statistically significant difference between Emiratis and the expatriates, with higher rates in emirates population.³ A similar study at King Fahad Medical City in Riyadh, Saudi Arabia, to examine prevalence of vitamin D deficiency among 160 pregnant Saudi women and related risk factors. Vitamin D deficiency and insufficiency were reported in 50% and 43.8% of the study sample, respectively. Age group, educational level, sun



exposure frequency and daytime and daily practice of exercise were significantly associated with vitamin D status. Overall, vitamin D deficiency was common among pregnant Saudi women in Riyadh. Steps should be taken to address the current situation, including increased sunlight exposure, consumption of fatty fish, and vitamin D.⁴ In a similar study it revealed that Vitamin D deficiency is more common in South Asia and Southeast Asia than is appreciated. With this cut-off level, the prevalence of vitamin D deficiency was about 70% or higher in South Asia and varied from 6–70% in Southeast Asia.⁶

Association of awareness regarding Vitamin D with selected demographic variables

The present study revealed no significant association of awareness with age, gender, education level, nationality & women. There was a significant association for occupational status at 0.001 level of significance, students had a greater awareness. In a similar study conducted among the general population in Jeddah, Saudi Arabia revealed that there was a significant association between knowledge level and education level. The awareness of vitamin D deficiency is high regarding its benefits. The study revealed that participants who did not have children had the highest score for benefits.⁵ A similar study in the American University of Sharjah, United Arab Emirate revealed subjects were Undergraduate college female students (n, 480), aged 18-26 years. **Results revealed** overall, 47.92% had suboptimal serum vitamin D levels. Risk factors included: wearing hijab by 37.5% of the students that might have interfered with the penetration of UVB radiation into the skin, short time sun exposure, use of sunscreens and limited intake of foods rich in vitamin D. The study concluded that Vitamin D deficiency problem needs to be addressed, where prevention of future health consequences in this young group is still possible.³

A similar study at King Fahad Medical City in Riyadh, Saudi Arabia revealed age group, educational level, sun exposure frequency and daytime and daily practice of exercise were significantly associated with vitamin D status.⁴ In a similar study it revealed that the determinants for the variation of vitamin D status are skin pigmentation, aging, the sun protection behaviors such as application of a sunscreen, religious, lifestyle and nutritional differences. Advanced age is a known risk factor for vitamin D deficiency. Interestingly, elderly in countries such as Korea and Thailand, had higher 25(OH)D levels when compared with young people. This widespread vitamin D deficiency problem especially in the young generation is an urgent health issue that needs to be remedied.⁶

Conclusion

The present study findings have revealed good awareness regarding Vitamin D among adults. There is a need to screen for Vitamin D among the general population & educate people regarding Vitamin D deficiency, sources and the updated recommendations of Vitamin D.

Ethical Considerations

The study proceeded after permission form Institution Review Board, consent was obtained and confidentiality maintained



Conflict of Interest

There is no conflict of interest

Contribution of Authors

All authors have contributed to this research

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