



## Estimation of Serum Vitamin D Level among Patients Attending some Polyclinic in Sirte Libya

*Eshtawe M. Algadid*

*Sirte university, Faculty of education, Department of chemistry, Sirte, Libya.*

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### A B S T R A C T

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An Analytical study was conducted to detect Vitamin D Deficiency (VDD) and its associations to age and gender of patients. The study took place during the fourth quarter of 2022. 244 patients were subjected to blood analysis to determine the concentration of 25 hydroxyvitamin D in serum. The sample was consisted of 28.7 % males and 71.3 % females. 48.8 % of the sample (119 patients) were suffering from Vitamin D Deficiency (VDD). Most patients, who had Vitamin D Deficiency (VDD), belong to age group of 26 -65 years old 59.66 % of sample with an average of vitamin concentration  $13.23 \pm 3.7$  ng/ml. The results indicate that 21.7 % of patients had severe vitamin D deficiency and 27 % of them had insufficiency vitamin D whereas 6.1 % had higher vitamin D concentration than normal level. The study concluded that females are more likely to suffer vitamin D deficiency, as the infection rate reached 78.99 % of the samples. The infection rate was higher between the 26 -65 age group at 58.5 %. The results showed that females are more susceptible to infection than males, especially between 26 -65 aged groups.

## 1 Introduction

Vitamin D is a fat-soluble vitamin, it was discovered in 1920, and it is formed in the human skin by sunlight as the body can synthesize it when exposed to Ultraviolet radiation with wavelengths of 290 – 320 nanometers. [2, 1]. The UV penetrates the skin and alters 7-dehydrocholesterol to pre-vitamin D<sub>3</sub>, transforming it into active vitamin D<sub>3</sub>[1]. It is also found in different food elements such as oily fish, egg yolks, liver, and milk. Vitamin D is moved to the liver and hydroxylated to 25-hydroxyvitamin (calcidiol) the major circulating form of vitamin D. In the kidney, the 25-hydroxyvitamin is hydroxylated again to the biologically active type of vitamin D as 1, 25 dihydroxyvitamin which plays an essential role it enhances the absorption of calcium and phosphorous from the tiny intestine and maintains the calcium level in serum by acting of parathyroid hormone. [3, 4] Studies state that vitamin D behaves more like a hormone than a vitamin, it is synthesized in the body[2]

During the last decade, vitamin D deficiency (VDD) was considered a pandemic worldwide. [5] It is known as the most spread disease in the world, and it is implicated in various health troubles. Since discovering vitamin D, its task in the body has gotten extreme attention. The most well-known purpose of vitamin D is to help calcium absorption from the gastrointestinal tract.[5] Vitamin D (1,25 hydroxycholecalciferol) is essential for maintaining calcium homeostasis and bone formation.[1] The decrease in vitamin D levels in the blood leads to an increase in the precipitate of calcium in arterial blood which considers the mean reason for atherosclerotic plaque which leads to heart attacks and strokes [6]. Vitamin D deficiency will lead to increased secretion of PTH, which works with vitamin D to regulate the level of blood calcium that the body needs, in addition, to bone formation.[6] A growing body of facts relates vitamin D deficiency with cardiovascular disease. As it leads to chronic diseases such as

cardiovascular disease, diabetes mellitus, hypertension, chronic kidney diseases [4], some type of cancers, and mental illnesses. [5,7] and also Vitamin D deficiency is the most common cause of rickets.

In the early stages of vitamin D deficiency, it leads to osteomalacia in the bones. With the continuation of the deficiency in vitamin D and the increase in calcium withdrawal from the bones, it will lead to bony caverns and an increase in osteoporosis, causing osteoporosis. Bones full of holes. This risk with age increases the chance of bone fractures.

Several studies were conducted to discuss factors influencing vitamin D deficiency including gender, age, pregnancy, and chronic disease status.

In 2012- 2013, a study was carried out to determine the rate of the deficiency of vitamin D experienced by women in Latakia City in Syria. The study was achieved on 127 women randomly chosen. It states that vitamin D deficiency was high at 84.26 % and the normal level was 15.74 among all samples and 55.15 of patients were severing from vitamin D deficiency at a moderate level and 44.85 severing from it at acute deficiency.[6] In December 2020, another study was conducted in Baluchistan on teenage girls reporting that the overall vitamin D deficiency of 92.4 % and 9.9 of girls were suffering severe deficiency and a high proportion belonged to urban girls. Also, it stated the prevalence rate of vitamin D insufficiency as 39.4 % and urban girls had a higher prevalence of low levels of vitamin D. The study concluded that vitamin D deficiency has a high prevalence among adolescent girls and it is more than in urban areas than rural areas.[4] Another study was conducted in Misurata region in Libya, to evaluate vitamin D intake among Libyan women. The vitamin D status revealed inadequacy present in 82 % (61.6 % had 25 (OH)D less than 25 nmol/L and 20.2 % had 25-50 nmol/L and more than 79.4 % had vitamin D level below 50 nmol/L compared to 52% of male and the lowest level was among women between 25-64 years of age followed by 11-24 years of age. [5]

In 2019, another study was conducted to estimate the vitamin D level among adults in Misurata - Libya indicating that 20 % of young males had sufficient vitamin D levels, 45% with insufficient levels, and vitamin D deficiency was reported in 35% of cases. Also, it stated that the young males had higher serum vitamin D levels than young females.[8]

In 2017, a study was carried out in Tripoli Libya identified that 69% of nursing mothers had 25(OH)D less than 30 nmol/L and 30% had 25(OH) more than 30 nmol/L [3]. A more recent investigation in Jan in 2023 Tripoli Libya, on the prevalence of vitamin D deficiency and association with risk factors among 262 female patients also indicated that 87.7% of the patients

had serum vitamin D level less than normal (30 ng/ml) and about 50.8 % had vitamin D level less than 10 ng/ml (severe vitamin D deficiency) 27.5 % had level less than 20 ng/ml (vitamin D deficiency) and 9.1 % of patient had insufficiency vitamin D and 12.6 % had sufficient vitamin D more than 30 ng/ml. The study concluded that all patient had body aches, fatigue, and nonspecific bone pains, which related to vitamin D deficiency [2]

Another study was conducted in Benghazi in 2016 on 287 participants, the study of serum 25(OH) levels were provided by 184 participants rate of 64 % (58.8 % females and 5.9 % males), The study reported that vitamin D deficiency (less than 20 ng/ml) was 76.1 %, insufficiency (21-29 ng/ml) was 15.2 % and sufficiency (more than 30 ng/ml) was 8.7 %. The results indicated that vitamin D deficiency is higher among female and increase with age adolescents younger than 20 years.[9].

Regarding an association between death and vitamin D deficiency disease, there is a consensus that vitamin D deficiency has become a threat to humanity; previous studies concluded that vitamin D deficiency is directly related to many factors, including gender, age, and eating habits. By, females are more affected by vitamin D deficiency than males. Also, people aged from 20 to 50 years old are more susceptible to vitamin D deficiency. Consequently, habits, traditions and eating habits regarded the main reason for vitamin D deficiency.

## 2 Materials and Methods.

### Selection of Vitamin D deficiency patient's blood samples.

This study was carried out to investigate the vitamin D concentration according to the gender and age of patients, who attending to five outpatient clinical laboratories, in Sirte city, Libya. The study was approached between September and December 2022. Blood samples were collected from 244 patients of different ages consisting of 70 males (28.7 %) and 174 females (71.3 %). The vitamin D results were collected randomly from laboratories.

### Sample analysis method.

Generally, the concentration of 25-hydroxyvitamin in the blood serum indicates the body's store of vitamin D and it is used as a reference to vitamin status as vitamin D deficiency. It is defined as 25(OH)D serum levels less than 30 nmol/L (12 ng/ml), and insufficiency as 25 (OH)D between 30 nmol/L (12 ng/ml) and 50 nmol/L (20 ng/ml) and level above of 125 nmol/L (50ng/ml) may cause some health problems. [3, 10]

### 3 Results.

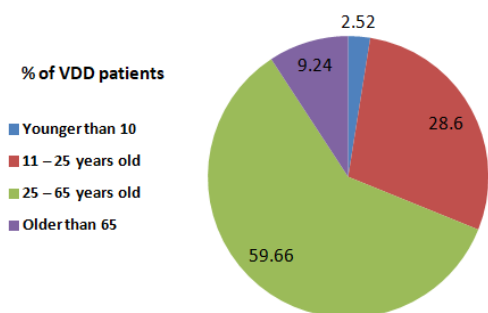
The study was conducted on 244 patients. 48.8 % (119 patients) of them were suffering from vitamin D deficiency. The patients were divided into four groups based on their ages (younger than 10 years old, 11 to 25 years old, 26 to 65 years old, and older than 65 years old)

Note: vitamin D can be measured in ng/ml or n mol/l as 1 nmol/l equal to 0.4 ng/ml.

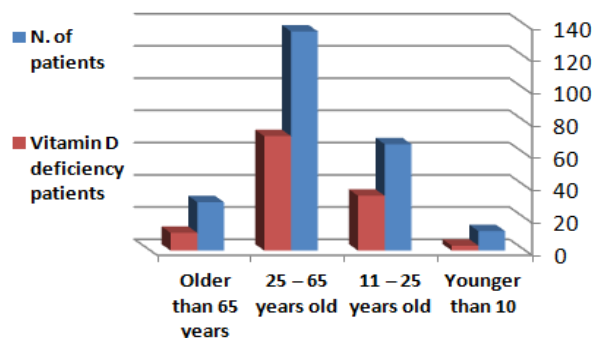
**Table (1):** Distribution of the patients according their age.

Age groups	N. of patients	Vitamin D deficiency patients	Percentage of the age group to VDD patient %	Mean of Vitamin D Concentration (ng/ml)
Younger than 10	12	3	2.52	11.59 ± 7.6
11 – 25 years old	66	34	28.6	12.72 ± 4.2
25 – 65 years old	136	71	59.66	13.23 ± 3.7
Older than 65	30	11	9.24	15.63 ± 4.5
Total	244	119	100	

The results indicate that 48.8% of the total samples were suffering from vitamin D deficiency and the higher levels in age group is 25-65 years old (59.66 %) with mean of vitamin D concentration (13.23 ± 3.7 ng/ml) followed by 11 – 25 years old group (28.6 %) with mean of vitamin D concentration (12.72 ± 4. ng/ml)



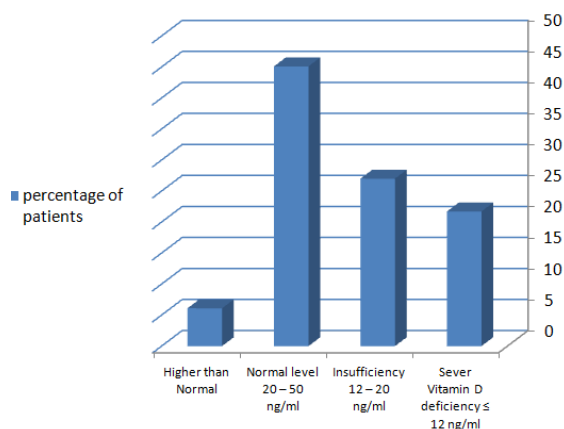
**Figure (1):** Distribution of Vitamin D deficiency patients based on their ages



**Figure (2):** Number of participated patients and Vitamin D deficiency patients

**Table (2)** state the vitamin D concentration among the study samples.

Vitamin D level	N. of patients	Percentage to Vitamin D deficiency patients %	Mean of Vitamin D Concentration (ng/ml)
Sever Vitamin D deficiency ≤ 12 ng/ml	53	21.7	9.4 ± 1.8
Insufficiency 12 – 20 ng/ml	66	27	16.4 ± 2.3
Normal level 20 – 50 ng/ml	110	45.1	28.3 ± 6.7
Higher than Normal	15	6.1	60.7 ± 13.4
Total	244	100	-



**Figure (3):** Percent of patients according to Vitamin D concentration

The results indicates that 21.7 % of total sample suffering from severe vitamin D deficiency with average  $9.4 \pm 1.8$  ng/ml and 27.5 % of them have insufficiency vitamin D deficiency while 45.1 % from the sample have normal vitamin D level and 6.1 % have higher than normal level.

**Table (3)** state the results of vitamin D concentration according of patient age.

Age groups	N. of patients	Percentage to Vitamin D deficiency patients %	Mean of Vitamin D Concentration (ng/ml)
Younger than 10	3	2.5	$11.59 \pm 7.6$
11 – 25 years old	34	28.6	$12.72 \pm 4.2$
25 – 65 years old	71	59.7	$13.23 \pm 3.6$
Older than 65	11	9.2	$15.63 \pm 4.5$
Total	119	100	-

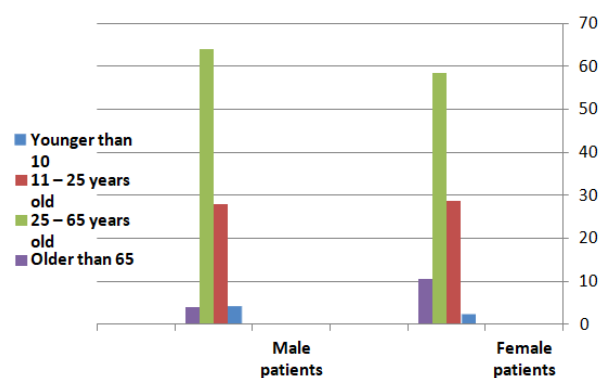
The results state that patient with age of 26 – 65 years old are more severing from vitamin D deficiency 59.7 % with mean  $13.23 \pm 3.6$  ng/ml. The 119 patients whom have vitamin D deficiency (VDD) consist of 25 (21 %) male and 94 (79 %) females, which confirm the previous studies that vitamin D deficiency has relationship with gender as 79 % of patients were female.

**Table (4):** the results of vitamin D concentration according of patient age and gender

Female patients			
Age groups	N. of patients	Percentage to (VDD) patients %	Mean of Vitamin D Concentration (ng/ml)
Younger than 10	2	2.1	$13.9 \pm 9.2$
11 – 25 years old	27	28.7	$11.85 \pm 4.1$
25 – 65 years old	55	58.5	$13.25 \pm 3.8$
Older than 65	10	10.6	$15.47 \pm 4.7$
Total	94	100	-

Male patients			
Age groups	N. of patients	Percentage to (VDD) patients %	Mean of Vitamin D Concentration (ng/ml)
Younger than 10	1	4	6.98
11 – 25 years old	7	28	$16.07 \pm 3.1$
25 – 65 years old	16	64	$13.16 \pm 3.4$
Older than 65	1	4	17.2
Total	25	100	-

The results in Table (4) state that the vitamin levels for females ages 26 – 65 years old have high severing from vitamin D deficiency (VDD) with 58.5 % of the study sample while for males, the results in Table (4) indicate that the age group between 26 – 65 years old have high infected by vitamin D deficiency (64 %) of the male sample.



**Figure (4):** Percent of Vitamin D Deficiency according to their ages and gender

#### 4 Discussion.

Various factors were attributed to vitamin D deficiency (VDD) including lack of sunlight exposure, veiling, pigmented skin, warm weather, vitamin D intake, [4] age, gender, pregnancy, and chronic disease.[8] By reviewing the results under this study, it was found that vitamin D deficiency is one of the common diseases among the population of the city of Sirte, as well as in the rest of the world, as 48.8 % of the patients were severing from the vitamin D deficiency which indicates that vitamin D deficiency

(VDD) has pandemic magnitude among Sirte City residents. Thus, this study agreed with previous regional and local studies which demonstrated that high prevalence of vitamin D deficiency across near east and North Africa region [5]. The cases of vitamin D deficiency were classified into four levels, according to the concentrations of the vitamin D in serum, as it was found that 21.7 % of them suffer from a severe deficiency in the vitamin, with an average level of 9.4 + 1.8 ng/ml, 27 % of patients have an insufficient level of the vitamin with an average level of 16.4 + 2.3, and 6.1 % of the study sample had a higher than normal level. The results also showed that deficiency disease Vitamin D has a relationship with age, as it showed that most of the infected people were from the age group 26-65 years, where the percentage of infected people reached 59.66 %, and the average level of vitamin D was 13.23 + 3.7 ng/ml, and this is attributed to several factors. The study concluded that the incidence of vitamin D deficiency among females is higher than among males, as the percentage of females affected by the disease reached 78.99 %, and the highest incidence rate was in the age group 25-65 years. The age period is the period of pregnancy and childbearing for most women.

## 5 Conclusions

The current study results demonstrate that vitamin D deficiency is a common disease and widely spread among the population of Sirte city, Libya. The results confirm the high prevalence of vitamin deficiency among the population and higher in females specially in ages between 25 and 60 years old.

## References

- 1- Alalem A M, Younis M, Hawda S M, et al. (2022) The Frequency of Vitamin D and Calcium Deficiencies Among Women of Reproductive Age in Wadi Etba, Southern Region of Libya. *Cureus* 14(10): e29832. DOI 10.7759/cureus.29832

- 2- Al- Graiw Mh, Draid Mm, Zaidi Am, Al-Griw Hh. Serum Vitamin D Levels and Associated Risk Favior Among Libyan Females Living In Tripoli, Libya: Across-sectional study. *Labyan J Med Sci* 2020; 4:169-73
- 3- Benhamed, Mofida M, Marwan, Aref G, Dekna, Mohamed A, Ahmad, Ahmad A. Vitamin D level and rickets indices among infants and their nursing mothers in Tripoli – Libya. *The Libyan Journal of Agriculture Volume* (22), No (1): 2017: 47-60
- 4- Rahman G, Ahmad H, Ddin A, et al. (December 28, 2020) Demographic Differences and Trends of Vitamin D level Among the Teenaged Gitls in Balochistan. *Cureus* 12(12): e12335. DOI 10.7759/cureus.12335
- 5- Fathia Faïd, Marina Nikolic, Jelena Milesevic, Milica Zekovic, Agnes Kadvan, Mirjana Gurinovic & Marija Glibetic(2018) Assessment of vitamin D intake among Libyan women – adaptation and validation of specific food frequency questionnaire, *Libya Journal of Medicine*, 13: 1, 1502028, DOI: 10.1080/19932820,2018.1502028
- 6- Latefa Bayazeed. A Statistical Study of lack of Vitamin D Experienced by Women in Lattakia, *Tishreen University Journal for Research and Scientific Studies – Health Sciences Series Vol.* (36) No. (1) 2014
- 7- Alssageer et al. (2022) Knowledge, attitude and practice of Libyan medical students about vitamin D deficiency. *Mediterr J Pharm Pharm Sci.* 2(3): 46-56 <https://doi.org/10.5281/zenodo.7115292>
- 8- Abdalla R. Rfieda, Honaida A. Abdul Malik Omaima R. Ben Krayem. Estimation Of Vitamin D Serum Level Among Adult Population in Misurata. *Al-satil Vol.* 14 No. 22 March 2020.
- 9- Mariam Omar, Faiza Nouh, Manal Younis, Moftah Younis, Nesma Nabil, Marwa Saad, Munyah Ali. Vitamin D Status and Contributing Factor In Patients Attending Three Polyclinic In Benghazi Libya. *Journal of Advances in Medicine and Medical Research* 24(5) 1-13, 2017; Article no. JAMMR.37483
- 10- National Institutes of health – office of Dietary Supplements – [ods.od.nih.gov](https://ods.od.nih.gov).
- 11- Alkalash S H, Odah M, Alkenani H H, et al. (January 13,2023) Public Knowledge, Attitude, and practice Toward Vitamin D Deficiency in Al-Qunfudhah Governorate, Saudi Arabia. *Cureus* 15(1): e33756, DOI 10.7759/cureus.33756
- 12- Vandana Jain, Nandita Gupta, et al. Vitamin D deficiency in healthy breastfed term infants 3 months & their mothers in India: Seasonal variation & determinants, *Indian J Med Res* 133, March 2011, pp 267 -273