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Short Communication

Vitamin D3 and Ferritin Levels in Patients with Hypothyroidism in Baghdad, Iraq

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ABSTRACT

Background: Many studies have demonstrated the relationship between vitamin D and ferritin levels and hypothyroidism. The aim of this study was to establish a relationship between vitamin D and ferritin levels and patients with hypothyroidism.

Methods: Forty-eight individuals with hypothyroidism were enrolled and divided into two groups of hypothyroidism patients (n=48) and the control group (n=20); while thyroid hormone, vitamin D and ferritin levels were determined among all participants.

Results: Patients with hypothyroidism showed a significant decline for both ferritin and vitamin D levels in patients with hypothyroidism when compared to the control group.

Conclusion: The low levels of vitamin D and ferritin were associated with hypothyroidism, which emphasize the importance of a decreased vitamin D and ferritin levels.

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Introduction

The thyroid gland plays an important and vital role in regulating metabolism in humans by producing and releasing thyroid hormones such as T3 and T4, which are necessary in various body functions. The part controlling the levels of these hormones is the hypothalamus and the pituitary gland that plays the role of maintaining the balance (1, 2). When there is a decrease in thyroid activity, hypothyroidism may happen and leads to the emergence of symptoms with mild to severe complications (3). A subclinical hypothyroidism exhibits normal T4 level with a slightly higher TSH level, whereas hypothyroidism is clinically characterized by a low T4 level. Iodine insufficiency is the cause of these inadequacies; since it is a major factor in locations where iodine intake is poor (3).

Ingredients of a diet can have a crucial role in cell cycle and proliferation (4-6). Regarding vitamin D, it is a critical element for the immunological system and bone health and has a significant impact on thyroid function. Its conversion into active hormonal forms by the liver and kidneys validates the necessity for assessing the level of vitamin D in patients with thyroid problems (7). Evaluating the level of iron stores in people who suffer from hypothyroidism is also important as they have a significant impact on thyroid function, the response to autoimmunity, iodine deficiency, and insufficient levels of vitamin D, which can play a major role in the development of thyroid disorders (1). Several studies demonstrated that iodine, zinc, iron, selenium, and vitamin D are essential in the synthesis and manufacture of hormones. A lack of iron stores was shown to have a

close relationship with hypothyroidism, which leads to microcytic anemia due to absorption problems (8-11). There is also a study that confirms the role of vitamin D and its relationship to iron deficiency. In cases of Hashimoto's thyroiditis and Graves' disease, measuring the level of these nutrients can determine the deficiencies affecting the thyroid gland (2, 12).

Hypothyroidism is a widespread endocrine disorder that affects a large portion of people, especially females. Its prevalence rate varies from one region to another, and in Saudi Arabia was reported with a rate of 47.34%. It can lead to various functional disorders such as low bone density, anemia, reproductive problems, and cardiovascular diseases. A significant negative relationship was shown between levels of iron and vitamin D in people who suffer from hypothyroidism (13). A study conducted in Abu Dhabi revealed that levels of vitamin D and iron decreased significantly in people with hypothyroidism, and this decrease was associated with an increased level of the thyroid stimulating hormone (TSH). This study has also shown that a large percentage of patients with hypothyroidism suffered from a simultaneous deficiency in both iron and vitamin D (12). So the importance of monitoring the levels of iron and vitamin D can prevent osteoporosis and anemia too (12, 13). The aim of this study was to determine vitamin D3 and ferritin levels in patients with hypothyroidism in al-karkh, Iraq.

Materials and Methods

Forty-eight patients suffering from hypothyroidism who were admitted to Ghazi Hariri Hospital and Yarmouk Teaching Hospital in Baghdad, Iraq were enrolled. Patients were diagnosed according to clinical examination by skilled doctors, while the thyroid hormones, namely T3, T4 and TSH, were measured, as well as iron and vitamin D levels. Participants were divided into two groups of hypothyroidism patients (n=48) and the control group (n=20) who did not have thyroid problems. Among both groups, 5 mL of blood was taken, the serum was separated by a centrifuge at 3000 rpm for 10 minutes and was stored until use to determine the levelss of T3, T4 and TSH hormones and iron and vitamin D levels (Cobas-E411/Roche device) as described before (14). SPSS software (Version 20, Chcago, IL, USA) was utilized to compare groups employing statistical tests. A p value less than 0.05 was considered statistically significant.

Results

Table 1 illustrates the levels of thyroid hormones, vitamin D and ferritin levels in patients suffering from hypothyroidism revealing a reduction in the levels of vitamin D and Ferritin in hypothyroidism patients.

Discussion

Understanding the relationship between thyroid hormones and vitamin D and iron levels in patients with hypothyroidism is important in order to devise mechanisms to control the complications associated with hypothyroidism. A study conducted by Al-Rawi *et al.* revealed that individuals with vitamin D3 deficiency had higher levels of insulin resistance, which showed an association of antibiotics and thyroid gland activity (15). The relationship between the levels of iron and vitamin D and hypothyroidism and iodine deficiency was demonstrated in hypothyroidism patients (16). The interaction between iron and vitamin D levels and hypothyroidism has also been highlighted in Chaudhary *et al.*'s study (17). Another study illustrated that patients with iodine deficiency had low levels of ferritin, indicating an iron anemia in patients with hypothyroidism (18). A strong correlation between vitamin D deficiency and hypothyroidism has been described by D'Aurizio *et al.*'s too (19). This is consistent with the results of our research. In addition, Caturegli *et al.* reported serum ferritin level to be negatively associated with perfluorooctane acid level, which confirms a possible correlation between iron deficiency and hypothyroidism (20).

The relationship between vitamin D and hypothyroidism and an increase in autoimmune diseases was found as in thyroid deficiency a rise in anti-peroxides and anti-thyroglobulin antibodies happens (21-23). In our study, vitamin D level showed a decline in patients suffering from

Table 1: illustrate the levels of various hormones, Vitamin D and ferritin in patients suffering from hypothyroidism.

Variable	Control group	Hypothyroidism group	*P* value	Significant
	Mean±SE	Mean±SE		($p\leq0.05$ or $p\leq0.01$)
TSH (miU/dL)	1.265±0.150	9.038±2.277	0.0021	S**
T3 (ng/dL)	1.786±0.094	0.934±0.080	0.0001	S**
T4 (nmol/L)	125.598±4.079	62.761±4.306	0.0001	S**
D3 (ng/dL)	36.219±1.606	17.841±1.711	0.0001	S**
Ferritin (ng/dL)	21.605±1.077	8.093±0.687	0.0001	S**

hypothyroidism when compared to the control group explaining the correlation of vitamin D level with hypothyroidism. It was shown that the use of vitamin D supplements could lower the level of TSH but not as a major triad to affect the levels of T3 and T4 hormones (23). Other studies have also demonstrated that the use of vitamin D supplements for people with hypothyroidism has played an important role in improving the thyroid function, and regulating antibodies and autoimmune diseases that could negatively impact thyroid function (24). It was illustrated that autoimmune diseases can participate in destruction of thyroid activity and have a harmful effect on vitamin D level and thus increase the risk of thyroid cancers (25).

Conclusion

In short, it is important to assess levels of iron and vitamin D among individuals with hypothyroidism. A very close relationship between iron and vitamin D levels and thyroid hormones was demonstrated in our study. It is important to conduct other studies with a larger sample size and include other factors, such as sex, age, and region to explore the association between iron and vitamin D levels and hypothyroidism.

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Authors' Contribution

All authors contributed equally to this work.

Conflict of Interest

The authors declare no conflict of interest.

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