



Measurement Of vitamin D Deficiency and Calcium Level in Western Libya

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الملخص :

الخلفية: لقد انتشر نقص فيتامين د على نطاق واسع بين مختلف الأعمار وأصبح مشكلة صحية مجتمعية كبرى. والأكثر من ذلك، زيادة معدلات نقص فيتامين د في المناطق المشمسة في العالم، مثل ليبيا التي تعتبر أهم مصدر لفيتامين د. الهدف: تهدف هذه الدراسة إلى تقييم نقص فيتامين د إلى جانب حالة الكالسيوم بين السكان. في غرب ليبيا. المنهجية: تم إجراء دراسة مقطعية على مدار تسعة أشهر بدءًا من بداية يناير وحتى نهاية سبتمبر 2022. وتم طلب المشاركين المستهدفين لجمع عينات، من المنطقة المذكورة، والتي تكونت من عدد = 140 حالة، منهم 48 ذكوراً يمثلون 34% من عينة الدراسة، بينما تمثل الإناث 66%، الفئة العمرية (33-44) بنسبة 33%، بينما أقل فئة عمرية من حيث عينة الدراسة كانت أقل من 12 سنة مع بنسبة 8% من إجمالي العينة. وبالتالي، تم قياس مستوى الكالسيوم في الدم 25-هيدروكسي فيتامين د ((25(OH) D)) ومستوى الكالسيوم باستخدام طريقة المقايسة المناعية الإنزيمية. النتائج: تم جمع البيانات وتحليلها إحصائياً باستخدام برنامج Spss. تم استخدام برنامج v.26. ولذلك فإن 30% من عينة الدراسة لديهم نقص في فيتامين د، و42% غير كاف بينما 28% في المعدل الطبيعي. علاوة على ذلك، لا توجد علاقة بين فيتامين د والكالسيوم.

الاستنتاج: أظهرت نتائج هذه الدراسة أن نقص فيتامين د كان مرتفعاً جداً بين السكان في غرب ليبيا، كما لا يوجد ارتباط بين نقص فيتامين د ونقص الكالسيوم.

الكلمات المفتاحية : فيتامين د، مستوى الكالسيوم، المناعة الإنزيمية.

Abstract

Background: Vitamin D deficiency has widely spread among different ages and become a major community health problem. What's more, increased the rates of hypovitaminosis D in the sunniest areas of the world, such as Libya which considered as the most important source of vitamin D. **Objective:** This study was aimed to assess of a vitamin D

deficiency alongside with calcium status among populations in Western Libya. **Methodology:** a cross-sectional study was done over the course of nine months starting from the beginning of January to the end of September 2022. The targeted participating's were requested for samples collecting, from the mentioned area, which consisted of n= 140 cases, including 48 males, representing 34% of the study sample, while females representing 66%, the age group (33-44) with a rate of 33%, while the lowest age group in terms of the study sample was less than 12 years with a rate of 8% of the total sample. Thus, in parallel way both Serum 25-hydroxyvitamin D (25(OH) D) and calcium level were measured using an enzyme immunoassay method. **Results:** data were collected and analysed, statistically Spss. v. 26 software was used. Therefore, 30% of the study sample have a deficiency in vitamin D, 42% Insufficient while 28% are in the normal range. Furthermore, there is a no correlation between vitamin D and calcium. **Conclusion:** findings in this study showed that vitamin D deficiency was so high among population in western Libya, also there is no association between vitamin D deficiency and Ca⁺ deficiency.

Keywords: vitamin D, calcium, enzyme immunoassay.

INTRODUCTION

In 1920 it was first discovered of vitamin D by Mellanby, since then, the important of vitamin D has been increased in particular among the researchers and healthcare specialists [1]. Because it is created in the body when exposed to sunshine, which is thought to be the main source of vitamin D, it behaves more like a hormone than a vitamin, outcome 7-dehydrocholesterol to be processed in response to ultraviolet B (UVB), in addition, in liver organs metabolized process resulted in 25-hydroxyvitamin D – 6+–hich is used to investigation of vitamin D status and the most accurate marker [2].

The main function of vitamin D, regulates mineral metabolism and skeletal health, by stimulation of gut calcium and phosphate absorption, further, play a crucial role in osteoclast differentiation and calcium reabsorption from bone and encourages mineralization of the bone matrix [3].

On contrary, unbalanced minerals resulted in severe skeletal defects and frank hypocalcaemia, also related to various types of cancer and autoimmune disorders, such as type 1 diabetes mellitus (T1D), ultiple sclerosis (MS) and inflammatory bowel disease, and some serious developments of cardiovascular diseases, all considered as vitamin D deficiency outcomes [4,5].

In term of diagnostic and detection, vitamin D definition level below 20 ng/mL (50 nmol/L) categorise as deficiency, whereas, 20 to 29.9 ng/mL (52-72 nmol/L) ringing level defined

as insufficiency, however, above 30 ng/mL (75 nmol/L) considered as sufficient level, but the toxicity level for the majority of general population is 80 to 100 ng/ml [6,7].

Calcium regulation and vitamin D

Calcium is a vital element in the body, involved in several biological processes such as muscle contraction, hormone secretion and clotting cascade, thus considered as the fifth most component. In order to maintain calcium within normal level in the blood, there are three molecules which regulate the amount of calcium, including vitamin D, parathyroid hormone and calcitonin which completed in the kidney [9,11]. The most regulator of serum calcium is vitamin D with a half-life of about six hours, and considered as long-term regulator, its main function is to promote the intestinal absorption of calcium, and can be metabolised as cholesterol precursor to 7-dehydrocholesterol which in turn converted into vitamin-D3 under effects of UV radiation, as a consequence of this, in the liver vitamin-D3 is transformed to inactive compound called 25-hydroxyvitamin-D, this in turn, converted to 1,25-dihydroxyvitamin-D, under effects of 1- α -hydroxylase [8,9,10] as shown in next diagram.

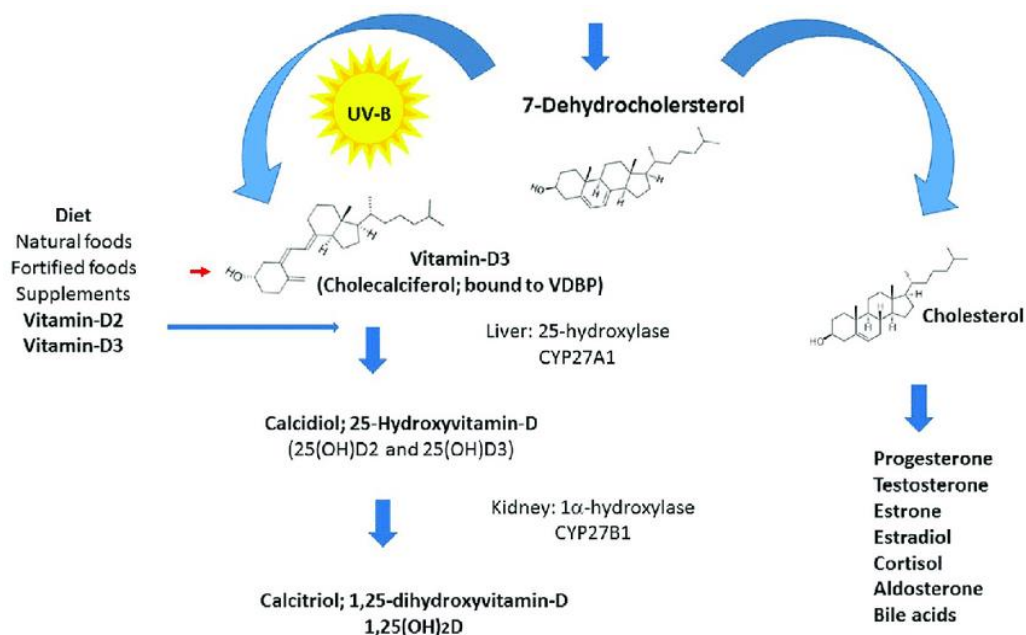


Figure 1 Schematic diagram of Vitamin D synthesis

AIM OF THIS STUDY

This study aimed to determine vitamin D deficiency alongside with calcium serum to assess any relationship, in western Libya (Zahra, zawiya).

SUBJECTS AND METHODS

A cross-sectional study was conducted, over a period of nine months from the beginning of January to the end of September 2022. The targeted participating's were requested

for samples collecting, from the mentioned area, which consisted of n= 140 cases, including 48 males, representing 34% of the study sample, while females representing 66%, the age group (33–44) with a rate of 33%, while the lowest age group in terms of the study sample was less than 12 years with a rate of 8% of the total sample. All participants provided written informed consent. The University Ethics Committee approved the protocol. Thus, in parallel way both Serum 25–hydroxyvitamin D (25(OH) D) and calcium level were measured using an enzyme immunoassay method.

Statistical analysis

Spss. v. 26 software was used to analyse the data of this study

Results

The study sample consisted of n= 140 cases, including 48 males, representing 34% of the study sample, while females representing 66%, the age group (33–44) with a rate of 33%, while the lowest age group in terms of the study sample was for the age group less than 12 years with a rate of 8% of the total sample. 30% of the study sample have a deficiency in vitamin D, 42% Insufficient while 28% are in the normal range. Also, our data show there is no association between vitamin D deficiency and Ca⁺ deficiency.

Table.1: Distribution of cases according to gender

Gender	frequency	Percentage
Male	48	34%
Female	92	66%
Total	140	100%

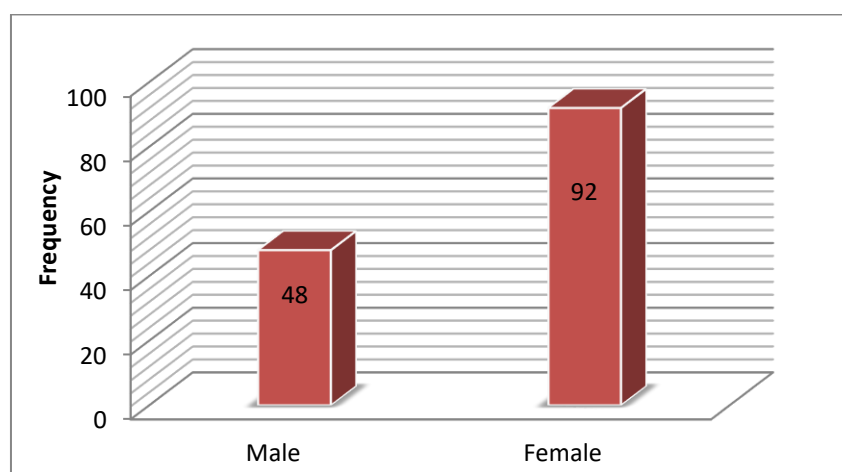


Figure.2: Distribution of subjects according to gender

Figure2 , table (1): illustrated that a total of (140) cases, including 48 males, representing 34% of the study sample, while females representing 66%.

Table.2: Distribution of cases according to age groups

Age	Frequency	Percentage
Less than 12	11	%8
12 – 22	21	%15
23 – 33	32	%23
34 – 44	47	%33
More than 44	29	%21
TOTAL	140	%100

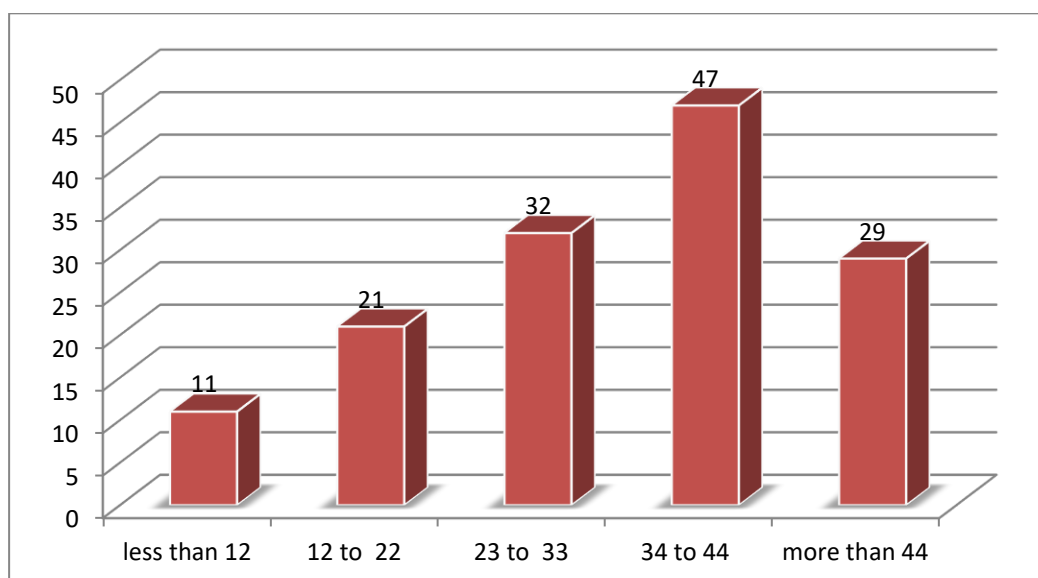


Figure.3: Distribution of cases according to age groups

Based on table, figure 3, it is clear that the largest percentage was for the age group (33–44) with a rate of 33%, while the lowest age group in terms of the study sample was for the age group less than 12 years with a rate of 8% of the total sample.

Table 3 Shows prevalence of Vit. D status among participant

Status	Frequency	Percentage
Deficient	42	% 30
Insufficient	59	%42

sufficient	39	%28
toxicity	0	%0
TOTAL	140	%100

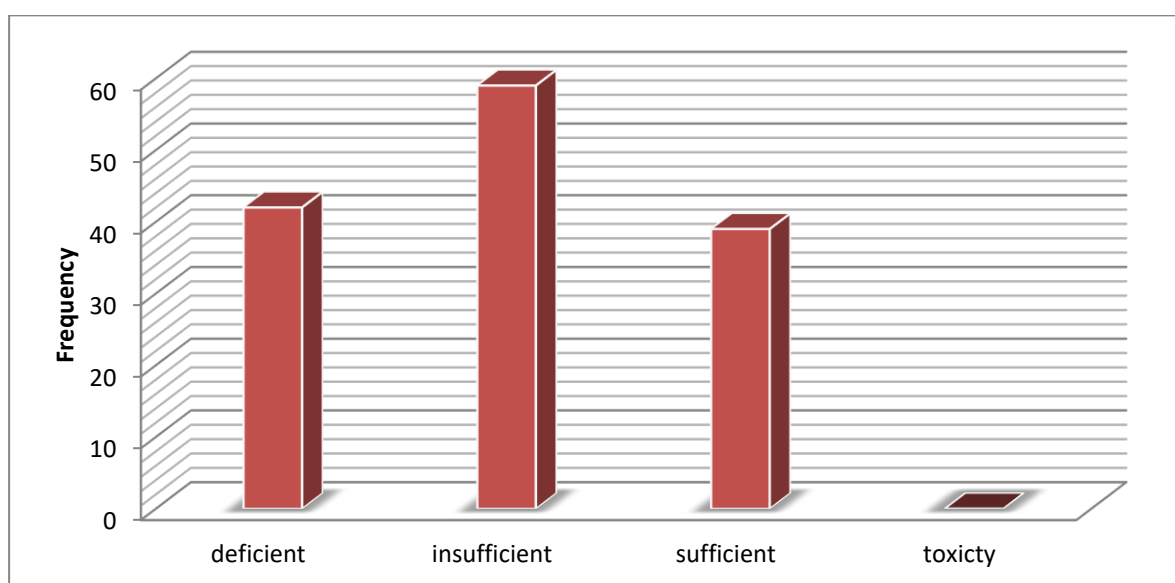


Figure. 4: Shows Vit. D status among participant

Based on table, figure (4): It is clear from 30% of the study sample have a deficiency in vitamin D, 42% are in the average, while 28% are in the normal range.

Discussion

This study was conducted in capital suburbs in western Libya (Zahra, zawiya) that located in sunny region. As mentioned early in this study, vitamin D has been defined as a serum 25 (OH) as well as an active molecular and diagnostic marker (Ginde, A. A. *et al.*, 2009). Data in this study were presented to show gender participation as illustrated in figure and table 1, which were about 34%,66% male and female respectively, further, 19 of the males have a deficiency in vitamin D compared to 23 of the females. Furthermore, in regardless to gender, participating were classified according to ages group, what's more, provided useful advantages as it covers most ages group in the targeted region as demonstrated in figure, table 2, The prevalence of vitamin D deficiency was 30%, 42%(Deficient, Insufficient) respectively , the age group was less than 12 years old, of whom 9.5% of this group had a deficiency in the vitamin, while the age group 12–22 years old

had 26% of them had a deficiency in the vitamin, . Thus, they most suffering from a deficiency of vitamin D was the age group 23–33 years, with a rate of 38%. As for the age group, whose age is more than 44 years, about 12.5% of them suffer from vitamin deficiency, and all together higher than 70% among study subjects who suffering from vitamin D health problem, among the population in western Libya (Zahra, zawiya). on contrary, the normal average was approximately 28% from the representative group as shown in table, figure 3. The high prevalence of vitamin D deficiency seen among study subjects is in an agreement with previous studies published in African (Afaf, A. et al., 2019), (64.99%), Americans, Hispanics (69.2%) (Forrest, K. Y., & Stuhldreher, W. L. 2011; Wu, Y. et al., 2017), and in Sri Lanka (57.2%) (Rodrigo, M. et al., 2013).

In addition, as it has been well documented that, vitamin D considered as one of the most regulated of calcium molecular in the body (James C. Fleet 20017), data in this study showed that there is no association between vitamin D deficiency and calcium, and the statistical analysis was non–significant, as the value of the Pearson correlation coefficient was equal to 0.041, which is a non–significant value at the significance level of 0.05. and this result was in disagreement with previous study published by Eljamay SM and *etal* 2022.

CONCLUSION and FUTURE STUDIES

Vitamin D is increasingly becoming a public health condition not only in not sunny country region. It can be concluded that Vitamin D deficiency is a common health issue in population in in western Libya (Zahra, zawiya). Our findings demonstrated that higher prevalence of vitamin D deficiency was more in females than males especially in severe vitamin D deficiency which was 23 in females and 19 in males. The higher prevalence of vitamin D deficiency was in age groups (23–33) in both gender. Moreover, there is no association between vitamin D deficiency and calcium serum. In the future, more and larger clinical and repetitive study are needed to determine how vitamin D deficiency are spread in different area, the obtained findings has risen alarm for health care department to take its main roles.

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