

# The Contribution of the COVID-19 Pandemic Lockdown Restrictions on Vitamin D Levels among Postmenopausal Women in Kerbala Province

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## Abstract

**Objective:** To evaluate the prevalence of vitamin D deficiency in postmenopausal women in light of restrictions imposed by the Covid-19 pandemic.

**Methods:** This was a single-center cross-sectional study with total of 167 women patients (post-menopausal :133, pre-menopausal: 24) who were divided into two groups according to age.

**Result:** There were significant negative links between serum T4 hormone levels and each of serum calcium values ( $r=-0.049$ ,  $p < 0.001$ ) in post-menopausal. Serum T4 hormone levels are negatively correlated to TSH hormone levels ( $r=-0.032$ ,  $p < 0.001$ ) but T3 hormone levels shows significantly negative correlation ( $r=-0.277$ ,  $p < 0.001$ ). The correlation between serum T4 hormone levels vs Glucose in patients was significantly negative ( $r= -0.017$ ,  $p < 0.001$ ), The results show that significant decrease ( $p < 0.01$ ) in serum levels T4, T3 hormone, vit. D in post-menopausal women compared as compared to pre-menopausal, correlation of vitamin D with serum calcium (0.23 and T4, hormone (0.137) was significantly positive, and high fasting glucose in post-menopausal as compared to pre-menopausal .

**Conclusion:** Baseline serum vitamin D levels are inversely related with thyroid hormone in post-menopausal women .

**Key words:** TSH, T4, COVID-19, vitamin D, post-menopausal

## Introduction

Coronavirus disease (COVID-19) is a remarkable international emergency that has led to the application of unprecedented measures that stem the prevalence of the infection. among many different nations, governments are enforcing estimates such as travel prohibition, quarantine, isolation, and social distancing leads to an outspread period of time at residence. The link between the serum vitamin D level and the severity of COVID-19 has been discussed worldwide. Research

into alternatives to treat people contaminated with COVID-19 indicate that vitamin D can this is because in addition to its homeostasis function, it participates in the regulation of the immune system and manages to destroy viruses in the body through cathelicidin <sup>(1)(2)</sup>. Elderly people belong to one of the groups at risk, especially those who live in nursing homes and who are deprived of exposure to sunlight. They often also have inadequate nutrition and interactions with medications, and for these reasons tend to have vitamin D deficiency <sup>(3)</sup>. Vitamin D is as a pro-hormone in the arrangement of calcium and phosphate scales, and therefore it is specially basis for bone and mineral metabolism. However, in new years, lots of studies have been illustrate an outcome of vitamin D deficiency in many diseases, such as hypertension, cancer, cardiovascular diseases, and autoimmune

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thyroid disorders in addition to diabetes mellitus<sup>(4)</sup>. Even though vitamin D levels of higher than 20 ng/mL are considered suitable for its skeletal amounts, values over 30 ng/mL are wanted to prevent appearance of vitamin D insufficiency in the organs outside the skeletal system<sup>(5)</sup>.

## Materials & Approaches

### Position and Period of the Study

This study was managed at Al-Hussein Medical City - Al-Hussein Teaching Hospital - Kerbala – Iraq from April, 2020 to August, 2020

Samples, Age and Experimental Design and Grouping

Two groups were compared in the study; post-menopausal Women constituted the case group, while there were healthy pre-menopausal Women volunteers in the control assembly. the case assembly were 133 female aging 45-60 years, The control group include of 24 in good health people aging between 22 and 44 years They were alive in kerbala city and inducting to Outpatient Clinics of Al-Hussein Medical City , during the period from April, 2020 to August, 2020. Informed

consent of all subjects involved in the study was obtained for participation in study groups ,Exclusion criteria Patients with post radioiodine hypothyroidism, renal dysfunction or hepatic, on vitamin D supplementation or anti- epileptic medications were excluded from the study. The Endocrine Society Clinical Practice Guidelines were used to define VDD (<20 ng/ml), sufficiency (>30 ng/ml). and insufficiency (20-30 ng/ml)<sup>(6)</sup>.A 5ml of venous blood is drawn from each volunteerpatient using a disposable plain vacutainer system in fasting state. Serum is separated during half an hour by centrifugation and kept at 2-8°C temperature until analysis is completed. Thyroid hormones assay and Vitamin D level were done by Fluorometric enzyme immunoassay (FEIA) method on TOSHO AIA-360 Immunoanalyzer machine. Estimation of serum Calcium values using spectrophotometric analysis by ERBA CHEM-7 semiautoanalyzer. This procedure is depended on production of Ca<sup>+</sup> ions violet complex with o-cresolphthalein complex in alkaline pH. An obtained data was statistically studied by utilizing SPSS statistics (spss) software program version 20.0. Correlations were done with Pearson's Correlation intended for numerical parametric data. P value < 0.01 was look statistically significant.

## Results

**Table 1. Mean± SEhormone variation of the post-menopausal&pre-menopausal**

parameter	groups	Mean	SE	p.value
TSH/uIU/mL	pre-menopausal n(133)	2.79	0.19	0.79
	post-menopausal n(24)	3.00	0.34	
T4 nmoL/L	pre-menopausal n(133)	61.28	1.63	0.00
	post-menopausal n(24)	90.00	3.51	
T3nmol/L	pre-menopausal n(133)	26.38	0.89	0.00
	post-menopausal n(24)	2.46	0.26	
Free T4 pmol/L	pre-menopausal n(133)	17.20	0.61	0.12
	post-menopausal n(24)	16.11	0.28	
Free T3 pmol/L	pre-menopausal n(133)	4.22	0.16	0.31
	post-menopausal n(24)	4.37	0.06	

T4 : thyroxine, TSH = thyroid stimulating hormone, T3 : triiodothyronine, free T4 : free thyroxine, Free T3 : free

triiodothyronine ,n: number

**Table 2. Mean ± S.E of serum vit. D, Calcium and Glucose levels & calcium in post-menopausal&pre-menopausal**

parameter	Groups	Mean	SE	p.value
D3 ng/mL	pre-menopausal n(133)	35.56	1.85	0.00
	post-menopausal n(24)	18.73	1.36	
calcium mg/dl	pre-menopausal n(133)	9.32	0.12	0.01
	post-menopausal n(24)	8.83	0.07	
Glucose mg/L	pre-menopausal n(133)	100.88	2.30	0.00
	post-menopausal n(24)	158.82	7.01	

**Table 3. Correlation of vit. D levels with thyroid hormones and TSH with & Serum Calcium**

parameter	vit D	
	P value	(r)
TSH	>0.01	-0.142
T4	>0.01	0.062
T3	<0.01	0.137
calcium	<0.01	0.23
Glucose	>0.01	-0.143

Ca: Calcium,vit. D: Vitamin D, free T4 : free thyroxine, T4 : thyroxine, TSH = Thyroid Stimulating Hormone

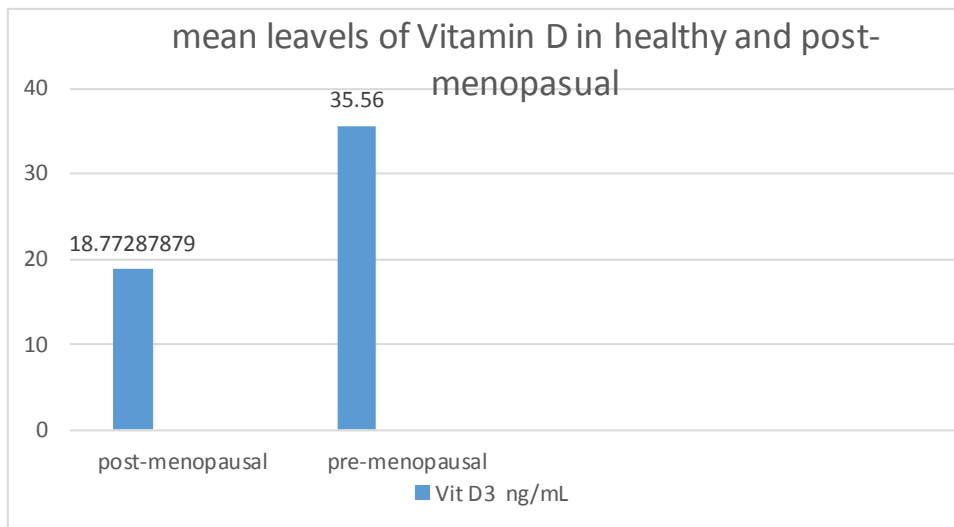
**Table 4. Correlation of T4 hormone levels with t T3 hormone, TSH,Vitamin D& Serum Calcium**

parameter	T4 hormone	
	P value	(r)
TSH	>0.01	0.032
T3	<0.01	-.277- <sup>**</sup>
Free T4	>0.01	-0.015
Free T3	>0.01	0.016
calcium	>0.01	-0.049
Glucose	>0.01	-0.017

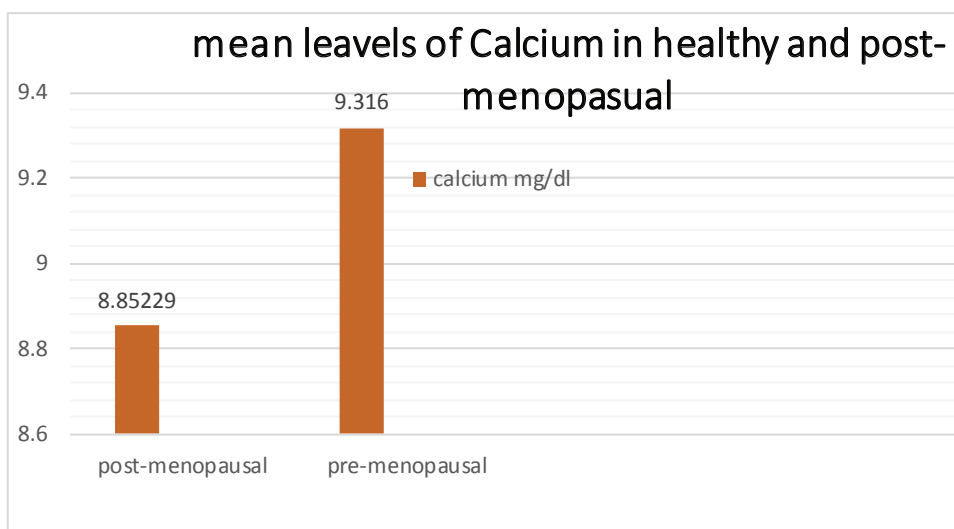
T3 : triiodothyronine, Free T3 : free triiodothyronine, T4 : thyroxine, free T4 : free thyroxine, TSH = thyroid stimulating hormone

**Table.3,4:** There were significant negative links showed between serum T4 hormone levels and for each serum calcium levels ( $r = -0.049, p < 0.001$ ) in post-menopausal. Serum T4 hormone levels is negatively correlated to TSH hormone levels ( $r = -0.032, p < 0.001$ )

but T3 hormone levels shows significantly positive correlation ( $r = .277^{**}, p < 0.001$ ). The correlation between serum T4 hormone levels vs Glucose in patients was significantly negative ( $r = -0.017, p < 0.001$ )



**Figure(1)**Distribution of mean vitamin D<sub>3</sub> levels in study subjects



**Figure (2)**Distribution of mean Calcium levels in study subjects

### Discussion

The current study offer that vitamin D value was significantly reduce in women post-menopausal compared to the controls. we suggested that deficiency of vitamin D participated to the option of low thyroid hormones. One of two mechanisms may demonstrate the

low levels of vitamin D in patients for hypothyroidism .Firstly, the low amounts of vitamin D probably because of poor absorption of vitamin D of intestine .Secondly, the human body may not activate vitamin D suitably<sup>(7)</sup>, Popularly known people live in the cities spending a majority of their time indoors, people can little expose sufficient sunlight exposure for enough

cutaneous production of vitamin D. So, vitamin D deficiency has become a considerable health interest in cites society, Maybe the action proposed ban for the spread of the COVID-19 pandemic<sup>(8)</sup>. Vitamin has in history been related to bone health. However, there are several studies that have shown poor vitamin D status to be associated with many chronic diseases<sup>(9)</sup>, This may be very important during the present COVID-19 disease because of lockdown measures that cause people experiencing a reduced amount of direct sunlight, thus impacting negatively on vitamin D production, The Iraqi government subjected measures like travel bans, isolation, quarantine, and social distancing leading to an extended period of time at home. This has caused in reductions in physical activity and changes in dietary intake<sup>(10)</sup>. Our result showed between the studied groups a significant variance in serum calcium stages. 18]conducted a study showed a significant variations in ionized Ca, but not total Ca means that the physiologically active constitute of Ca is influenced, even though the total concentration of Ca is yet significantly unaffected. Disturbance of calcium homeostasis were frequently observed with thyroid dysfunction<sup>(11)</sup>. Thyroxine normally regulates blood calcium levels by releasing calcium extra cellular<sup>(12)</sup>. In hypothyroidism, less thyroxine in the bloodstream and thus less thyroxin entry into the cells leading to decreased extra cellular calcium release. <sup>(13)</sup>, Daily calcium intake below the necessary daily requirements has been linked to low vitamin osteoporosis, and fractures<sup>(11)</sup>, Hypovitaminosis D appears in the context of a multifactorial model caused by changes in lifestyle eating habits, sleep patterns, and other conditions produced by stress. This combination of factors may end up in connective tissue pathology with syndromic features, predominantly affecting young or post-menopausal women <sup>(14)</sup> The environmental conditions related to the geographical location are determinants that establish social and cultural patterns: apparel type and walking to work directly influence the degree of sunlight exposure, a necessary physiological component or Vit-D production. Interaction between these variables and those derived from lifestyle eating habits, age, and sex transform into a risk formula that impacts the incidence or prevalence of Vit-D deficiency<sup>(14)(15)</sup>. The mechanisms of vit. D supplement by which high blood glucose may be affected are unclear. Recent information on thyroid hormone signaling suggests a common relationship

between thyroid hormones and diabetes. The changes made by thyroid hormone in hormone levels and genetic profiles can put the body in a state such as fasting, and thus decrease insulin signals, and thus stimulate glucose formation in the liver, thus increasing blood sugar levels. <sup>(16)</sup>. The association between thyroid dysfunction with diabetic populations have showed that different spread as it seen more than a few studies <sup>(17)</sup>, The conclusion of Moura Neto et al.'s <sup>(18)</sup>. study showed no significant changes were measured in TSH level by subjects with high blood glucose levels had lower amounts of T4 compared with the standard group, The results of a study mentioned out by Singh et.al who stated higher level of TSH in T2DM and lower level of T4 compared to the control group in reverse these results [9]. In another academic work, women have diabetic were illustrated to have higher mean serum TSH values and lower FT4 value than men have diabetic <sup>(19)(20)</sup>.

## Conclusion

In the current quarantine, with the recommendation by the authorities to stay at home, people should seek to consume healthy foods that have some vitamin D content such as fish and eggs, as well as take time to sit in the sun by windows and doors of the homes. To avoid skin problems, sunscreen should be used.

**Conflict of Interest** – Nil

**Source of Funding**- Self

**Ethical Clearance** – Not required

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