Public awareness, knowledge and attitude of vitamin D deficiency and its effects on their serum levels

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Objective

This study aims to evaluate Public Awareness, Knowledge and Attitude of Vitamin D Deficiency and Its Effects on their serum levels.

Methods

A cross-sectional study was done at Garnadha mall in Riyadh- KSA on the 25th of February until the 27th of February 2017. Informed and written consent about blood samples was taken and that the results will be used in the research. The study included a total number of 1207 of participants and their age ranges between 15 & 60 years. Review of literature was done to design a proper questionnaire that assesses vitamin D level and its relation to gender, smoking, education, previous vitamin D value as well as the degree of awareness and its relationship to the state of pregnancy. Data analysis was done by SPSS.

Results

Majority of participants (890) had insufficient knowledge and only (236) of individuals in the study had appropriate knowledge of vitamin D deficiency and effects, while minority (81) of participants had poor knowledge towards vitamin D level. Our data revealed that there is a direct relationship between the knowledge about vitamin D and vitamin D serum levels.

Conclusion

Public awareness of vitamin D deficient is poor and people who have appropriate knowledge has less percentage of vitamin D deficiency compared to people who have poor knowledge about it.

Keywords: Awareness, Knowledge , Attitude , Vitamin D Deficiency , Serum Levels

Introduction

Worldwide, Vitamin D deficiency is widespread in children and is usually unrecognised. Recently, vitamin D deficiency considered a global epidemic. (1, 2)
Western countries studies showed that vitamin D deficiency is present in 20% -25% of the overall population (3–5). In the Middle East, about 60%–65% of the people had vitamin D deficiency or insufficiency. (2) Although there is strong sunlight throughout the year in Saudi Arabia, a lot of studies showed that vitamin D deficiency is prevalent. (6–11) A recent study showed that about 40% of men and 60% of women had vitamin D deficiency. (11)

This significant vitamin D deficiency in sun areas such as in Saudi children, due to insufficient knowledge and practice of vitamin D and its health implications. Another study done on healthy Saudi adults showed that vitamin D deficiency is common among the adult population. (12-17)

Contemporary evidence suggests that Vitamin D deficiency in some cases may be too risky to the general health of individuals. Low level of titte of serum vitamin D has a profound relation to lower endurance, weak muscle power and bone strength. (18)

A study was done by Alshamsan, and Bin-Abbas, found that a majority of children who have type-1 diabetes were also suffering from vitamin D deficient, even vitamin D deficiency was higher in the female. (19)

Sunlight is the most profound source of vitamin D, and its food sources are limited. The ultraviolet (UV) B from sunshine starts the synthesis of vitamin D in the skin, by transforming seven dehydrocholesterol to pre-vitamin D. (20)

It is essential to know the role of sun exposure for the synthesis of vitamin D, also one should know that skin cancer influence vitamin D status as sun exposure is related to high rates of a cutaneous tumour such as basal cell carcinoma and squamous cell carcinoma. (21)

Physical inactivity, sun-avoidance, low intake of dairy products and poor diets are leading causes of vitamin D deficiency especially among female adolescents and increase the risk of early osteoporosis. (22, 23)

Outdoor activity is essential for endogenous vitamin D synthesis and increases serum vitamin D. Sedentary indoor lifestyle is related to vitamin D deficiency and poor general health. Outdoor activities depend on climatic conditions like temperature, socioeconomic, and
cultural background. The widespread use of screen block creams and negative attitudes towards sun exposure result mostly in the indoor dwelling and sun avoidance. As well as the fear of skin cancer leads to a decrease in time spent outdoors and the daily use of sunscreens. (24, 25)

UV-B radiation, required for the endogenous vitamin D synthesis is filtered up to 95% by the use of sunscreens 5. So, Women in urban areas have a higher rate of Vitamin D Deficiency compared to ladies in rural areas, who spent more time outdoors and experience significant sun exposure and higher serum 25(OH) vitamin D concentration. Clothes style concerning religious or cultural issues has a minor effect in comparison to the considerable impact of socio-economic status and sedentary lifestyle. (26)

It is essential to know the population's knowledge about concerns regarding vitamin D, to start education programs targeting the defects. To guide interventions aimed at achieving adequate vitamin D status among people.

Therefore, this study aims to evaluate Public Awareness, Knowledge and Attitude of Vitamin D Deficiency and Its Effects.

Methodology

This study is a cross-sectional study that was held at Garnadha mall in Riyadh- KSA as a part of an awareness campaign to enhance the knowledge of the population regarding vitamin D health issues on the 25th of February until the 27th of February. Each participant was given a consent form to ensure that the participant is aware of the intervention of blood drawing and for the results to be used in the research. A questionnaire was handed to all healthy participants between the ages of 15 & 60 years who are not using any supplements and signed the consent. Review of literature was done to design a proper questionnaire. Previously prepared surveys were adjusted to fit in our settings, the questionnaire contained 25 questions, and trained individuals were responsible for asking each participant. Questionnaires were coded and linked to the consent form that included the phone numbers of the participants. Surveys also contained personal questions that accessed only by authorised personnel for confidentiality purposes. Questionnaire analysis was made using SPSS.
The Medical centre handed blood sampling in the University of Imam Mohammed Bin Saud University, and the medical centre provided a doctor for any unfavourable events during the drawing of blood.

The study included a total number of 1207 participants. Blood containers were kept in the refrigerator for a maximum of four hours until taken to the labs. The measurements were made using Vitamin D kits, Abbott 4100 (Architect) and Cobas 6000.

Authorised personnel sent the results to participants via a message, two weeks after the blood has been drawn. For the research purposes, results of each participant were combined with his/her questionnaire using the code by the researchers.

Results

Our study conducted on 1207 participants, 515 of the individuals in the study were males, 420 (81.6%) of them had vitamin D deficiency, 79 (15.3%) were vitamin D insufficient and 16 (3.1%) of participants had normal vitamin D level. Female participants accounted for 692 individuals, 535 (77.3%) of them were vitamin D deficient, 115 (16.6%) had vitamin D insufficiency, 42 (6.1%) had normal levels of vitamin D. (Table 1)

Table 1: Gender distribution among participants concerning vitamin D level.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Vitamin D level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal</td>
<td>insufficiency</td>
</tr>
<tr>
<td>Male</td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>% within Gender</td>
<td>3.1%</td>
</tr>
<tr>
<td>Female</td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td></td>
<td>42</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td>% within Gender</td>
<td>6.1%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td></td>
<td>58</td>
<td>194</td>
</tr>
</tbody>
</table>

P- Value= 0.041

In regard to educational level, we categorised them into five categories: primary, intermediate, secondary, bachelor's degree and higher education. The primary educated group
accounted for 42 of participants, whereas the middle group accounted for 95 participants. The secondary educated group had a total of 239 participants, bachelor group, on the other hand, accounted for the majority of our population with a total of 704 participants. The last category was higher education which accounted for 104 participants. There was a no significant relation between education level and vitamin D level (Table 2).

Table 2: Education level among participants and its relation to Vitamin D level.

<table>
<thead>
<tr>
<th>Education</th>
<th>Vitamin D level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal</td>
<td>insufficiency</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>Count</td>
<td>2</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Count</td>
<td>3</td>
</tr>
<tr>
<td>Secondary</td>
<td>Count</td>
<td>9</td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>Count</td>
<td>36</td>
</tr>
<tr>
<td>Higher education</td>
<td>Count</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>57</td>
</tr>
</tbody>
</table>

P Value = 0.467

We have classified our population into three groups: appropriate knowledge, insufficient knowledge and poor knowledge. Majority of the participants (890) had insufficient knowledge, and only 236 of individuals in the study had proper knowledge while minority 81
had inferior knowledge. We noticed that participants with higher knowledge were found to be having higher vitamin D serum levels. (Table 3)

Table 3: Knowledge among participants and its relation to Vitamin D level.

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Count</th>
<th>Normal</th>
<th>Insufficiency</th>
<th>Deficiency</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>appropriate knowledge</strong></td>
<td></td>
<td>16</td>
<td>43</td>
<td>177</td>
<td>236</td>
</tr>
<tr>
<td>% within Grade</td>
<td>6.8%</td>
<td>18.2%</td>
<td>75.0%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td><strong>Insufficient knowledge</strong></td>
<td></td>
<td>39</td>
<td>140</td>
<td>711</td>
<td>890</td>
</tr>
<tr>
<td>% within Grade</td>
<td>4.4%</td>
<td>15.7%</td>
<td>79.9%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td><strong>Poor knowledge</strong></td>
<td></td>
<td>3</td>
<td>11</td>
<td>67</td>
<td>81</td>
</tr>
<tr>
<td>% within Grade</td>
<td>3.7%</td>
<td>13.6%</td>
<td>82.7%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>58</td>
<td>194</td>
<td>955</td>
<td>1207</td>
</tr>
<tr>
<td>% within Grade</td>
<td>4.8%</td>
<td>16.1%</td>
<td>79.1%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Regarding smoking among participants and its relation to vitamin D level, 151 of the population were smokers, 6 of them had a healthy level of vitamin D, 22 were vitamin D insufficient, and 123 were vitamin D deficient with a percentage of 4%, 14.6% and 81.5%, respectively. While the majority of participants 959 were a non-smokers and 51 of them had a
normal levels of vitamin D, 159 were vitamin D insufficient, and 749 were vitamin D deficient, 5.3%, 16.6% and 78.1%, respectively. (Table 5)

Regarding relationship between knowledge of participants towards vitamin D and state of pregnancy, most of the participants who had appropriate knowledge125 (75.3%) were pregnant. While most participants who had insufficient knowledge 177 (36.3%) were non-pregnant. Pregnancy status was equally distributed among poor knowledge participants. However, there was a statistically significant relationship between awareness and pregnancy with P value = 0.005. (Table 6)

Table 6: the relationship between knowledge of participants towards vitamin D and state of gestation.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Count</th>
<th>Pregnant</th>
<th>Non-Pregnant</th>
</tr>
</thead>
<tbody>
<tr>
<td>appropriate knowledge</td>
<td></td>
<td>125</td>
<td>41</td>
</tr>
<tr>
<td>% within Grade</td>
<td></td>
<td>75.3%</td>
<td>24.7%</td>
</tr>
<tr>
<td>insufficient knowledge</td>
<td></td>
<td>310</td>
<td>177</td>
</tr>
<tr>
<td>% within Grade</td>
<td></td>
<td>63.7%</td>
<td>36.3%</td>
</tr>
<tr>
<td>poor knowledge</td>
<td></td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>% within Grade</td>
<td></td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>449</td>
<td>232</td>
</tr>
<tr>
<td>% within Grade</td>
<td></td>
<td>65.9%</td>
<td>34.1%</td>
</tr>
</tbody>
</table>

Discussion.
Vitamin D has a profound role in the regulation of body physiology. Our study showed that majority of participants have insufficient knowledge about vitamin D deficiency. Also, in a survey conducted by Alshamsan & Bin-Abbas, they found that only half of the patients were aware of the health effects of vitamin D status, compared to 70% of healthy children, (19) which is similar to Kung et al. and You et al. results. (27, 28)

Awareness of vitamin D importance can encourage people to keep their vitamin D within normal levels through food, supplements, and safe sun exposure. A study conducted by You et al. showed that 16% of participants increased their sun exposure as a treatment to improve vitamin D level. (28)

Although adequate vitamin D levels cannot be maintained through food sources alone, consumption of certain foods can help in cases of limited sunlight exposure.

There are no enough research studying the evaluation of the relationship between education and vitamin D levels. In a survey conducted on the American population, (N= 4495) %41.6 adult participants have vitamin D deficiency as well as being common in participants with low educational level, (P< 0.001). Our results showed that educational level has no statistically significant relationship to vitamin D levels where the majority of participants had a deficiency in vitamin D regardless of their education level.

Our results confirmed a high prevalence of vitamin D deficiency that highlights the importance of evaluating the problem and solving it correctly. These results are constant with a study carried out by Haj Bloukh et al. which revealed that 42.3% of the participants in the study had vitamin D deficiency. (30)

A study done in Hong Kong University to assess the attitudes, behaviours and knowledge about vitamin D, showed that majority of participants knew only the name of vitamin D, but they were not aware of its effects or sources. Only a minority of individuals in the study recognised that sunlight was a significant source of vitamin D. Ironically, most of the participants used sunscreen products. (31)

In a similar vein, Al Bathi B. et al (2012) conducted a study which examined the Knowledge, attitude and practice of patients in Kuwait attending primary care centres toward vitamin D who were treated with vitamin D supplements. The results revealed that the minority of
participants had adequate information about their vitamin D deficiency. Regarding the main knowledge source about vitamin D, 40.5% of patients got knowledge from doctors, 12.5% knew about vitamin D from the media, while 29.0% of participants got their information from relatives and friends, 8.5% from background information and 9.5% from journals and magazines. While, in our study, we didn't assess participants source of knowledge. (32)

A research was done in Saudi Arabia on 100 pediatric patients (vitamin D-deficient), and 100 healthy children have shown that minority of patients had information about the sources of vitamin D, while most of healthy children were aware of the sources of vitamin D.

**Conclusion**

Public awareness of vitamin D deficiency is poor and people who have appropriate knowledge has less percentage of vitamin D deficiency compared to people who have poor knowledge about it. Campaigns may improve public awareness, and attitudes regarding vitamin D deficiency and its effects.

**References**


