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Patterns of Vitamin D Deficiency in Population Resident in Diwanhyia city /Iraq

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ABSTRACT

Background: Vitamin D deficiency is widespread and consider as a major health problem glob-ally. It is a significant public health problem in both developed and developing countries,

Aim of study: to highlight on extent of vitamin D deficiency community and some of risk factors that associated to that deficiency.

Patients and methods: A cross sectional study carried out in private laboratory in Al Diwanyia governorate for 6 months from 1st January to 1st June 2023 year. The recruited 122 patients were visited the laboratories for checking up with age range 18-60 years.

Results: One hundred twenty two participants enrolled in this study with mean age 32.7±9.2 years. Female constituent about 62.2% and male were 37.8%. Regarding residence, 66.3% of them were live in urban area and 33.7% resident in rural area. Vitamin D deficiency was seen 68.1% of total sample, insufficiency in 17.2% and normal level seen in 14.7%. female presented low mean vitamin D17.5 ± 8.1and male20.2 ± 16.2 with p-value 0.1

Conclusion: vitamin D deficiency is highly prevalent among the population of the Iraq, particularly among females.

Introduction

Vitamin D deficiency is widespread and consider as a major health problem glob-ally. It is a significant public health problem in both developed and developing countries [1,2].

Prevalence of vitamin D deficiency is much higher in Asia. A total of 30-50% of people in India, Lebanon, and Turkey and also 45% of females in China had vitamin D deficiency [3].

Middle-Eastern countries have the highest prevalence of vitamin D deficiency and in-sufficiency, women have higher rate of vitamin D deficiency than men because of in-adequate exposure to sunlight and low nutritional intake so put them at risk of many vitamin D deficiency related diseases [4].

Vitamin D deficiency among women of re-productive age is of particular concern because it can have adverse consequences for the mother, fetus, infant and child [5]. If females were vitamin D deficient during their first few years of life, their pelvis would be flat and deformed making it difficult if not impossible for childbirth [6].Peak bone mass occurs around age of 30 so that interventions to increase peak bone mass are more effective at preventing osteoporosis than interventions later in life [7].

Vitamin D is also known as a secosteroid hormone known for its vital role in maintaining the normal function of bones. Research regarding the specific role of vitamin D in the immune system has been discovered[8].

Vitamin D can influence more than 200 genes in various tissues, showing its credibility among the fat-soluble vitamins[9].

Vitamin D deficiency is directly proportional to primary clinical conditions such as cardiovascular diseases, diabetes, malignancy and multiple types of scleroses. Therefore, clinicians recommend large intake of vitamin D in the Diet so as to prevent these significant clinical conditions[10].

Vitamin D deficiency exists throughout the world in various populations, including children, adults, both male and female (pregnant and lactating), and those who often avoid sunlight exposure. It is worth mentioning that individuals who have darkly pigmented skin are more prone to vitamin D deficiency[11].

Food is a limited source of vitamin D. Hence, overcoming the deficiency of vitamin D through food will not be sufficient. However, vitamin D supplements could be used to control its deficiency, but their efficacy is inconsistent and variable[12].

It has been noticed that vitamin D level is low in those individuals who have a mood disorder, and its mechanism of action has been noticed in causing depression. Vitamin D synthesis in the fair skin is enormously fast and significant even after a few minutes of exposure to sunlight [12].

Incidental sun exposure is the major and prominent source of circulating vitamin D. Upon exposure to sunlight in the summer season, Fair Skin can produce about 20,000 IU of vitamin D in less than 30 min[13]. A study conducted in the US in 89 different geographical locations on a large population suggested that the incidence of depression is greater in those people who have deficient vitamin D levels instead in those who have normal vitamin D levels[14]

Vitamin D has a key role in preventing rickets in children and reduces the risks of cancer, multiple sclerosis, and bacterial infections . Vitamin D deficiency leads to diabetes mellitus; its deficiency causes a decrease in microglial inflammatory function leading to increased brain infections[15].

Therefore, vitamin D is known for regulation of innate immunity, both as a transcription

and growth factor by interrelating with surface receptors in diverse immune cells[16]. Vitamin D is, therefore, associated with its ability to regulate both immune responses of peripheral and central nervous systems[17].

The antimicrobial properties of vitamin D has been described as its first immune-related properties, but it is also involved in the modulation of both innate and adaptive immune reactions. In this perspective, depression and anxiety are often related with a low-grade inflammatory significance and peripheral increase in acute-phase proteins and inflammatory cytokines[18].

It is observed that vitamin D regulates the gene expression for one of the essential enzymes Tyrosine Hydroxylase, which is involved in synthesizing dopamine and norepinephrine. These neurotransmitters are famous for their role in depression and mood disorders[19].

Vitamin D maintains physiological functions, such as calcium homeostasis, membrane permeability and axonal conduction, and neurotransmission[20] .

Aim of study: to highlight on extent of vitamin D deficiency community and some of risk factors that associated to that deficiency.

Patients and methods

A cross sectional study carried out in private laboratory in Al Diwanyia governorate for 6 months from 1st January to 1st June 2023 year. The recruited 122 patients were visited the laboratories for checking up with age range 18-60 years.

Subjects were excluded if they had a significant cardiac, hepatic, oncologic disease, or disorders known to affect bone mineral metabolism including hyperthyroidism, hyperparathyroidism, osteomalacia or Paget's disease. Pregnant women, patients with chronic renal failure. Patients using any drugs containing vitamin D were also excluded.

Data collection. Each participant completed a questionnaire to provide socio-demographic characteristics (age, marital status, smoking status and occupation), medical history, and medications. Bodyweight and height were measured for the participants for the calculation of body mass index (BMI).

Clinical measures. Trained health workers performed the data collection and obtained blood samples from the individuals who consented to participate. All the blood samples were obtained during the day and were collected in gel tubes.

Collection of blood samples

Blood samples (3 mL) were collected from subjects, labelled, and stored in vials at 4°C. The tubes were centrifuged (Megafuge 1.0, Heraeus Sepatech) at 5000 rpm for 10 min. The blood serum was analysed for vitamin D level.

Determination of vitamin D level

For vitamin D determination, serum was separated. The serum level of vitamin D is monitored in Architect Plus, Abbott. The recorded data was noted automatically and further processed on the instrument CI 4100, where vitamin D level was determined and reported in ng/mL.

the present study, the vitamin D status was categorized into three major cut-offs based on serum 25(OH)D concentrations:

<20 ng/ml for deficiency, 20-29.9 ng/ml for insufficiency and 30-60 ng/ml for optimality. Levels >60 ng/ml were considered toxic [(11)].

Ethical approval:

The participants were briefly informed about the study and an oral consent was taking from each participant prior to interview

Statistical analysis

Data was collected and included in a data based system and analyzed by statistical package of social sciences ((SPSS, Inc., Chicago, IL, USA)) version 23.

Parametric data were expressed as mean ± standard deviation (SD). It was analyzed statistically using student t-test while non-parametric data were expressed as percentages and were analyzed using chi square. A *P*-value of <0.05 was considered to be statistically significant.

Result

One hundred twenty two participants enrolled in this study with mean age 32.7±9.2 years. Female constituent about 62.2% and male were 37.8%. Regarding residence, 66.3% of them were live in urban area and 33.7% resident in rural area as in table 1.

Table 1: patients characters.

Variables		**Number**	**Percentage**
Age group	**18-39 years**	**54**	**44.2%**
	40-60 years	**68**	**55.8%**
	Total	**122**	
Gender	**Male**	**46**	**37.8%**
	Female	**76**	**62.2%**
BMI	**Under weight**	**14**	**11.4%**
	Normal	**53**	**43.5%**
	Over weight	**37**	**30.3%**
	Obese	**18**	**14.8%**
Residence	**Urban**	**81**	**66.3%**
	Rural	**41**	**33.7%**

Table two shows about 42.5% of participants were private worker, employment were 40.2%. According to education level, illiterate were 17.3% whereas participants with primary and secondary education about 60.6% and 22.1% were had college degree.

Table 2: presented occupation and education characters of sample.

		Number	Percentage
Occupation	Worker	30	42.5%

	Employment	49	40.2%
	Non worker	43	35.3%
Education	Illiterate	21	17.3%
	Primary and secondary	74	60.6%
	Bachelors and above	27	22.1%

Vitamin D deficiency was seen 68.1% of total sample, insufficiency in 17.2% and normal level seen in 14.7% as in table 3. The variation in level of vitamin D between age and gender were in significant, in spite of older age group demonstrated higher level. However, female presented low mean vitamin D17.5 ± 8.1and male20.2 ± 16.2 with p-value 0.1, as in table 4.

Table 3: show prevalence of vitamin D deficiency.

		Number	**Percent**
Vitamin D status	Normal	18	**14.7%**
	In sufficiency	21	**17.2%**
	Deficiency	83	**68.1%**
	Total	122	

Table 4: shows variables result of vitamin D according to age and gender.

Variables		**Vitamin D Mean ±SD**	**p-value**
Age group	**18-39 years**	**22.1±10.2**	**0.4**
	40-60 years	**23.3±8.3**	
Gender	**Male**	20.2 ± 16.2	**0.2**
	Female	17.5 ±8.1	

There were significant association between educational level and pattern of vitamin D deficiency. Thirty eight participants employment had vitamin deficiency and 58 of participants

with primary and secondary education had deficiency, as in table 5.

Table 5: shows association between occupation and education level with vitamin level.

		Vitamin D pattren			Number	
		Normal	In sufficiency	deficiency		p-value
Occupation	Worker	5	8	17	30	0.2
	Employment	7	4	38	49	
	Non worker	6	9	28	43	
Education	Illiterate	2	8	11	21	0.005
	Primary and secondary	10	6	58	74	
	Bachelors and above	6	7	14	27	
Total		18	21	83		

Discussion

The roles vitamin D have found in many physiological functions. It facilitates the absorption of calcium and phosphorus, which is important to prevent osteoporosis or fragility fractures development. Vitamin D deficiency and insufficiency is a worldwide common health issue and nowadays is linked with many diseases therefore measuring circulating levels of 25 OHD provides evidence of a person's deficiency/insufficiency of vitamin D[21].

Our study reveal the vitamin D deficiency was seen 68.1% of total sample, insufficiency in 17.2% and normal level seen in 14.7%, these result close to study by Jaff P[5], HUSSEIN *et al*: [22]. L.Y. Mohammed et al. were observed in our population that vitamin D was deficient in 41.19% population while the 37.33% had insufficient vitamin D levels[23].

There were many studies reported variable range of vitamin D deficiency according to geographical and genetic variation of sample.

In China, Ning *et al* reported that 87.1% of the Beijing population were vitamin D-deficient, and only 2.9% of the participants achieved optimal levels[24]. In Pakistan, the prevalence of vitamin D deficiency and insufficiency were reported to be 70 and 21.1%, respectively [25] . A study conducted in Qatar revealed a prevalence of 64% [26]. A meta-analysis on the prevalence of vitamin D deficiency in Saudi Arabia also revealed that 81% of the population were deficient[27]. In Kuwait, the prevalence of deficiency was found to be 83% [28]. Bachhel and colleagues found that 90% of the Indian population were vitamin D insufficient (<30 ng/ml) [29]. In Iran, vitamin D deficiency prevalence was found to be around 85.2% [30].

Additionally, the study by Öztürk *et al,* in southeast Turkey revealed very similar findings to those of the present study, with a mean serum level of 25(OH)D of 16.61±6.90 ng/ml, with the prevalence of vitamin D deficiency and insufficiency being 75.54 and 19.38%, respectively[30] .

In a recent study performed in the Dohuk Governorate, Iraq by Abdulrahman *et al*, only 24% of the participants had a normal level of total 25(OH)D, which is higher than that observed in the present study population[31].

In present study the mean level of serum vitamin D in female was lower than to male (17.5 ±8.1 and 20.2 ± 16.2 respectively) but these difference not significant it similar to study by L.Y. Mohammed et al. [23]. A study conducted in 2007–2010 by NHANES recorded no major gender gaps between adults in the United States[32].

In Middle East countries, many studies have demonstrated the incidence of vitamin D levels. For example, in Saudi Arabian population, 25–37% of healthy Saudi men with low vitamin D have been reported although sunny days are abundant almost year around[33].

A study in Baghdad found females patients were more suffering for Vitamin D deficiency than men which may be related many reasons, such as that the females were less expose to sun light than men due to the nature of their work and their life style in Iraq[34]. Breast feeding and menstrual cycle lead to loss Vitamin D inconsiderable amounts. From this study, it seemed that women cannot gain enough quantities of Vitamin D in their meals especially for peoples not following proper life[33].

However, the findings in the literature are conflicting regarding this aspect. Some studies have indicated a higher prevalence among females due to less sun exposure, which may be explained by the frequent use of

sunscreens, fewer outdoor activities and the Islamic culture of covering the body from head to toe[22] . However, other studies have demonstrated lower 25OHD levels and a higher prevalence of vitamin D deficiency among males, probably due to the more common use of vitamin D supplements among the females of these populations [26].

In conclusion, vitamin D deficiency is highly prevalent among the population of the Iraq, particularly among females. We need special effort to put light on this public problem, especially it connected to many diseases.

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