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Health education effects on attitude and practice regarding vitamin-D among students in Tabuk, Saudi Arabia

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ABSTRACT

Vitamin D deficiency is a global health concern and has been linked to numerous health disorders. We aimed to investigate the effects of health education on the knowledge, attitudes and practice of vitamin D deficiency among students in Tabuk City, Saudi Arabia. An interventional educational study was conducted among 100 students randomly chosen from secondary schools in Tabuk, Saudi Arabia during the period June to December 2016. All the participants signed a written informed consent. A structured questionnaire was used to assess the basic knowledge, attitude and practice of vitamin D deficiency at baseline and after educational sessions. The Statistical Package for Social Sciences (SPSS, Version, 20, New York) was used for data analysis. They were 100 male students, their ages ranged from (15-18) years. Only 2% new the daily-recommended vitamin-D dose versus 9% post-education, 11% knew the level in the blood versus 45% post-intervention. The participant's knowledge about risk factors and associations of vitamin-D deficiency ranged from 11-38%, 44% versus 54% post-education exposed to the sun. A significant improvement was found regarding the vitamin D knowledge, P-values< 0.05, while no differences were evident regarding the attitude and practice, P-value >0.05. The health education was beneficial with regards to vitamin D deficiency knowledge, but it was not effective in changing the attitude and practice of the participants, further larger longitudinal studies using more effective tools of health education and assessing the barriers to practicing the preventive measures of this major health problem.

1. INTRODUCTION

Vitamin-D a fat-soluble vitamin is mainly sensitized internally through the exposure to sunlight; it is present naturally in relatively little food, vitamin D leads to 85% of calcium and 40% of phosphate absorption from the gastrointestinal tract and is considered the most important factor in maintaining the bone mass density and musculoskeletal development [1]. In spite of the importance of the sun exposure in the synthesis of vitamin-D, the vitamin-D deficiency is highly prevalent in the sunniest region including the Middle East, Asia, Africa, and the Indian Sub-continent, vitamin D deficiency is considered among the most prevalent disease among children worldwide [2]. Vitamin D deficiency is historically linked to the development of musculoskeletal abnormalities (rickets and osteomalacia); there is an increasing awareness about the role of vitamin D deficiency in various diseases like coronary artery disease, hypertension type 1 and type2 diabetes mellitus, rheumatoid arthritis, and demylinating disorders [3].

Vitamin D deficiency is prevalent among all ages group worldwide, it is estimated that globally one billion people are affected by the vitamin deficiency or insufficiency, the deficiency was reported among males and females and even among healthy individuals [4], [5].

In the Kingdom of Saudi Arabia more than half of the adult population were either vitamin D deficient or insufficient, the deficiency was commoner among the younger age groups, women, and those with anemia. The wearing of traditional clothes that cover most of the body, avoidance of sun-exposure, and inadequate dietary intake are thought to be the principal factors associated with vitamin D deficiency [6].

The vitamin D deficiency is in addition to genetic predisposition could be linked to various human practices like lack of sun exposure due to environmental and cultural factors, obesity, job involving inactivity, lack of vitamin D supplementation, latitude, the type of clothes worn, and the use of sun blocks, and most importantly lack of health education [7]. Vitamin D deficiency is a preventable disease by raising the awareness about the risk factors associated with the vitamin deficiency and making the necessary lifestyle modifications [8]. Previous literature highlighted the importance of raising the awareness of the public as were health professional about vitamin D deficiency [9].

Raising the awareness about the importance of vitamin D for health and the deleterious effects of vitamin D deficiency could influence the attitude and behavior towards the lifestyles that contribute to the deficiency. The attitude and behavior towards sun exposure could be an influential factor towards healthier levels of vitamin D. Males usually fail to identify that they are at risk of vitamin D deficiency and they are under-recognized [8]. To our best of knowledge, no researchers have studied the effect of health education on the knowledge and attitude about vitamin D deficiency in Tabuk, Saudi Arabia, thus we conducted this research, in this study we assessed the effect of health education on the knowledge and attitude towards vitamin-D deficiency in Tabuk, the Kingdom of Saudi Arabia.

2. Material and Methods

2.1 Study design and participants

This interventional study was conducted among 100 secondary school students randomly selected from the twenty-one schools in Tabuk City, Saudi Arabia in Tabuk. Stratified methods was applied to select the participants. Five schools were selected and 100 students were chosen from the lists. First, the knowledge and attitude about vitamin-D was assessed using a structured pre-tested questionnaire. Two community physicians and an endocrinologist approved the questionnaire; it consisted of twenty-five questions of multiple-choice and short-answer questions.

2.2 Measures

A structured questionnaire was used to interview the participants.
The following information were collected:

- The general information about vitamin-D including: the daily requirements of vitamin-D, the daily requirements of vitamin-D IU, the level of vitamin-D in the blood, vitamin-D deficiency symptoms, the benefits of vitamin-D to the health, and the fact that 90% of Saudi females are vitamin-D deficient.
- The risks and associations of vitamin-D deficiency: Smoking and alcohol, soft drinks, osteoporosis, and rickets, inflammatory bowel diseases, and celiac disease.
- The preventive measure of vitamin-D deficiency including sun exposure, the frequency and timing of the exposure, the consumption of food rich in vitamin-D (eggs, fortified milk, and oily fish, if the patient is on vitamin-D supplements, and exercise

The researchers then educated participants in the form of group sessions, videos, and lectures then invited to respond to the same questionnaire after two months.

2.3 Data analysis

The Statistical Package for Social Sciences (SPSS, Version, 20, New York) was used for data analysis. The chi-square was used to compare categorical data, the data were presented as percentages range or mean± SD with a P-value of <0.05 considered significant.

2.4 Ethical consideration

All the participants signed a written informed consent. The ethical committee of the University of Tabuk approved the research.

3. Results

They were 100 participants, 60% were males. Their mean age ranged from 15 to 18years with a mean of ±sd. Only 2% knew the daily requirement of vitamin-D vs. 49% post education, with significant statistical difference (P-value <0.001). Sixteen percent vs. 4% knew the correct daily requirement of vitamin-D in IU with significant statistical difference (P-value <0.001), 10% pre-education vs. 3% post-education knew the level of vitamin-D in the blood with significant statistical difference (P-value <0.001). No participant knew vitamin-D symptoms vs. 50% post-education with significant statistical difference P-value <0.001. Table (1) illustrated the participant's general knowledge about vitamin-D.

Table 2. Depicted the risk factors of vitamin-D deficiency among the participants in which: twenty-nine percent vs. 36% thought that alcohol and smoking could lead to vitamin-D deficiency pre and post-education respectively with no significant statistical difference P-value 0.337. Eleven percent vs. 18% consume soft drinks prior to and post- education with no significant statistical difference P-value 0.123. in addition, 37% vs. 36% thought that vitamin-D should be measured at least once/year with no significant statistical difference P-value 0.539 and 30% and 37% knew that vitamin-D deficiency could lead to osteoporosis with no significant statistical difference P-value 0.075, while 28% vs. 36% knew that vitamin-D deficiency could lead to rickets with significant statistical difference P-value 0.028. Regarding the preventive measures of vitamin-D deficiency, 44% used to expose their face and limbs to the sun this increased to 54% post-education with no significant statistical difference P-value 0.749. In this study 15% of participants exposed their face and limbs to the sun two times/day, the number dropped to 10% post-education. Nine percent vs. 6% exposed their face and limb to the sun three times/day pre and post-education respectively, 5% vs. 3% exposed their face and limb to the son four times/day, while the number increased from 12% to 31% for those who exposed their face and limbs to the sun pos-education.

In the present study 5% of participants exposed their face and limbs < 15 minutes pre and post-education, 26% of participants used to expose their face and body to the sun from15-20 minutes/day the number stand at 24% post-education. The number of participants who exposed their body to the sun from 21-25 increased from 9% to 13% post-education with no significant statistical difference P-value 0.794.

In the current study 10% vs. 12%, 11% vs. 12%, and 29% vs. 26% exposed their face and limb to the sun in the morning, afternoon, and evening respectively with no significant statistical difference P-value 0.823. The number of participants who took vitamin-D supplementation dropped from 12% to 9% post-education with no significant statistical difference P-value 0.617. While, those who consume eggs, fortified milk or oily fish increased from 40% to 41% post-education with no significant statistical difference P-value 0.799, while those who that exercise could prevent vitamin-D deficiency increased from 39% to 40% post-education with no significant statistical difference P-value 0.689. Table (3).

Table 1. The participant's general knowledge about vitamin-D

Character	Pre	Post	P-value
Do you know the daily requirements of vitamin-D	2 (2%)	49 (49%)	0.000
Do you know the daily requirements of vitamin-D IU			0.000
A minimum of 400 IU	22 (22%)	0 (0%)	
500	2 (2%)	42 (42%)	
600	16 (16%)	4 (4%)	
700	10 (10%)	4 (4%)	
Do you know the level of vitamin-D in the blood	1 (1%)	47 (47%)	0.000
The level of vitamin-D in the blood is			0.000
12-15	23 (23%)	4 (4%)	
15-20	1 (1%)	42 (42%)	
20-50	10 (10%)	3 (3%)	
50-70	16 (16%)	1 (1%)	
Do you know the vitamin-D deficiency symptoms	0 (0%)	50 (50%)	0.000
Vitamin-D deficiency symptoms are			0.000
Nervousness	3 (3%)	0 (0%)	
Osteoporosis	41 (41%)	7 (7%)	
Weakness	5 (5%)	5 (5%)	
Muscular pain	0 (0%)	11 (11%)	
Increasing weight	1 (1%)	11 (11%)	
Depressed mood	0 (0%)	11 (11%)	
Is vitamin-D beneficial to your health	44 (44%)	48 (48%)	0.142
Ninety% of Saudi females had vitamin-D deficiency	16 (16%)	25 (25%)	0.026

Table 2. The participant's general knowledge about risk factors and associations of vitamin-D deficiency

Character	Pre	Post	P-value
Smoking and alcohol lead to vitamin-D deficiency	29 (29%)	36 (36%)	0.337
Do you consume soft drinks	11 (11%)	18 (18%)	0.123
Number of bottles	38 (38%)	39 (39%)	0.410
Vitamin-D should be measured at least once/year	36 (36%)	37 (37%)	0.539
Vitamin-D deficiency could lead to osteoporosis	30 (30%)	37 (37%)	0.075
Vitamin-D deficiency could lead to rickets	28 (28%)	36 (36%)	0.028

Vitamin-D deficiency is associated with crohn's disease	14 (14%)	20 (20%)	0.430
Vitamin-D deficiency is associated with celiac disease	10 (10%)	7 (7%)	0.718
Vitamin-D deficiency is associated with ulcerative colitis	10 (10%)	6 (6%)	0.489

Table (3): The participant's general knowledge about the preventive measures of vitamin-D deficiency

Character	Pre	Post	P-value
Do you expose your face and limbs to the sun	44 (44%)	54 (54%)	0.749
How many times do you expose your face and limbs to the sun		35 (35%)	0.001
Twice	15 (15%)	10 (10%)	
Three times	9 (9%)	6 (6%)	
Four times	5 (5%)	3 (3%)	
Five times	12 (12%)	31 (31%)	
other	9 (9%)	0 (0%)	
For how long do you expose your face and limbs to the sun			0.794
0-15 minutes	5 (5%)	5 (5%)	
16-20	26 (26%)	24 (24%)	
21-25	9 (9%)	13 (13%)	
other	10 (10%)	8 (8%)	
Which time do you expose your face and limbs to the sun			0.823
Morning	10 (10%)	12 (12%)	
Afternoon	11 (11%)	12 (12%)	
evening	29 (29%)	26 (26%)	
Do you consume egg, fortified milk or oily fish	40 (40%)	41 (41%)	0.799
Do you take vitamin-D supplements	11 (11%)	9 (9%)	0.617
Daily exercise could prevent vitamin-D deficiency	39 (39%)	40 (40%)	0.689

4. Discussion

Vitamin D deficiency could be detrimental to health. Contemporary evidence suggests a higher level of numerous serious health disorders among patients with the vitamin deficiency compared to others with sufficient levels. It is hypothesized that increasing the knowledge and raising the awareness about vitamin D health benefit could modulate vitamin D sufficiency [10]. In the present study, a significant statistical improvement was observed regarding the questions that assessed the knowledge about vitamin D deficiency pos-education.

It is interesting to note that there was no improvement in the practice regarding the measures of vitamin D prevention, namely sun exposure, consumption of food items rich in vitamin D and vitamin D supplementation. In the Kingdom of Saudi Arabia, there are no recommendation regarding vitamin D supplementation by the health authorities and the practice is left for the health institutions with a wide variation among doctors with different specialties towards prescription [11]. A plausible explanation for the lack of increasing vitamin D supplementation in the current study could be that the participants were not comfortable taking supplementation by themselves without referring to a doctor. This emphasize the importance of the establishment of guidelines and raising the awareness among health professional, another barrier may be the cost of supplementation [12]. The sun exposure an important source of vitamin D. however, it might be limited in Saudi Arabia due to cultural tradition. Other barriers to sun exposure could be for cosmetic reasons as some believe that it may be harmful to their skin because some are aware about the link

between sunrays, erythema, and skin cancer. Another reason could be the houses with limited outside areas and the lack of infrastructure that insure privacy for exposing the body for the sun [9]. Many are concerned about sun related eye diseases like cataract [13].

Many factors could combined to make difficult practice regarding vitamin D prevention, for example pavement are limited if not absent and if one wanted to spend a time outside a car is needed. Furthermore, due to the sedentary lifestyle, people move from home to his car to another place, it is difficult to walk. This is of severe implication on the general health in term of lack of physical activity as well as sun exposure.

In the Kingdom of Saudi Arabia, fish is not popular and a dramatic shift has been observed towards fast food at the expense of other rich in vitamin D [14], [15]. Thus, it is not surprising that there was no improvement in consumption of egg, oily fish or dairy products.

Milk and bread are fortified in Saudi Arabia; a recent study concluded that vitamin D Nano-emulsion is an efficient tool in micronutrient delivery that increased bone strength among rats [16], [17]. Fortification is an important tool in vitamin D deficiency; rice would be evaluated as stable food in Saudi Arabia.

5. Conclusion

Although health education has increased the knowledge about vitamin D deficiency, it was not translated into practice that could aid prevention; further larger studies using more effective tools of health education like health promotion campaign could be effective tools to achieve the desired effect. Researches with to assess the barriers to sun exposure, including the food rich in vitamin D in the diet, and vitamin D supplementation are highly needed.

Limitation of the study: The study had many limitations: The small sample of the study group, so it may not be representative of the population in Tabuk, the use of more specialized terms, levels may be more difficult to consolidate, and the education sessions were not longitudinal.

Conflicts of Interest: None to declare

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