



ORIGINAL ARTICLE

# Knowledge, attitude and practice of patients attending primary care centers toward vitamin D in Kuwait

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Received 4 January 2012; accepted 15 February 2012

Available online 18 March 2012

## KEYWORDS

Vitamin D;  
Deficiency;  
Patients;  
Knowledge;  
Attitude

**Abstract** *Background:* Extracellular calcium is vital for the functioning of many metabolic processes and neuromuscular activities. Awareness and practice of patients with vitamin D deficiency are very important.

*Objective:* To explore knowledge, attitude and practice of patients receiving vitamin D supplement and attending primary health care (PHC) in Kuwait.

*Subjects and methods:* The study design is a simple descriptive cross-sectional one that was carried out in two PHC centers. Two hundred patients were selected randomly from a list of all registered patients in the selected centers. Criteria for inclusion included adult age  $\geq 18$  years, diagnosis with hypovitaminosis D within a year, and under vitamin D supplement.

*Results:* Only 28.5% of participants were aware about their condition, 53.5% related pain to vitamin D deficiency, 33.5% knew the presence of relation between vitamin D deficiency and joint pain. One third of the participants received the loading dose of vitamin D, and, 17.5% had the maintenance dose. Only 21.0% believed that they feel better regarding musculoskeletal symptoms after taking treatment doses and 12.5% of the participants knew that the level of vitamin D dropped

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Peer review under responsibility of Alexandria University Faculty of Medicine.



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again after stopping medication. Only 29.5% knew the relation between vitamin D and other diseases. The majority of patients (85.5%) agreed about the importance of sunshine as a source of vitamin D and 60.0% thought that they can get vitamin D from the nutrients. Regarding the main sources of knowledge about vitamin D, 40.5 % of patients got knowledge from doctors, 12.5% from the media, 29.0% from relatives and friends, 8.5% from background information and 9.5% from journals and magazines.

*Conclusions:* The majority of the study participants had limited knowledge, poor practices, and negative attitude toward vitamin D problems. Planning health education interventions for this group of patients are essential.

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## 1. Introduction

Vitamin D plays a primary physiological role in maintaining extracellular calcium ion levels in the human body. Extracellular calcium is vital for the functioning of many metabolic processes and neuromuscular activities. Vitamin D influences calcium levels primarily by controlling the absorption of calcium from the intestine, through the direct effects on bone and also through its effects on parathyroid hormone secretion.<sup>1</sup> Furthermore, vitamin D deficiency, resulting in decreased bone mineralization, secondary hyperparathyroidism, and increased cortical bone loss, has been linked to the pathogenesis of osteoporosis and hip fractures.<sup>2,3</sup> Vitamin D is acquired both through nutritional means (10–20%) and by the cutaneous synthesis under the action of sunlight (80–90%).<sup>4</sup> Vitamin D may play a role in muscle strength, pathogenesis of psoriasis, certain cancers, multiple sclerosis, diabetes, and blood pressure, among other physiological and pathophysiological processes.<sup>5–7</sup>

Determining vitamin D status of a population can be a challenging task.<sup>8</sup> Earlier observational studies have measured serum 25(OH)D levels in healthy population cohorts to determine reference values for sufficient levels of vitamin D. However, these are known to be influenced by lifestyle and environmental characteristics and, therefore, may not be applied clinically and worldwide.<sup>1,2</sup>

Clinical hypovitaminosis D is associated with rickets in infancy and osteomalacia in adults, which causes muscle weakness and contributes to falls and bone fractures.<sup>5</sup> Defining categories of vitamin D insufficiency and deficiency will affect the prevention strategies employed in a clinical setting. These are oral vitamin D supplementation, increased exposure to UV light (especially sunlight), and a better dietary intake.<sup>2,3,9</sup>

Studies from Saudi Arabia, Kuwait, United Arab Emirates, and Iran reveal that 10–60% of mothers and 40–80% of their neonates had undetectable low vitamin D levels (0–25 nmol/L) at delivery. Higher socioeconomic status, antenatal care, and vitamin D intake were associated with higher vitamin D levels.<sup>10–12</sup>

Proper compliance to medicines and life style modification strategies involving mainly diet and activity are important tools of secondary prevention. It has been shown that knowledge about disease in a patient improves his treatment compliance and decreases many complications associated with a disease.<sup>13</sup>

The aim of the present study was to explore knowledge, attitude and practice of patients attending primary health care (PHC) centers for vitamin D supplement.

## 2. Methods

### 2.1. Setting and design

The study design is a descriptive cross-sectional one that was carried out in two PHC centers. Kuwait was divided into five health regions, and each individual in the population was linked to one of the PHC units that are available in all residential areas in Kuwait. Two health regions were selected randomly for conducting the study, Capital and Hawalli. From each one PHC center was chosen randomly (AlSalam health center in Hawalli region and AlKhalidiya health center in the Capital region). Within each selected center a list of all patients > 18 years old, newly diagnosed and receiving vitamin D therapy was prepared. This study was conducted during the period from August to December 2010.

### 2.2. Subjects

The study population was Kuwaiti and non-Kuwaiti patients who attend the PHC centers for treatment by vitamin D supplement. Upon reviewing the computerized database of the selected centers, all registered subjects aged  $\geq 18$  years within the enrollment period were identified (1050 registered patients were in AlSalam center and 795 were in Khalidiya), and a random sample of 200 patients were proportionally and electronically selected. Selected subjects were recalled for interview and their records were reviewed manually for extraction of the required information.

Subjects were eligible for the study if they were  $\geq 18$  years old, newly diagnosed with vitamin D deficiency, under vitamin D treatment and registered in the selected centers within the enrollment period. Subjects were excluded from the study, if they presented with acute disease during the last two weeks preceding the study or diagnosed earlier than a year.

### 2.3. Data collection

The necessary data were collected with a structured questionnaire and via the interviews between the trained interviewers and the eligible subject. Also, patients' records were reviewed for abstracting data regarding the intake of loading and maintenance dose of vitamin D. Loading dose was defined as monthly injection of weekly capsules of 50,000 IU and maintenance dose as 1000 IU/day for 8 weeks. The collected data included information related to patient's knowledge about the

**Table 1** General characteristics of participants.

Variables	Number	%
<i>Gender</i>		
Male	67	33.5
Female	133	66.5
<i>Age (years)</i>		
18–39	89	44.5
40–59	59	29.5
≥60	52	26.0
<i>Nationality</i>		
Kuwaiti	162	81.0
Non-Kuwaiti	38	19.0
<i>Education</i>		
Primary or less	69	34.5
Intermediate/secondary	44	32.0
University or higher	67	33.5
<i>Occupation</i>		
Unemployed	46	23.0
Worker	123	61.5
Clerk	17	8.5
Professional	14	7.0
<i>Marital state</i>		
Married	163	81.5
Unmarried	37	18.5
<i>Family income/month (KD)</i>		
<500	43	21.5
500–999	23	11.5
1000–1499	112	56.0
≥1500	20	10.0
<i>Vitamin D level (nmol/L)</i>		
<25	120	60.0
25–49	40	20.0
50–69	27	13.5
≥70	13	6.5
Total	200	100.0

signs and symptoms of vitamin D deficiency as bone pain, muscle pain and joint pain, attitude toward vitamin D treatment, right or wrong beliefs about the relation between vitamin D and some chronic diseases, practice regarding intake of loading and maintenance doses as well as exposure to health sun rays. The sources of patients' knowledge about vitamin D test was also inquired.

All the necessary approvals for carrying out the research were obtained. The Ethical Committee of the Kuwaiti Ministry of Health approved the research. A written format explaining the purpose of the research was prepared and signed by the participant.

### 3. Statistical analysis

Data were collected and coded then entered into an IBM compatible computer, using the SPSS version 12 for Windows. Simple descriptive statistics were used. Qualitative variables were expressed as number and percentage while quantitative variables were expressed as mean and standard deviation.

### 4. Results

The general characteristics of the participants were illustrated in table 1. The age of the participants ranged from 18 to 62 years with a mean =  $41.3 \pm 14.3$  years. Two thirds of them

were females and 33.5% were males, about one fifth of the sample were non-Kuwaiti, while the majority were Kuwaiti patients (81.0%). A one third of the participants were highly educated, only 7% positioned in professional jobs, the majority were married (81.5%), two thirds had monthly family income >1000 KD. The mean vitamin D level ranged from 4 to 76 nmol/L (mean =  $23.5 \pm 6.2$ ).

Table 2 illustrates the awareness of participants about their vitamin D hypovitaminosis, their knowledge and attitude regarding vitamin D. When the patients were asked about their complaining from vitamin D deficiency symptoms, 33.0% answered negatively, 38.5% mentioned that they did not know and only 28.5% answered positively. When asked about the relation between vitamin D deficiency and pain, about half of the patients (53.5%) answered correctly regarding bone pain, 20.5% refuse this relation and 26.0% have no knowledge about this issue. Similarly, 33.5% of the participants answered correctly about the presence of relation between vitamin D deficiency and joint pain, while 40.0% refuse this relation and 26.5% have no knowledge. Slightly more than one half (53.0%) of the participants did not related muscle pain to vitamin D deficiency and 26.0% have no knowledge about the topic, while only 21.0% knew the relation.

About one fifth of the participants (21.0%) believed that they feel better regarding musculoskeletal symptoms after taking treatment, while 20% did not believe that and the majority 59% did not know. When participants asked if they noticed that the level of vitamin D dropped again after stopping medication, 87.5% did not know or answered negatively, whereas 12.5% believed this issue. However, 73.0% of the participants thought that vitamin D deficiency related to some musculoskeletal diseases. When patients were asked about the relation between vitamin D and other diseases like cardiovascular, diabetes mellitus, depression, hypercholestermia, cancer and multiple sclerosis, only 29.5% believed positively, 21.5% negatively and 49% reported that they did not know. The majority of the patients (85.5%) agreed about the importance of sunshine as a source of vitamin D, 60.0% thought that they can get vitamin D from nutrients, milk products and oily fish.

Concerning the intake of the loading dose of vitamin D as monthly injection or weekly capsules, only about one third of the participants (30.5%), mentioned that they got the dose. Moreover, only 17.5% reported that they had the maintenance dose. More than a half of the participants (56%) reported that they spend less than three times per week under the sunshine for 20 min between the time 9 am–3 pm, while 25.5% practiced that 3–4 times and less than a fifth of cases practiced that from 5 to 7 times as shown in table. Table 3.

Table 4 illustrates participants' main sources of information regarding vitamin D deficiency, treatment and test. Less than half of participants (40.5%) depended on the physician to get information, 12.5% from the media, 29.0% from relatives and friends, 8.5% from their background information and 9.5% from journals and magazines.

### 5. Discussion

Individuals with vitamin D deficiency have proximal muscle atrophy and loss of type II muscle fibers. They usually recover within 6–12 months of vitamin D supplementation. These effects may be a direct consequence of the action of vitamin D

**Table 2** Participants' Knowledge and attitude regarding vitamin D.

Variables	Number	%
Are you complaining from vitamin D deficiency symptoms?		
No	66	33.0
Yes	57	28.5
Do not know	77	38.5
Does bone pain could be related to vitamin D deficiency?		
Yes	107	53.5
No/do not know	93	46.5
Does joint pain could be related to vitamin D deficiency?		
Yes	67	33.5
No/do not know	133	66.5
Does muscle pain could be related to vitamin D deficiency?		
Yes	42	21.0
No/do not know	158	79.0
Did you feel better regarding the musculoskeletal symptoms after taking the treatment courses?		
Yes	42	21.0
No/do not know	158	79.0
Did you notice that the level of vitamin D dropped again after stopping medication?		
Yes	25	12.5
No/do not know	175	87.5
Do you think that vitamin D deficiency is related to some musculoskeletal diseases?		
Yes	146	73.0
No/do not know	54	27.0
Do you think that vitamin D deficiency is related to other diseases like: cardiovascular, diabetes, depression, hypercholesterolemia, cancer and multiple sclerosis?		
Yes	59	29.5
No/do not know	141	70.5
Do you think that sunshine is an important source for vitamin D?		
Yes	171	85.5
No/do not know	129	14.0
Do you think that we can get vitamin D from nutrients as milk products and oily fish?		
Yes	120	60.0
No/do not know	80	40.0
Total	200	100.0

**Table 3** Participants' practice regarding vitamin D deficiency.

Practice	Number	%
Did you take the loading dose		
Yes	61	30.5
No/do not know	139	69.5
Did you take the maintenance dose		
Yes	35	17.5
No/do not know	165	82.5
Exposure to healthy sunshine/week		
0-2	112	56.0
3-4	51	25.5
5-7	37	18.5
Total	200	100.0

on specific receptors on skeletal muscle or mediated by the effects of vitamin D on serum calcium and phosphate.<sup>5</sup> The results of the current study revealed the lack of knowledge among the participants of the study regarding the effect of vitamin D deficiency. The low level of knowledge found in this study is in keeping with the reports of other studies that revealed that vitamin D deficiency has been associated with impaired muscle strength<sup>6</sup> and that inadequate vitamin D is associated with increased body sway.<sup>7</sup> In a similar study on hypertensive patients, it was shown that poor perception of

**Table 4** Participants' main sources of information about vitamin D test.

Source of information	Number	%
Physicians	81	40.5
Media	25	12.5
Relatives and friends	58	29.0
Patient him/herself	17	8.5
Reading journals and magazines	19	9.5
Total	200	100.0

good health and irregular visits to physician are some of the most important factors for unawareness, untreated and uncontrolled hypertension.<sup>14</sup> Also, the relatively lower levels of education of a considerable proportion of participants in this study could contribute to the lack of knowledge and awareness. Patient education plays a critical role in facilitating patients' acceptance of their diagnosis and understanding behavioral changes required for the participation in treatment.<sup>15</sup>

Vitamin D may play a role in muscle strength, pathogenesis of certain cancers, some skin and other chronic diseases. When patients were asked about the relation between vitamin D and other diseases like cardiovascular, diabetes mellitus, depression,

hypercholestermia, cancer and multiple sclerosis, only 29.5% believed positively.<sup>5-7</sup>

Although the best-characterized sequel of vitamin D deficiency involves the musculoskeletal system, a growing body of evidence suggests that low levels of vitamin D may adversely affect the cardiovascular system.<sup>16</sup> Clinical studies have reported cross-sectional associations between lower vitamin D levels and blood pressure, coronary artery calcification, and prevalent cardiovascular disease.<sup>16-18</sup> Despite these clinical observations, prospective data are needed because vitamin D deficiency could be a consequence of cardiovascular disease rather than a cause. Thus, patients knowledge regarding this issue could not be taken as an indicator for their awareness regarding the results of vitamin D deficiency.

Vitamin D is acquired both through nutritional means (10–20%) and by the cutaneous synthesis under the action of sunlight (80–90%).<sup>4</sup> Participants in our study had the right attitude toward sunshine, where 85.5% agreed about the importance of sunshine as a source of vitamin D, 60.0% thought that they can get vitamin D from nutrients as milk products and oily fish. It is indicated that patients with vitamin D deficiency had adequate general knowledge and awareness about the importance of sun rays as a source of vitamin D, but they did not practice enough exposure to sun as they have no comprehensive understanding of their condition.

Several factors have significant effects on serum vitamin D levels, including season, sunlight exposure, age, race and diet.<sup>19-22</sup> About one third of the participants mentioned that they got the loading dose of vitamin D and only 17.5% reported that they had the maintenance dose. These figures should be taken cautiously as many patients received the prescribed treatment without discussing its nature with their physicians due to the overload of work of them. Also, patients could have the impression that the treatment is for relieving their musculoskeletal symptoms. More than a half of the participants reported that they either not exposed or spend less than three times per week under the sunshine for 20 min between the time 9 am–3 pm, while 25.5% practiced that 3–4 times and less than one fifth of cases practiced that from 5 to 7 times. Other studies revealed that vitamin D is predominantly derived from exposure of the skin to solar ultraviolet B radiation.<sup>19,20</sup> Natural dietary sources of vitamin D are limited, unless fortification or supplementation practices are adopted.<sup>21</sup> Knowledge of vitamin D testing is confused between the participants. The lack of knowledge and beliefs may be related to the effects of different dress styles in working, where exposure to sunlight is supposed to be adequate in summer time and negligible in winter in Gulf countries. For religious and cultural reasons, women's dress styles range from those that totally cover the whole body, including the hands and face, to western-type dress styles. Women wearing these continue doing so during their working hours, but usually free themselves from these dresses inside their homes and this could expose them to deficiency.<sup>4</sup> Therefore, health education programs should be targeted at women through various media including leaflets, television, and radio.

We apologize certain limitations of this study. One of this limitation is non inclusion of many categories of patients who may have better knowledge, attitude and practice than those participated in the study. Another limitation is conducting the study in two centers only. However, the general character-

istics of the practice and the study population shared many of the features of all health structures available in Kuwait.

## 6. Conclusion

Our results indicated that the majority of the study participants had limited knowledge, poor practices, and negative attitude toward vitamin D problems and have to improve. Health care workers may play an important role in communicating health behaviors to the general public and planning health education interventions for this group of patients.

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