

Prevalence of Vitamin D Deficiency Among Population in Iraq: Review Article

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ABSTRACT

Vitamin D is a lipid-soluble substance that has two forms, vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol). UV light is the main source of vitamin D that induced conversion of 7-dehydrcholesterol to vitamin D in the skin. food sources that contain high amount of vitamin D are egg yolk, fish, and liver. Several studies revealed wide prevalence of deficiency in Vit. D among healthy population, in addition different diseases have relation with its inadequacy in the body. This review study summarized the results recorded by published articles in different regions in Iraq regarding vitamin D deficiency. The review concluded that there is high prevalence of Vit. D deficiency among population in different regions of Iraq.

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INTRODUCTION

Vit D is a prohormone that has two forms, vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol), to be active form(1,25(OH)₂, two hydroxylation processes, one in the liver and the second in the kidney are required (1). The main function of the active Vit. D is regulation of calcium and phosphorus balance for bone mineralization and remodeling (2). It is important for absorption of dietary calcium and phosphorus in the body (3). UV light is the main source of vitamin D that induced conversion of 7-dehydrcholesterol to Vit. D in the skin (3). food sources that contain high amount of Vit. D are from animal origin. Vitamin D acts in the body on specific receptors called (VDR) that are distributed in most tissues and cells in the body, so it has a wide range of biological actions (4).

Vitamin D deficiency (VDD) is prevalent among population worldwide in both children and adults and is considered as

epidemic (5). High level of VDD is due to low level of awareness and knowledge regarding vitamin D health importance and sources (6).

AIM OF STUDY

This study reviews the published articles concerning the prevalence of Vit. D deficiency among population in different regions in Iraq for a period from 2016-2021, in addition the study summarized the importance of Vit. D for health.

LITERATURE REVIEW

The total level of vitamin D in the blood can be determined in the laboratories by measuring the level of 25-hydroxy vitamin D(calcidiol) in the blood (7). The normal levels of vitamin D in the blood can be classified according to Endocrine Society of Clinical Practice (ESCP) (8)(9) (**Table1**).

Table 1. Normal levels of vitamin D in the blood

Status	Level in the blood in ng/mL
Deficiency	Less than 20
Insufficiency	21-29
Sufficiency	More than30
Toxicity	More than150

The daily requirements of Vit. D were suggested by ESCP (Table 2) (10). Because of only animal products regarded as a source of Vit. D, supplement can be used as a capsule, chewable tablets, liquids and drops (11). 600 IU daily for adults male and female for good bone health is recommended by institute of medicine (IOM) (8).

Table 2: Daily requirements of vitamin D

Old	Vitamin D requirement IU/day
0-6 months	1000
Six months -One year	1500
One- three years	2500
Four-eight years	3000
Over eight years	4000

Biological effects of Vit. D

Vitamin D binds with its receptors that located on many cells, the binding leads to transcription of specific genes and reveal its action on the cells (12). One of the most widely functions of Vitamin D is its role in bone health. It enhances Ca absorption from intestine and mediates its incorporation into the bone matrix. It has been found that 800 IU of Vit. D /day reduced hip fractures by about 20%, in addition it reduces risk of fall as it increases the muscle strength (13)

Vit. D has effect in cellular differentiation and their proliferation, also it has a role in angiogenesis inhibition (14). These functions are important in terms of cancer prevention. There is a relation between low level of Vit. D and high risk of cancer as proved by previous studies (15). Vitamin D also involved in the regulation of several body hormones including follicle stimulating hormone, estradiol and progesterone, that having role in fertility (16).

Vit. D has protective effect on cardiovascular system (17). Patients with low vitamin D concentration were shown to be more likely to have hypertension than those with high concentration (more than 30ng/mL). The suppression effect of vitamin D on renin-angiotensin system is related to the antihypertensive effects of vitamin (18).

A clinical study conducted in Norway showed the association between Vit. D and the risk of depression (19). Parkinson disease may develop as a result of low level of vitamin D in the body (20).

Vit. D has effect on immune system by its action on its receptors located on leukocytes (21). Multiple sclerosis, Type I diabetes mellitus (DM), and rheumatoid arthritis are autoimmune disease that may occur due to VDD (22). Recent studies have concluded that there is a relation between low level of vitamin D and insulin secretion in population with Type 2 DM (23).

Factors affecting Vit. D Uptake

Aging is one of the factors that affect vitamin D concentration in serum. This is because many elderly people remain homebound and their exposure to sunlight is less than younger. Dark skin pigmentation is also affecting vitamin D level in serum, the darker melanin in the skin causes 99% reduction in the amount of UV radiation that penetrate cells of skin (24). Using sun protection reduces Vit. D synthesis in the skin (25).

Vit. D is a lipid soluble and its absorption affect by fatty food, so in patients with Crohn’s disease, sprue or cystic fibrosis, Vit. D absorption will be less despite the amount of vitamin

D /and or dietary fat ingested (26). Obesity is associated with VDD, fat soluble vitamin D is less bioavailable and stored in adipose tissues in obese individuals (27). There is an inverse relationship between vitamin D level and body mass index (BMI) (28). Vitamin D needs hepatic enzymes for hydroxylation, so liver disease causes inhibition of this step and reduce its level in the blood. Kidney diseases also prevent conversion of vitamin D into active form (27). Some types of medicines may prevent absorption of vitamin D from gastrointestinal tract, such as cholestyramine, , phenobarbital and phenytoin are liver enzyme inducers that accelerate the hepatic metabolism of Vit. D to inactive metabolites and decrease its activity (29).

Prevalence of Vit. D deficiency in Iraq

One study regarding VDD was conducted in private clinic in Karbala City. The study included 300 participants that were divided into four groups. It was found that the prevalence of vitamin deficiency was 60%-85% in different groups of population (2016) (2). A retrospective study conducted in Erbil city on 10832 participants that referred to laboratories in a period from 2013-2017. The study showed that 78% of the participants have vitamin D deficiency and there was no statistical significant difference between male and female, while there was significant difference in the grouped ages(30).Other prospective study in Sulaymaniyah for analysis of vitamin D was conducted ,3520 participants enrolled in the study, the study diagnosed 2869 patients to have vitamin D deficiency, in addition the study showed that there is association between vitamin D deficiency and the age and sex(31).A sample of 500 women at reproductive age in Al-Hilla region of Iraq, the sample was grouped according to age, the results revealed a widespread and severe VDD in women at reproductive age in a percentage of 76% of the whole sample had vitamin d deficiency(32).A cross sectional study was performed in 2019 among population in Duhok and Zakho cities in which 1143 of subjects were included and grouped according to sex and age. The results showed 44.9% and 38.19% of participants had VDD in Duhok and Zakho respectively. The study also revealed that there is no significant difference in deficiency between male and female, but there was significantly difference between the age groups. VDD was more found in age group between 20-40 years old(33).A retrospective study on 3692 persons that visit Faiha specialized Diabetes, Endocrine and Metabolism Center in Basrah from 2017-2019 was conducted to assess VDD, it was concluded that 62% of participants have VDD and this was

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associated with sex, age, nulliparous and rural residency(34).A cross-sectional hospital -based study conducted in Babylon Governorate to determine VDD among 240 patients attending Merjan teaching hospital, the findings revealed that 53.5% of patients have VDD.(16).A prospective case control study was conducted in one of hospitals among 106 women, 76.4% of them had VDD(35).In north of Iraq, a

cross sectional study was conducted on the government primary school, a sample of 1074 children age from 6-12 years old, VDD was found in 59.7% of children(36).Other study conducted in Baghdad city to evaluate VDD among male and female sample of 300 participants, the results revealed that 84% of male and 89.33% of female have VDD(37).

Table 3. Prevalence of VDD among population in Iraq

Reference	Year	Place	No of participants	% Of prevalence
Al_Hilali KA (2)	2016	Karbala City	300	60-85%
Abdulrahan RM, <i>et al</i> (30)	2018	Erbil City	10832	24%
Abdullah SA, <i>et al</i> (31)	2018	Sulaymaniyah City	3520	
Al-Hantoosh HA, <i>et al</i> (32)	2018	Hilla City	500	76%
Mohammed LY, <i>et al</i> (33)	2019	Duhok City	1143	44.9% 38.19%
Hussein IH, <i>et al</i> (34)	2021	Basrah City	3692	62%
Jabbar AF, <i>et al</i> (16)	2020	Babylon City	240	53.5%
Al-Jammas, <i>et al</i> (35)	2021	Mosul city	1072 children	59.7%
Ali NF(36)	2021	Baghdad City	300	84% in male, 89.33% in female

DISCUSSION

Several studies concerning vitamin D benefits, use and deficiency have been conducted recently which indicates that there is interest regarding Vit. D in medical aspects (6). About one billion people worldwide have VDD (3). Several studies show low awareness and knowledge concerning Vit. D role, sources, advantages and the consequences of its deficiency among population that can be a potential risk factor for VDD worldwide. Studies in Hong Kong, Saudi Arabia, USA, India, and UK show a low level of knowledge about Vit. D sources, role and symptoms of deficiency (2,13).

Prevalence of VDD was recorded in different Arab countries including Qatar, Egypt, Saudi Arabia ,and Jordan(34) . Age and sex are the most factors studied and found to be associated with VDD. Women has higher prevalence of vitamin D than men and patients aged less than 40 years was more likely to have vitamin DD in these countries.

In Iraq, several studies were conducted concerning prevalence of VDD among people in different regions of Iraq, different ages, male and female (Table 3), most studies revealed high percentage of VDD among participants.

CONCLUSION

This review shows a high rate of vitamin D deficiency among Iraqi people, although the presence of high level of sunshine, this may be due to low level of knowledge and awareness regarding vitamin D sources, advantages, factors causing its levels in the body, and the consequences of its deficiency on general health. Campaigns by ministry of health are needed to increase the awareness of VDD consequences and to the routine screening for its inadequacy among all populations.

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