

Original article

Preliminary Study of Vitamin D Deficiency and Its Associated Risk Factors in Libya

Mahmud Abushhewa^{1*}, Abdulati Salem², Ramzi Mohsen³, Embarka Aqila⁴, Abdusalam Mahmoud⁵

¹Department of Biochemistry and Molecular Biology, Faculty of Medicine, Azzaytuna University, Libya

²Department of Biochemistry, Faculty of Medicine, University of Misrata, Libya

³Department of Pharmacology and Toxicology, Faculty of Medicine, Azzaytuna University, Libya

⁴Faculty of Medical Technology, Azzaytuna University, Libya

⁵Department of Preventive Medicine, Faculty of Veterinary Medicine, University of Tripoli, Tripoli, Libya

ARTICLE INFO

Corresponding Email. alhmroni832004@yahoo.com.au

Received: 28-11-2023

Accepted: 30-12-2023

Published: 02-01-2024

Keywords. Vitamin D, Risk Factors, Hypovitaminosis, Libya.

Copyright: © 2024 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>

ABSTRACT

This study was conducted to investigate levels among the target population and its associated risk factors in Libya. A cross-sectional study was conducted to investigate level and its associated risk factors in Libya during 2022-2023. 192 serum samples were tested in private laboratories. A structured designated questionnaire was filled in containing all the relevant information. Descriptive analyses frequency and percent were measured for numerical data, number, and percent for qualitative data using SPSS version 22. The chi-square test and student t-test were used for the data analysis and to investigate the level of association among variables at the significance level of ($p < 0.05$). The ratio of female to male included in this study was estimated to be (77.04%) and (22.96%) respectively. Our results reported mean average of level among male (15.59 mg/dl), while in female (11.45 mg/dl), the results reported sex based significant difference ($p = .00009$). The present study results reported an overall average (12.40 mg/dl) of level. Regarding the age categories, our results reported variable differences in the levels, however there is no statistically significant difference ($p = 0.894$). The results showed that using supplements for hypovitaminosis did not significantly influence therapeutic outcomes. The mean average level among males was significantly higher than those in females; however, both levels in the two groups are in the deficiency category. Interestingly the group who received treatment of vitamin D, their level was lower than the group who did not receive treatment.

Cite this article. Abushhewa M, Salem A, Mahmoud A, Mohsen R, Embarka Aqila E. Preliminary Study of Vitamin D Deficiency and Its Associated Risk Factors in Libya. *Alq J Med App Sci.* 2024;7(1):7-10. <https://doi.org/10.54361/ajmas.2471002>

INTRODUCTION

(Vitamin D) is an essential fat-soluble vitamin that is required for regulation of calcium metabolism in the human body and consequently is considered important to maintain bone health [1]. Is acquired through dietary sources or synthesized in the human skin via exposure to ultraviolet B (UVB) radiation. Vitamin D deficiency is highly prevalent in sunny countries such as Libya. According to different studies within the country indicated a high rate of vitamin D deficiency among the Libyan population [1, 2]. However, data is scarce about the prevalence of vitamin D deficiency in the country.

Hypovitaminosis D is reported to be significantly higher among various age groups, especially in females, when compared to countries with less sunny climates [3]. Biological demand for in humans is met either by exogenous

sources (dietary supplements) or through *de novo* synthesis aided by exposure to ultraviolet light (90% of the total requirement) [3]. Vitamin D deficiency has been recognized as an international public health problem due to its important role in the physiological body functions and vital role in the maintenance of healthy status and functional capacities for the most body systems, mainly for the skeletal system where vitamin D deficiency causes rickets, osteomalacia, and osteoporosis [4]. It's well-known that, Sunlight is an important source for VD. Also, nutrients like milk products and oily fish are considered sources of vitamin D [5]. Vitamin D deficiency was highly prevalent in adult populations within Libya. Studies from Libya have reported that the prevalence of vitamin D deficiency is rather more prominent among women compared to men [6]. Therefore, vitamin D deficiency could be as predisposing factors for occurrence various metabolic disorders and increase the potential risk of infectious diseases in Libya. High prevalence rates of osteoporosis, osteopenia, and osteoarthritis were reported from Libya [7]. Females were significantly better for testing their status than males. Studies from Libya denote that females are more susceptible to conditions necessitating investigation than males as women are less exposed to sunlight [8, 9]. In spite, various researches that have been published so far to understand the potential risk factors and impacts of vitamin D deficiency, still, there is a scarcity of information regarding values (levels) among different Libyan populations [2, 10]. Furthermore, the misunderstanding and misuse of extensive medical and non-medical description related to therapy might be lead to an adverse effect. Therefore, this study was conducted to investigate level among the target population and to assess most potential risk factors associated vitamin D deficiency.

METHODS

A cross-sectional study was conducted to investigate level and its associated risk factors in Libya during 2022-2023. Total of 192 serum samples were tested in private laboratories. A structured designated questionnaire was filled in containing all the relevant information. Descriptive analyses frequency and percent were measured for numerical data, number, and percent for qualitative data using SPSS version 22. The chi-square test and student t-test were used for the data analysis and to investigate the level of association among variables at the significance level of $p < 0.05$.

RESULTS

Over all 192 samples were collected in our study with mean age 36.7 years. In this study, 77% of the sample were females. The mean average of vitamin D level of this study was 12.4 ng/ml. The personal characteristics of the participants are listed in Table [1].

Table 1. The personal characteristics of the participants.

Total Number	192
Age (mean) y	36.77
Urban (%)	48.95
Female (%)	77.08
weight (mean) Kg	66.45
White (%)	77.08
Sun exposure (%)	65.62
Non-vegetarian (%)	60.41
Vitamin D supplement therapy (%)	44.79
Vitamin D level (serum concentration) (mean) ng/ml	12.40

As shown in table [2] females have lower vitamin D level in comparison with males (11.4 ng/ml) $p < 0.05$. Interestingly people who received vitamin D therapy had lower vitamin D level (11.9 ng/ml) ($P=0.4$). Light skin color people have lower Vitamin D level (11.8) ($P=0.1$).

Considering age groups, most of the sample among different age groups lie in deficiency category as shown in table [3].

Table 2. The relationship between vitamin D level and associated risk factors

Risk factors	Mean Vitamin D level (ng/ml)	P value
Male	15.59	0.0009
Female	11.45	
Treated	11.97	0.4622
Non-treated	12.70	
White skin	11.84	0.1039
Colored skin	14.21	

Table 3. The univariant analysis of Vitamin D and associated risk factors (age)

Age group	Samples Tested	Vitamin D Level (%)			p-value
		Deficiency	Inadequate	Normal	
30-49 Year	150	86%	11%	3%	0.894
50-69 Year	37	89%	8%	3%	
≥70 Year	5	100%	0	0	

DISCUSSION

Vitamin D deficiency has been an increasingly public concern among Libyan people in recent years. It is crucial for both researchers and physicians to comprehensively understand the various risk factors influencing levels. Recognizing these factors is essential for effective prevention and management strategies. The present study revealed a high frequency of vitamin D deficiency among the targeted population under the study. In line with previous studies reported a high level of vitamin D deficiency in the Libyan population [2,10]. Our study identified a notable gender disparity in testing, with females exhibiting a higher tendency to assess their status compared to males. This gender-based difference has implications for healthcare awareness and education programs. The mean age group was the middle age and this gives a clue that this particular age group are more interested in investigating vitamin D levels than in the older age groups. Youngers and kids are not well represented in this study may be because there is not enough awareness that their needs to be checked either by the family or pediatric physicians.

Regarding age groups, in our study there is no difference in levels among different age groups. Other studies suggest elderly are more willing to administer than younger age groups [11]. This could be equally true in Libyan society however, it is not apparent in our study. In accordance with other studies, the mean level in the whole sample was in the deficiency category [1,10,12]. For that reason, this could be explained by; first: the data was collected from people seeking medical advice so they may have already diseases affect their level. Life style of Libyan people have changed in the recent decades toward more sedentary style [13]. Level was significantly lower in the female group than in the male group may be due to less exposure to the sunlight, even though the food system is typical for both [13]. White-skinned people should have higher levels [11]; however, in our study, it was lower. Ethnic variations regarding receptors could be an explanation but this needs more biochemical studies [13].

The findings of our study highlight a substantial frequency of deficiency within the targeted population. This observation emphasizes the urgent need for interventions and public health initiatives to address this nutritional concern. People receiving therapy have surprisingly lower levels as compared to people not taking drug therapy and this may be attributed to the lack of data concerning their base level before they started the therapy. Moreover, details about the regimen they are taking are completely lacking in this study. In Libya, most people are not following guidelines in getting therapy or following standard international protocols. Our study sheds light on a concerning trend in Libya, where a significant portion of the population does not adhere to established guidelines for therapy. This non-compliance emphasizes the necessity for targeted educational campaigns and healthcare policy interventions. Despite the valuable insights gained from this study, it is imperative to acknowledge its limitations, notably the relatively small sample size. Nevertheless, there are some limitations during this study either to the limited number of the targeted population and need to be expanded in further studies. In addition, the Inter-laboratory variability techniques. However, this study is still representative of valuable results regarding the deficiency in this country. Further studies should include more data and an expanded on the national level. It should cover details about drug therapy protocols and patient compliance.

CONCLUSION

The mean average of level among males was significantly higher than those in females; however, both levels in the two groups are in the deficiency category. Interestingly the group who received treatment of vitamin D, their level was

lower than the group who did not receive treatment. This study recommends further expanded national studies should be conducted to include a broader spectrum of variables, including lifestyle factors, dietary habits, and geographical considerations, to facilitate a more comprehensive analysis of deficiency in Libya.

Conflict of interest. Nil

REFERENCES

1. Al-Graiw M, Draid M, Zaidi A, Al-Griw H. Serum Vitamin D levels and associated risk factors among Libyan females living in Tripoli, Libya: A Cross-sectional Study. *Libyan J Med Sci.* 2020;30:156.38.51.140.
2. Holick M. Vitamin D. A millennium perspective. *J Cell Biochem.* 2003;88:296-307.
3. Sniadecki J, Sniadecki J. (1768 –1838) on the cure of rickets. (1840) Cited by W Mozolowski. *Nature* 1939;143:121– 4
4. Holick MF. Resurrection of vitamin D deficiency and rickets. *J Clin Invest* 2006;116:2062–72.
5. Hess AF. Collected writings, volume I. Springfield, (IL): Charles C Thomas; 1936:669 –719.
6. Hess AF, Unger LJ. The cure of infantile rickets by sunlight. *JAMA* 1921;77:39.
7. A British paediatric association report. Infantile hypercalcaemia, nutritional rickets, and infantile scurvy in Great Britain. *Br Med J* 1964;1: 1659 – 61.
8. Brot C, Vestergaard P, Kolthoff N, Gram J, Hermann AP, Sorensen OH. Vitamin D status and its adequacy in healthy Danish perimenopausal women: relationships to dietary intake, sun exposure and serum parathyroid hormone. *Br J Nutr* 2001;86:S97–103.
9. Atia A, Arhoma S. Epidemiological study of Vitamin D deficiency among Libyan patients. *MRIMS Journal of Health Sciences.* 2022;10(1):14-17.
10. Dinu M, Fulgoni V, Zhou F, Zheng J, Zhang L. Prevalence, trend, and predictor analyses of vitamin D deficiency in the US population, 2001–2018. *Front Nutr.* 2022;9:965376.
11. Nasef A, Hassan M, El- Taguri A, Ali Nagi A. Prevalence of vitamin d deficiency in central region of libya. *Int J Adv Res (Indore).* 2020;8(5):988-994.
12. Buzgeia M, Madi M, Hamza M, El-Taguri H. Modern and Traditional Fast Foods Consumption in Benghazi, Libya. *J Inter Med Res Health Sci.* 2021;1(2): 26-35.
13. Hsu S, Hoofnagle A, Gupta D, Gutierrez O, Peralta C, Shea S, et al. Race, Ancestry, and Vitamin D Metabolism: The Multi-Ethnic Study of Atherosclerosis. *J Clin Endocrinol Metab.* 2020;105(12):e4337–50.

دراسة أولية لنقص فيتامين د وعوامل الخطر المرتبطة به في ليبيا

محمود أبوشهيو^{1*}، عبد العاطي سالم²، رمزي محسن³، امباركة عقيلة⁴، عبدالسلام محمود⁵

¹قسم الكيمياء الحيوية والبيولوجيا الجزيئية، كلية الطب، جامعة الزيتونة، ليبيا

²قسم الكيمياء الحيوية، كلية الطب، جامعة مصراتة، ليبيا

³قسم الأدوية والسموم، كلية الطب، جامعة الزيتونة، ليبيا

⁴كلية التقنية الطبية، جامعة الزيتونة، ليبيا

⁵قسم الطب الوقائي، كلية الطب البيطري، جامعة طرابلس، ليبيا

المستخلص

أجريت هذه الدراسة لمعرفة مستوى فيتامين د بين السكان المستهدفين وعوامل الخطر المرتبطة به في ليبيا. أجريت دراسة مقطعية لمعرفة مستوى فيتامين د وعوامل الخطر المرتبطة به في ليبيا خلال الفترة 2022-2023. تم فحص إجمالي 192 عينة مصل في المختبرات الخاصة. تم ملء استبيان منظم مخصص يحتوي على جميع المعلومات ذات الصلة. تم قياس تكرار التحليلات الوصفية والنسبة المئوية للبيانات العددية والعدد والنسبة المئوية للبيانات النوعية باستخدام SPSS الإصدار 22. وتم استخدام اختبار مربع كاي واختبار الطالب t لتحليل البيانات وللتحقق من مستوى الارتباط بين المتغيرات في مستوى الأهمية $P < 0.05$. قدرت نسبة الإناث إلى الذكور المشمولة في هذه الدراسة بـ (77.04%) و (22.96%) على التوالي. أبلغت نتائجنا عن متوسط مستوى فيتامين د بين الذكور (15.59 ملغم / ديسيلتر)، بينما لدى الإناث (11.45 ملغم / ديسيلتر)، أشارت النتائج إلى اختلاف كبير على أساس الجنس $p=0.00$. أظهرت نتائج الدراسة الحالية متوسطاً إجمالياً (12.40 ملغم / ديسيلتر) لمستوى فيتامين د. فيما يتعلق بالفئات العمرية، أشارت نتائجنا إلى اختلاف المتغيرات في مستويات فيتامين د، ولكن لا يوجد فرق ذو دلالة إحصائية ($P = 0.894$). أظهرت النتائج أن استخدام مكملات فيتامين د لنقص الفيتامين لم يؤثر بشكل كبير على النتائج العلاجية. كان متوسط مستوى فيتامين د بين الذكور أعلى بكثير من نظيره لدى الإناث، ومع ذلك، فإن مستويات فيتامين د في المجموعتين تقع في فئة النقص. ومن المثير للاهتمام أن المجموعة التي تلقت العلاج بفيتامين د، كان مستوى فيتامين د لديها أقل من المجموعة التي لم تتلق العلاج. وتوصي هذه الدراسة بإجراء المزيد من الدراسات الوطنية الموسعة لتشمل المزيد من متغيرات البيانات.

الكلمات الدالة. فيتامين د، عوامل الخطر، نقص الفيتامين، ليبيا.