



Evaluation of Vitamin D and Associated Factors in Working and Retired Teachers in Yazd, Iran

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ABSTRACT

Vitamin D is an essential nutrient for maintaining bone structure Existing evidence shows the high prevalence of vitamin D deficiency worldwide, especially in developing countries, including Iran. The aim of this study was to evaluation of Vitamin D and associated factors in teachers who working and retired in Yazd city 2011. Sixty eligible teachers were selected by systematic random sampling to participate in this cross sectional study. 2 ml of fast blood was



drawn and following separation of serum, 25-OH vitamin D was analyzed by enzyme-linked immunosorbent assay (ELISA) kit. Statistical analysis was done by SPSS softwarever16. P value < 0.05 was considered significant. Mean of serum 25-OH vitamin D in studied participants was 18.4. Overall, 90% of teachers had vitamin D deficiency. Prevalence of mild, moderate and severe forms of vitamin D deficiency was 23.3,35 and 31.7%, respectively. Results showed that there were significant differences in mean serum 25-OH vitamin D level in term of gender and body areas exposed to sunlight (P value= 0.01 and P value< 0.0001, respectively). Based in this study; there is a significant deficiency of vitamin D in both groups of participants (working and retired teachers) in Yazd city. Due to role of teachers in education of society and their awareness effects on community awareness, it is important to know effective factors of deficiency of vitamin D and appropriate approach to solve this problem. Meanwhile sensitization of teachers for vitamin d deficiency do facilitate any program of supplementation in schools.

Key words: Vitamin D Deficiency; Teacher; Working, Retired

Evaluación de la vitamina D y factores asociados en docentes activos y jubilados en Yazd, Irán

ABSTRACT

La vitamina D es un nutriente esencial para mantener la estructura ósea La evidencia existente muestra la alta prevalencia de deficiencia de vitamina D en todo el mundo, especialmente en los países en desarrollo, incluido Irán. El objetivo de este estudio fue evaluar la vitamina D y los factores asociados en docentes que trabajaban y se jubilaron en la ciudad de Yazd en 2011. Sesenta docentes elegibles fueron seleccionados mediante un muestreo aleatorio sistemático para participar en este estudio transversal. Se extrajeron 2 ml de sangre rápida y, tras la separación del suero, se analizó la 25-OH vitamina D mediante un kit de ensayo inmunoabsorbente ligado a



enzimas (ELISA). El análisis estadístico se realizó con el software SPSS ver16. Se consideró significativo un valor de $p < 0,05$. La media de 25-OH vitamina D en suero en los participantes estudiados fue de 18,4. En general, el 90% de los docentes tenían deficiencia de vitamina D. La prevalencia de las formas leve, moderada y grave de deficiencia de vitamina D fue del 23,3,35 y 31,7%, respectivamente. Los resultados mostraron que hubo diferencias significativas en el nivel medio de 25-OH vitamina D en suero en términos de género y áreas del cuerpo expuestas a la luz solar (valor de $P = 0,01$ y valor de $P < 0,0001$, respectivamente). Basado en este estudio; hay una deficiencia significativa de vitamina D en ambos grupos de participantes (maestros en activo y jubilados) en la ciudad de Yazd. Debido al papel de los maestros en la educación de la sociedad y sus efectos en la conciencia de la comunidad, es importante conocer los factores efectivos de la deficiencia de vitamina D y el enfoque apropiado para resolver este problema. Mientras tanto, la sensibilización de los maestros sobre la deficiencia de vitamina d facilita cualquier programa de suplementación en las escuelas.

PALABRAS CLAVE: Deficiencia de vitamina D; Docente; Trabajando; Jubilado

INTRODUCTION

Vitamin D is the most important hormones which are effective on calcium balance and healthy bones and teeth in associated with calcium, phosphorous (1,2). This vitamin may play an important role in prevention or decrease in severity of diseases like diabetes mellitus, hypertension, multiple sclerosis and some cancers (3,4). Deficiency of vitamin D can lead rickets, osteomalacia and

osteoporosis in child, adults and old people respectively (5-7). Deficiency of vitamin D in adults and osteomalacia is associated with loss of bone density, severe bone pain in legs, and back (7,8). Therefore, Ca, P and vitamin D have to use from youth in order to prevention of bone diseases (9-12).

It seems that deficiency of vitamin D can causes increased risk of breast cancer or prostate by weak immune system (13,14).



Deficiency of vitamin D is a common and serious topic that is known pandemic in world (15,16). Unexpected, it is more common in sunny countries like Middle East. Factors that are related to deficiency of vitamin D is: season, ethnic, latitude, cover, body mass, sun exposure, use of sunscreen, intake of Calcium (Ca) and vitamin D from foods and usage of vitamin supplements (17,18). Previous studies in Iran showed that there is significant prevalence of deficiency of vitamin D in different population groups (19,20). However it is important to know related factors of deficiency of vitamin D and appropriate approach to solve this problem (21). In base of high prevalence of deficiency of vitamin D, inadequate supply of vitamin and special coverage in Iran, it seems that evaluation of vitamin D and Ca in different sites of country could be health priorities. Due to role of teachers in education of society and awareness of their vitamin effects on community awareness and child promotion to receive vitamin D, the aim of this study was to evaluation of Vitamin D and

associated factors in teachers who working and retired in Yazd city 2011.

METHOD

This is a cross-sectional study. The participants were teachers who working and retired in Yazd city. Inclusion criteria were: age (20-70 years), residing in Yazd and satisfaction in cooperation. Exclusion criteria were: any diseases that is effective on vitamin D like Rheumatism, drugs that affect the metabolism of vitamin D like corticosteroids, pregnancy, breastfeeding, smoking and inject able vitamin D in the past 6 months.

Based on criteria, 60 teachers (working and retired) were assessed and any information likes age, occupation, sex, the time of sun exposure, sun-exposed area of the body, use of sunscreen, weight, length, BMI was recorded by questionnaire and tests. 2 ml of fast blood was drawn and following separation of serum, 25-OH vitamin D was analyzed by ELISA kit (DRG, Germany). Vitamin D status was divided to 4 levels base on the amount of 25-OH vitamin D: severe deficiency (less than 10 ng/ ml),



moderate deficiency (10-20 ng/ml), mild deficiency (20-30 ng/ml) and normal level (more than 30 ng /ml).

STATISTICAL ANALYSIS

Statistical analysis was done by SPSS softwarever16. In order to evaluation of normal distribution of serum vitamin and vitamin assessment based on independent factors in participants, Kolmogorov – Smirnov, ANOVA, and POST-HOC TUKEY was applied. P value < 0.05 was considered significant.

RESULTS:

In base of data in this study, 25-OH vitamin D follows a normal distribution in participants. The mean and standard deviation (SD) of 25-OH was 18.4 and 15.6 ng/ml respectively. Vitamin D status in

participants of this study is shown in table 1. Totally, 90% of subjects in this study suffer from different types of vitamin D (severe, moderate and mild) and 10 % were normal. Independent factors in participants were summarized in table 2. Vitamin D status based on independent factors is shown in table 3. The mean of 25-OH vitamin D has no significant changes in both groups of teachers (working and retired) (P= 0.34) although there was a significant decrease in females in comparison with males (P=0.01). Based on data that is shown in table 3, there was no significant correlation between 25-OH vitamin D and sex, Body mass index (BMI), the time of sun exposure, use of sunscreen, intake of Ca and vitamin D from foods. However, there was a significant difference between the mean of 25-OH vitamin D and sun-exposed area of the body.

Table1. Vitamin D status in participants



Vitamin D status	number	%
Normal	6	10
Slight Deficiency	14	23.3
Moderate Deficiency	21	35
Severe Deficiency	19	31.7
Total	60	100

Table2. Characterization of evaluated Independent factors in participants

Variable (Qualitative)	number	%
Occupation		
Working	30	50
Retired	30	50
Sex		
Male	30	50
Female	30	50
the time of sun exposure		
>1 hours	31	51.7
< 1 hours	29	48.3
sun-exposed area of the body		
Face	25	41.7
Face and hands	25	41.7
Face, hands and Arms	10	16.7
use of sunscreen		
yes	28	46.7
no	32	53.3
Variable (Quantitative)	average	Standard deviation
Age (year)	48.3	11.9
BMI (kg/m ²)	25.5	2.7
intake of vitamin D from foods	1.3	1.6
intake of Ca from foods	1049	433

Table3. Vitamin D status in participants according to Characterization of evaluated Independent factors



Variable	Concentration of 25-hydroxy vitamin D		P value
	average	Standard deviation	
Occupation			
Working	16.5	11	0.34
Retired	20.3	19.1	
Sex			
Male	23.4	19.5	0.01
Female	13.4	7.7	
the time of sun exposure			
more than 1 hours	21.7	19.5	0.09
lower than 1 hours	14.9	8.8	
sun-exposed area of the body			
Face	11.9	7.1	<0.0001
Face and hands	18.3	8.9	
Face, hands and Arms	35.2	28.5	
use of sunscreen			
yes	16.3	10.1	0.33
no	20.2	19.1	
Age (year)			
< 49.5	16.7	11.6	0.41
> 49.5	20.1	18.7	
BMI (kg/m ²)			
< 25.8	18	11.8	0.86
> 25.8	18.8	18.8	
intake of vitamin D from foods			
< 1	19.2	19.4	0.71
> 1	17.7	10.7	
intake of Ca from foods			
< 957	18.8	19.7	0.84
> 957	18	10.2	

DISCUSSION

This subject was the first study that is evaluated the prevalence of vitamin D

deficiency in teachers who residing in Yazd city. Based on results in this study, the prevalence of vitamin D deficiency was high



in teachers who working or retired and is focused on variable like sex and cover that is effective on vitamin D status. The result of this study is consistent with previous studies that the prevalence of vitamin D deficiency was 91.5 % in staff of hospital which was similar to 90% in this study (22). There was a similarity between this and previous study on sex that was significant. Generally, season, ethic, cover, BMI, sun exposure, use of sunscreen, intake of Ca and vitamin D from foods and usage of vitamin supplements is known as effective factors on vitamin D deficiency (16,17). Season, ethic, latitude was similar for all of participants and also usage of vitamin supplements was considered as exclusion criteria. Due to this, these variables was not evaluated in this study. The gather of samples was done in a season when sunshine was intense, because this is the best situation for vitamin d state. Nevertheless, the prevalence of vitamin D deficiency was as a healthy problem in Yazd. The causes could be avoided of exposure to direct sunlight especially on sunny days and inadequate activity in open spaces²³. Different studies in tropical

countries like China, India, Turkish, Kuwait, Saudi Arabia and Iran showed that vitamin D deficiency is more common although there is an adequate sunlight that related reasons were considered avoided of exposure to direct sunlight and cover. Another study in Isfahan, Iran, 2005, showed that vitamin D deficiency was 4 times more in female students compared to male (20). In base of these studies and present study, the prevalence of vitamin D deficiency is higher in females in comparison with males (19,20,24). Due to cover in men, the prevalence of vitamin D is lower than female. Although veiling may act as a precipitating factor but high prevalence of deficiency in male show that style of life is more important than the veiling in our region (25). Data of this study showed that vitamin D status in participants is related to lack of outdoor activity or avoidance from sun due to cosmetic reason or high intensity of sun ray that people prefer not to expose. The results of this study had similarity with Hashemi pour' study in variables like: the time of sun exposure, use of sunscreen, BMI, intake of Ca and vitamin D from foods



¹⁹. There was no significant difference in 25-OH vitamin D in working and retired teachers that it could be due to doing activity in close spaces. Another study in Brazil was shown that there is deficiency of vitamin D in teenager due to inadequate intake of vitamin D (26).

CONCLUSION

Based in this study; there is a significant deficiency of vitamin D in both groups of participants (working and retired teachers) in Yazd city. Due to role of teachers in education of society and their awareness effects on community knowledge, it is important to know effective factors of deficiency of vitamin D and appropriate approach to solve this problem.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Ethics committee of Shahid Sadoughi University of Medical Sciences.

CONSENT FOR PUBLICATION

A consent form was prepared from all participants in the study.

AVAILABILITY OF DATA AND MATERIAL

Not applicable.

COMPETING INTERESTS

There is no competing interests.

AUTHORS' CONTRIBUTIONS

Study design was done by all authors. All author done writing and reviewing of the manuscript. MO carried out data collection. HZZ was one data analysis. SASB contributed in data collection. MS designed and managed the study

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