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Alluation Of Health Care Of Hypothyroidism Patients Using Levels Of V.D And Calcium

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Abstract

Background and purpose: Hypothyroidism is a condition that occurs when the thyroid gland does not produce enough hormones to meet the body's needs, which leads to a slowdown in some body functions. The study was conducted to evaluate hypothyroidism and its relationship to vitamin D and calcium deficiency
Method and materials: The study group included children [n=20], men [n=20], and women [n=20] as a group of cases. The levels of TSH, Ca, and Vit D were measured. This study was conducted in the Zliten Teaching Hospital
Results: present study showed non-significant correlation for child patients(0.05)were the averaged vit D (0.043) and calcium (0.025) also into showed female patients(0.0527)were the averaged vit D (0.034)and calcium (0.025) also into showed male patients (0.05) were the averaged vit D (0.05) and calcium.

Introduction

The human body contains many glands, including the thyroid gland, which is an endocrine gland found in human vertebrates. This gland is located in the front part of the neck, under the Adam's apple, and consists of two continuous lobes, the lowerTwo-thirds of the lobes are connected by a thin band of tissue called the thyroid isthmus. The thyroid gland secretes three hormones: triiodothyronine T3 and thyroxine T4, which contain iodine and the peptide hormone calcitonin. These two hormones affect the rate of metabolism and protein synthesis and also affect the growth and development of children, and calcitonin plays a role in the balance of calcium within the body. The secretion of thyroid hormones is regulated by TSH produced by the anterior pituitary gland and regulated by thyroid-releasing hormone (TRH). Increased levels of TSH indicate hypothyroidism. (Boron wf Boulpaep et, 2012). Thyroid disorders include hyperthyroidism, hypothyroidism, thyroiditis, goiter, and thyroid nodules. Thyroid disorder and hypothyroidism are common diseases around the world, especially in women, but no specific reason has been found for its higher incidence in women compared to men. Hypothyroidism syndrome in adults is generally called myxedema, and hypothyroidism in children from birth is called creatinism. Hypothyroidism may be the end result of a number of thyroid diseases, and may be secondary to failure of the pituitary gland (hypopituitarism). The thyroid gland responds to a test dose of TSH. Your body also needs vitamin D to adequately absorb calcium from the intestines and maintain normal calcium and phosphate levels in the blood. Vitamin D is essential for the function of the musculoskeletal system (which consists of bones, muscles, and connective tissue). It strengthens muscles and bones, and thus has an effective role in preventing falls, osteoporosis, and fractures. Vitamin D can also affect the heart and immune system and may protect your body against cancer. Vitamin D affects the thyroid gland. Low levels of this vitamin lead to Hashimoto's thyroiditis, and it is an essential mineral for life, in addition to building and maintaining healthy bones. About 99% of the calcium in our bodies is found in our bones and teeth. Hypocalcemia, also known as calcium deficiency disease, occurs when low levels of calcium occur in the blood. Calcium deficiency may cause early symptoms. Many people are at increased risk of calcium deficiency. This deficiency may be due to a variety of factors, such as low calcium intake over a long period of time. Time, especially in childhood, hormonal changes, especially in women, some genetic factors, calcium deficiency disease. People with this condition do not produce enough parathyroid hormone, which controls calcium levels in the blood. (Citation: Gonzalez MJ, 2021) Patients with hypothyroidism suffer from vitamin D deficiency and hypocalcemia. Moreover, the significant positive relationship between both vitamin D in the blood and calcium with thyroid hormones and the negative relationship with TSH levels indicate that vitamin D deficiency in the blood and calcium levels were significantly associated with the degree and severity of hypothyroidism, which encourages the development of hypothyroidism. Desire to take vitamin D supplements. A different gene in the vitamin D receptor has been shown to predispose people to autoimmune thyroid diseases, including Graves' disease and Hashimoto's thyroiditis.For these reasons, it is important for patients with thyroid problems to understand how the vitamin D system works. Vitamin D mediates its effect by binding to the vitamin D receptor (VDR) and activating VDR-responsive genes, while VDR gene polymorphisms have been found to be associated with thyroid disease. Autoimmune thyroiditis (AITDs). (Ira Martin Grais, James R. 2014)

2-Methods and materials

2.1-Study types

This study was conducted on a group of women, a group of men, and a children, and they were selected according to the selection criteria

.2.2-Place of study

This study was conducted in the Zliten Teaching Hospital varied between private and public

laboratories

2.3-Time of study

This study was conducted in the period of time between 5/January / 2024 To 20/ May 2024

2.4-Study design

Retrospective study

2.5-Study problem

Evaluation the complication of the hypothyroidism disease on the patient

2.6- Population and sample

2.6.1 -Population

The study population consists of patients aged from 6 months to 90 years

2.6.2-Sample

A total of 60 patients was participating on this study , 20 male , 20 famel, 20 children

Inclusion and Exclusion criteria

After obtaining written informed consent detailed history and physical examination was done in all subjects

2.6.2.1-Inclusion criteria

The subject were divided into 3groups male and female, children Hypothyroidism patients:- subjects who suffer from hypeothyroidism for the last 5 years

The subjects were chosen in age groups of 5-90 yrs of age

2.6.2.2-Exclusion standards

Hyperthyroidism , Parathyroid gland , Healthy individuals who are not affected by glandular disorders , family history.

2.7-Study variables

2.7.1-Independent variables

Subjects who have hypeothyroidism

2.7.2-Dependant variable : changes that accured in parameter level of Vit,D, and calcium

.2.8-Sample collection

Blood samples were obtained from men and children and female by venipuncture under sterile water

T.S.H. & V.D & Ca serum tests Health care providers band a rubber around the arm to express the instant and facilitate withdrawal, then they sterilize the area that wanted to withdraw from using alcohol, then it is emptied after that into the specialized tube

By drawing blood from the patient’s arm to relieve pain. It is advised not to use a tourniquet while drawing blood and to be sure to draw while sitting in a sitting position only and supervising the grip

of the hand

3-Result

Table 1, Figure 1 presents demographic and clinical data of hypothyroidism children. Wear The mean age of the children is 11.6 years. The mean TSH level is 13.4 mIU/L, notably higher than the upper limit of the normal range, indicating hypothyroidism. Additionally, the mean vitamin D level is 20.6 ng/mL, which falls within the insufficient range. However, the mean calcium level of 9.3 mg/dL is within the normal range for children, indicating no significant abnormalities in calcium metabolism

Table1.averaged of the calcium and vitamin D in serum of the hypothyroidism children (n =20)

	Age	TSH (mIU/L)	Vitamin D (ng/mL)	Ca (mg/dL)
Hypothyroidism children	11.6±2.6	13.4±25.5	20.6±4.7	9.3±0.7

Results expressed as mean±SD

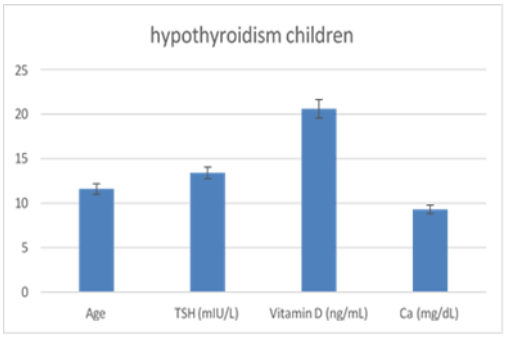

Figure 1. Demographic and clinical data in serum of the hypothyroidism childrens (n=20).

Table 2: Correlation of TSH waith calcium and vitamin D among of the hypothyroidism patient in children

		Vitamin D	Ca
TSH	Pearson Correlation	-0.017*	-0.15*
	Sig. (2-tailed)	0.043	0.025

*Correlation is significant at the 0.05 level (2-tailed).

Vitamin D deficiency and ***Ca*** showing non significant negative correlation with TSH.

In this study showed the corre lation is statistically non significant link between TSH levels and either vitamin D levels (Pearson correlation coefficient = -0.017, p = 0.043) or calcium levels (Pearson correlation coefficient = -0.15, p = 0.025). These findings indicate that there is a non significant correlation between fluctuations in TSH levels and alterations in vitamin D or calcium levels within

this particular group of participants (table 2).

Table 3, Figure 2 which specifically examines males with hypothyroidism, it is worth noting that the average age is was 48.3 years. The average TSH level is 17.6 mIU/L, which suggests the presence of hypothyroidism. The average vitamin D level is 15.9 ng/mL, which is considered insufficient. Nevertheless, the average calcium level of 8.8 mg/dL is somewhat below the standard range, suggesting a probable calcium imbalance in males with hypothyroidism.

Table3.averaged of the calcium and vitamin D in serum of the hypothyroidism males (n =20)

	Age	TSH (mIU/L)	Vitamin D (ng/mL)	Ca (mg/dL)
Hypothyroidism males	48.3±23.5	17.6±24.8	15.9±11.5	8.8±0.9

Results expressed as mean±SD

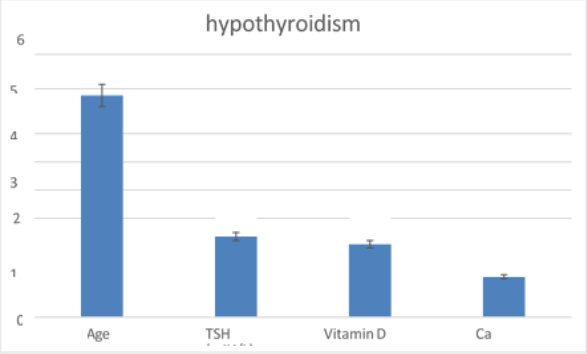

Figure 2. Demographic and clinical data in serum of the hypothyroidism males (n=20)

Table 4: Correlation of TSH with calcium and vitamin D among of the hypothyroidism patient in males

		Vitamin D	Ca
TSH	Pearson Correlation	-0.18*	-0.16*
	Sig. (2-tailed)	0.05	0.04

Correlation is significant at the 0.05 level (2-tailed)

Vitamin D deficiency and Ca showing significant negative correlation with TSH

The correlation analysis conducted on males with hypothyroidism indicates a noteworthy negative association between TSH levels and both vitamin D (Pearson correlation coefficient = -0.18, p = 0.05) and calcium levels (Pearson correlation coefficient = -0.16, p = 0.04) in table 4. This indicates that in males with hypothyroidism, there is a correlation between increasing TSH levels and decreasing levels of vitamin D and calcium. These data indicate possible connections between thyroid function

and calcium-vitamin D metabolism in this particular subgroup, which should be further studied and may require customized care strategies

Table 5, Figure 3 displays statistics specifically related to females with hypothyroidism. The average age is 45.5 years, which is comparable to males with hypothyroidism. The average TSH level is 13.3 mIU/L, indicating hypothyroidism although slightly lower than that of hypothyroid males. The average vitamin D level is 21.9 ng/mL, which is considered insufficient, just like the other groups. Remarkably, the averagecalcium level of 12.6 mg/dL is significantly above the expected range, indicating a possible calcium imbalance in females with hypothyroidism

Table5.averaged of the calcium and vitamin D in serum of the hypothyroidism females (n =20)

	Age	TSH (mIU/L)	Vitamin D (ng/mL)	Ca (mg/dL)
Hypothyroidism females	45.5±12.5	13.3±16.6	21.9±16.0	12.6±18.4

Results expressed as mean±SD

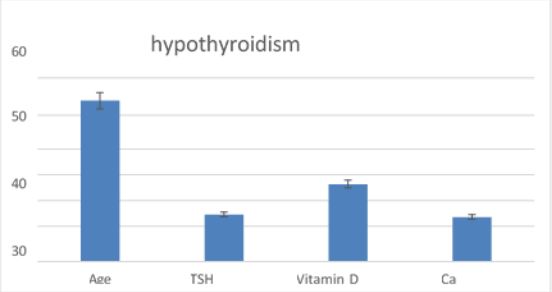

Figure 3. Demographic and clinical data in serum of the hypothyroidism females (n=20).

Table 6: Correlation of TSH with calcium and vitamin D among of the hypothyroidism patient in females

*Correlation is significant at the 0.05 level (2-tailed).

		Vitamin D	Ca
TSH	Pearson Correlation	-0.256*	-0.05*
	Sig. (2-tailed)	0.0527	0.034

The correlation analysis conducted on females with hypothyroidism reveals a noteworthy inverse link between TSH levels and vitamin D (Pearson correlation coefficient = -0.256, p = 0.0527) in table 6. This suggests that when TSH levels rise, there is a tendency for vitamin D levels to decline. Furthermore, there exists a notable inverse relationship between TSH levels and calcium levels (Pearson correlation coefficient = -0.05, p = 0.034), but it is less strong in comparison to the link with vitamin D. This highlights the significance of taking these interconnections into account when developing therapy approaches

To summarize, whereas all groups have increased TSH levels that suggest hypothyroidism, there are differences in vitamin D and calcium levels among other demographics. These variations may require customized management techniques to address possible gaps or imbalances in these factors

3.2-Discussion

Hypothyroidism is a prevalent kind of thyroid disease caused by a lack of thyroid hormones. Thyroid dysfunctions often lead to disruptions in mineral metabolism. Prior research conducted on serum

calcium, and vitamin D levels in thyroid diseases has yielded inconsistent findings. Our study examined the demographic and clinical information of children, males, and females diagnosed with hypothyroidism. The average age of the children was 11.6 years, and they had increased TSH levels indicating hypothyroidism and insufficient levels of vitamin D. Nevertheless, the levels of calcium were within the usual range. Males, with an average age of 48.3 years, exhibited significantly elevated TSH levels, as well as inadequate vitamin D levels and slightly below-average calcium levels. Women, with a mean age of 45.5 years, showed TSH levels indicating hypothyroidism, inadequate vitamin D, but significantly high calcium values, suggesting a possible calcium imbalance. These findings emphasize the necessity of customized therapies in the management of hypothyroidism, taking into account gender-specific disparities

In this studycshowed the correlation is results, a study included a total of 40 patients and 20 healthy volunteers, ranging in age from 20 to 50 years, and comprising both males and females. The patients with hypothyroidism were separated into two groups, with a total of 20 participants. These serums were subsequently used to determine the levels of T4, T3, TSH, Vit D3, and PTH. The levels of TSH hormone show a substantial increase in the group with hypothyroidism, while the levels of T4 hormone show a considerable decline in both patient groups. The Ca levels showed a considerable decrease. Additionally, the level of vitamin D3 was significantly lower in both patient groups. Furthermore, there is a decline in Vitamin D3 levels in hypothyroidism patients (Jouda et al., 2020)

Given the significance of vitamin D insufficiency and thyroid illnesses as major worldwide health concerns, our objective was to examine the potential correlation between vitamin D and calcium levels and hypothyroidism. In agreement with study in iran, a case-control study was performed on a total of 350 individuals, consisting of 175 participants diagnosed with hypothyroidism (75 males and 100 females). All subjects had measurements of serum levels of 25-hydroxyvitamin D, calcium, TSH, free T3, and total T4. Patients with hypothyroidism exhibited significantly reduced levels of Vitamin D and calcium. There was a significant difference in the levels of Free T3 and calcium among hypothyroid individuals depending on their vitamin D status. Furthermore, a significant positive connection was seen between free T3 and both vitamin D and calcium levels. The findings indicate a potential correlation between reduced vitamin D levels and thyroid function measures (Ebrahimabad et al., 2019)

The thyroid hormone plays a crucial role in regulating the body's hemodynamics, thermoregulation, and metabolism. It also directly impacts the absorption of Ca and magnesium. Thyroid hormone is crucial for the proper development and maturation of the skeletal system. Hypothyroidism is characterized by a reduced turnover caused by the inability to effectively move calcium into the bone, resulting in a drop in blood calcium levels. In cases of hypothyroidism, there is an elevated synthesis of calcium. The thyroid hormone calcitonin stimulates the reabsorption of phosphate in the tubules and encourages the excretion of calcium, resulting in a condition of low blood calcium levels and high blood phosphate levels. Another study aims to investigate the levels of serum total calcium in patients diagnosed with hypothyroidism. A statistically significant drop in serum total calcium levels was observed in hypothyroid individuals. The investigation revealed a statistically significant decrease in serum calcium levels hypothyroidism patients. A strong negative correlation was found between TSH and serum calcium levels (Gohel et al., 2014)

Suneel et al. (2011) is other study were conducted on the mineral status of individuals with thyroid disorders (Hypothyroidism & Hyperthyroidism) and observed a drop in calcium levels and an increase in phosphorus levels in hypothyroidism

Murgod & Soans (2012) conducted a study on patients with hypothyroidism to examine the alterations in their electrolyte profile. They found that the calcium level was dramatically decreased, while the levels of magnesium and phosphorous were elevated in patients with hypothyroidism.

Additionally, a notable negative connection was discovered between serum TSH and calcium levels. Simultaneously, a notable inverse relationship was seen between TSH and calcium levels. Thyroxin typically controls the blood calcium level by releasing calcium from cells. When the level of thyroxin in the blood decreases, less thyroxin reaches the cells, resulting in a reduced release of calcium. This can lead to hypocalcemia

Shivaleela et al. (2012) conducted a study on thyroid dysfunction patients to examine the levels of serum calcium and phosphorous. The results revealed that hypothyroid patients had lower levels of both calcium and phosphorous

Mane & Bhagwat, (2012) demonstrated reduced levels of total calcium, ionized calcium, and magnesium in individuals with hypothyroidism. Furthermore, contrasting alterations were noted in patients with hyperthyroidism. Thyroid hormones impact bone metabolism by modifying the regular processes of bone remodeling. The decreased serum magnesium level observed in hypothyroid individuals is a result of disrupted magnesium regulation

Our study's findings suggest a close relationship between mineral metabolism and thyroid hormone. The thyroid hormone regulates the mineral levels in the blood by controlling the release of minerals such as calcium into the bloodstream. It also affects the removal of minerals through urine by altering the glomerular filtration rate or the flow of plasma in the kidneys. In cases of hypothyroidism, low levels of calcium indicate impaired calcium metabolism. When treating individuals with hypo and hyperthyroidism, the treatment methods might be adjusted to account for changes in mineral metabolism.

The purpose of a study was to evaluate and examine the changes in serum calcium, magnesium, and phosphorus levels and their correlation with T3, T4, and TSH in a state of hypothyroidism. A case-control study was conducted on a sample of 40 individuals who were in good health and 40 individuals who had a shortage in thyroid hormone. Cases exhibited a notable decrease in blood calcium levels compared to controls. Thyroid

hormones control the flow of blood in the body, the regulation of body temperature, and the process of metabolism. They exert an impact on the regulation of renal blood flow, the filtration of substances in the glomerulus, and the management of electrolytes in the kidney (Mariani & Berns, 2012)

An investigation revealed a statistically significant decrease in serum calcium levels among the cases compared to the controls ($p<0.0001$). An evident inverse connection between TSH and serum calcium level among patients was established (Sridevi et al., 2016)

The objective of a study was to determine the alterations in serum calcium, phosphorous, and magnesium levels in individuals with subclinical hypothyroidism and overt hypothyroidism, and to establish a correlation between these parameters and serum TSH levels. The study participants were chosen from a group of patients who had their thyroid profiles evaluated. A total of 150 patients were included in the study, with 50 individuals diagnosed with subclinical hypothyroidism, 50 individuals diagnosed with overt hypothyroidism, and 50 individuals diagnosed as euthyroid serving as the control group. A blood sample was obtained from each of the participants, and the levels of serum TSH, FT3, FT4, calcium, phosphorous, and magnesium were measured. The analysis demonstrates a statistically significant negative correlation between calcium and TSH levels (Kavitha et al., 2014)

Thyroid abnormalities are the most prevalent endocrine illnesses globally. The thyroid hormone plays a pivotal role in regulating several bodily systems. Vitamin D deficiency is a widespread health issue that has been proven to have an impact on the immune system. Recent research has

shown a connection between a deficiency in vitamin D and autoimmune illnesses like Hashimoto's thyroiditis and Grave's disease, as well as a disruption in vitamin D signaling in thyroid malignancies.

Vitamin D primarily functions in the regulation of bone metabolism and maintenance of calcium homeostasis. Hence, the objective of a study was to evaluate the concentrations of 25-OH Vitamin D and serum Calcium in individuals who have recently been diagnosed with hypothyroidism. A total of 70 individuals who were recently diagnosed with hypothyroidism and 65 healthy individuals were enrolled in the study. Serum samples were obtained from the participants, and the levels of serum calcium, 25-OH vitamin D, T3, T4, fT3, fT4, and TSH were measured in the study groups. Patients diagnosed with hypothyroidism had a notable reduction in serum calcium and 25-OH vitamin D levels (Sinha & Bhushan, 2019)

A retrospective study conducted on a cohort of 776 individuals who had their serum 25-hydroxyvitamin D (25(OH)D) levels, thyroid function, and anti-thyroid antibodies evaluated. Vitamin D deficiency was characterized by a serum 25(OH)D level below 75 mol/L. The occurrence of vitamin D insufficiency was notably greater in the 369 patients with autoimmune thyroid disease (AITD) compared to the 407 patients without AITD (46.1% vs. 37.1%, p=0.011). Additionally, it was higher in the 221 patients with Hashimoto's thyroiditis) compared to those with Graves' disease or non-AITD (48.9% vs. 41.9%, 37.1%, -0.017). Among patients with hypothyroidism, those with overt hypothyroidism had a significantly higher prevalence of vitamin D insufficiency (60.4% vs. 44.1%, 21.7%, 37.1%, respectively, p <0.001) and lower levels of 25(OH)D (80.1 # 47.7vs. 99.34 ‡ 61.2, 110.3 # 69.9, 99.6 = 53.7 nmol/L, respectively, p-0.009) compared to those with normal thyroid function and subclinical hypothyroidism or those without autoimmune thyroid disease. It was concluded that vitamin D deficiency associated with hypothyroidism (Kim, 2016)

A study by Koch et al. (2016) is a cross-sectional investigation comprised a total of 152 individuals, aged 20-60 years, who were clinically suspected of having hypothyroidism. The levels of vitamin D, T3, T4, and TSH were quantified using an enzyme-linked fluorescence assay on the Vidas PC auto-analyzer from Biomerieux.The patients were classified into three groups based on their serum TSH levels: euthyroid (TSH 0.25-5 lU/ml), subclinical hypothyroid (TSH 3-7 IU/ml), and overt hypothyroid (TSH>7ulU/ml). The patients were categorized as vitamin D sufficient (30ng/mi), insufficient (20-30ng/ml), and deficient («20ng/ml) according to the current consensus on vitamin D categorization. The average level of vitamin D in subclinical hypothyroidism (16.73±12.46 ng/ml) and overt hypothyroidism (13.23±10.08 ng/ml) were substantially lower than in individuals with normal thyroid function (29.07±19.01 ng/ml) with a p- value less than 0.05. The Pearson correlation study between vitamin D and TSH (-0.314, P-0.01) has revealed a substantial negative association. There is a negative correlation between Vitamin D insufficiency and TSH levels. Therefore, it was recommending administering vitamin D supplements to all individuals with hypothyroidism

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تقييم الرعاية الصحية لمرضى قصور الغدة الدرقية باستخدام مستويات فيتامين د والكالسيوم

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استلمت الورقة بتاريخ 2025/02/02، وقبلت بتاريخ 2025/02/10، ونشرت بتاريخ 2025/02/12

الكلمات المفتاحية:
قصور الغدة الدرقية – فيتامين د - الكالسيوم

الملخص

الخلفية والغرض: قصور الغدة الدرقية هو حالة تحدث عندما لا تنتج الغدة الدرقية ما يكفي من الهرمونات لتلبية احتياجات الجسم، مما يؤدي إلى تباطؤ في بعض وظائف الجسم. أجريت الدراسة لتقييم قصور الغدة الدرقية وعلاقته بنقص فيتامين د والكالسيوم.

الطريقة والمواد: شملت مجموعة الدراسة الأطفال [ن = 20] والرجال [ن = 20] والنساء [ن = 20] كمجموعة من الحالات. تم قياس مستويات **TSH** والكالسيوم وفيتامين د. أجريت هذه الدراسة في مستشفى زليتن التعليمي

النتائج: أظهرت الدراسة الحالية عدم وجود ارتباط دال إحصائياً بين متوسط فيتامين د (0.05) والكالسيوم (0.025) لدى مرضى الأطفال، كما أظهرت الدراسة أن متوسط فيتامين د (0.043) والكالسيوم (0.025) لدى مرضى الإناث (0.0527) كان متوسط فيتامين د (0.034) والكالسيوم (0.025) لدى مرضى الذكور.