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Relationship between Helicobacter pylori and thyroid hormones disorder

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Abstract

This study aimed to assess the link between *Helicobacter pylori* patients and thyroid hormone abnormalities. The current study included serum samples collected from 50 patients (male and female aged 15 to 55 years) suffering from H. pylori, where the anti-H was detected. Pylori IgG did infection confirmation. Additionally, 50 serum samples were collected from healthy people as a control. Hormones of thyroid glands, including T3, T4, and TSH, were measured in both patients and the control group using Cobas e411. A significant correlation at a p-value of 0.01 was seen between the infected H. pylori group and thyroid hormone abnormalities. In conclusion, long-lasting infection with H. pylori may cause abnormality in thyroid hormone levels, either hyperthyroidism or hypothyroidism.

Keywords: *Helicobacter pylori, TSH, T3, T4*

Introduction

Since its discovery in 1982, *Helicobacter pylori*—a common, spiral-shaped, microaerophilic, Gram-negative bacteria that lives in the human stomach—has significantly influenced the field of gastroenterology and infectious illnesses (1). It is known to be the primary cause of gastritis in humans and is considered an important factor in the development of gastric cancer, peptic ulcers, and mucosa-associated lymphoid tissue (MALT) type gastric lymphoma. Bacterial infections cause a systemic low-grade inflammatory state and have been causally linked to a wide range of extra-gastric illnesses (2-4). According to an epidemiological investigation, the rate of *H. pylori* infection has surpassed 50% globally, is around 30% in wealthy nations, and can reach 80% in underdeveloped nations (5). The pathophysiology of autoimmune thyroid disease (ATD), which includes Hashimoto thyroiditis (HT) and Graves' disease (GD), the primary causes of hypothyroidism and hyperthyroidism, respectively, may also be influenced by the virus (6). Since there is little and inconsistent evidence specifically connecting *H. pylori*

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infection to subclinical hyperthyroidism in human populations, and because the majority of thyroid conditions exhibit a female predilection (7), we carried out a large prospective cohort study to find out if baseline *H. pylori* infections were linked to subclinical hyperthyroidism in adult women. Furthermore, research has shown that dietary determinants may be important in subclinical hyperthyroidism (8), which directly affects the colonization or virulence of H. pylori (9). Therefore, the current study aims to evaluate the relationship between thyroid hormone abnormalities and *Helicobacter pylori* patients.

Materials and Methods

Ethical approval

The sample was collected from the patient after verbal consent, according to Declaration of Helsinki. Moreover, all personal information of each patient was protected

Sampling

Serum samples were collected from 50 patients (males and females aged 15 to 55) suffering from H. pylori infection. The diagnosis was confirmed by detecting the infection with H. pylori IgG, in addition to 50 serum samples from healthy people. Patients suffering from gastrointestinal symptoms were introduced to the physician, and blood samples were collected from December to April 2024 in a teaching laboratory / Medical City of Baghdad. A five-ml venous blood sample was collected from each patient and serum was separated from whole blood after centrifugation. The level of IgG due to *H. pylori* infection was detected by using VIDUS (biometrics, France).

Estimation of Thyroid gland hormones (T3, T4, TSH)

The Thyroid glands hormones (T3, T4, and TSH) were measured in the samples of both patients and the control group using Cobas e411(Roshe, German). The normal range for as indicated by the kit manufacturer TSH levels (0.4-4) ng/ml, T3 levels (0.79-1.58) ng/ml and T4 level (4.9-11) µg/l.

Statistical analysis

The mean, standard deviation, correlation analysis, and chi-square tests were done using SPSS version 21.

Results

In the current study, there was a significant relationship between *H. pylori* infection and abnormalities of thyroid hormones compared to the control group. All participants were chosen to be middle-aged to avoid the influence of age as a factor affecting the result. Mean aged between (15-55) years old. The value of the Chi-square test (5.065) at a significant level (0.079) displayed in (Table.1) ; this indicates homogeneity, independence, and the effect of the positive hormone by gender in the selected sample at a level (< 0.010).

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Table 1. Positive Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.065[a]	2	0.079
Likelihood Ratio	5.146	2	0.076
Linear-by-Linear Association	2.140	1	0.144
N of Valid Cases	126		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.57.			

The details of each hormone in infected patients with *H. pylori* were displayed in Table. 1. Moreover, the elevation of T3 and T4 in patients with chronic infection of *H. pylori* is shown in Figure.1.

Table 2. Thyroid hormones levels in *H. pylori* patients

	TSH	**T_3**	**T_4**	**Total**
Low hormone content	2	0	0	2
High hormone content	0	8	8	16
Total	2	8	8	18

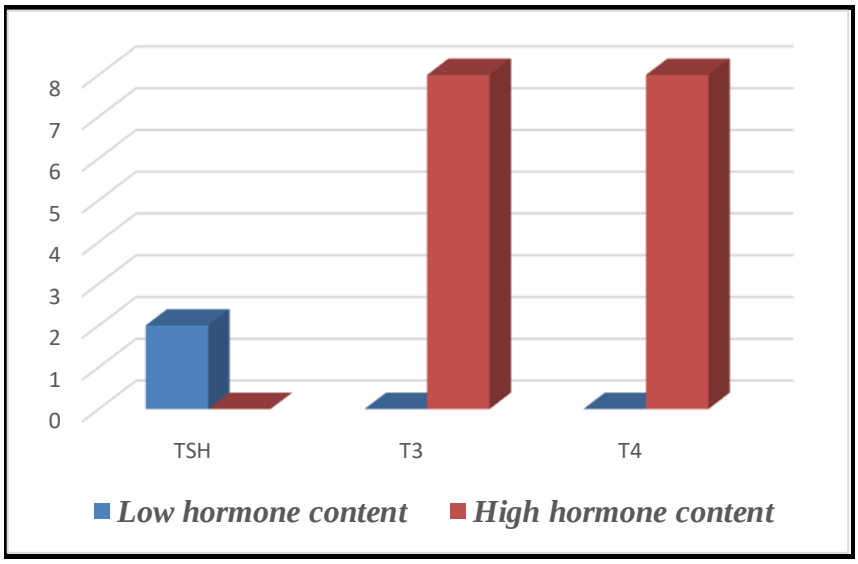

Figure 1. Thyroid hormones levels in *H. pylori* infected patients

A significant difference was found in gender susceptibility to thyroid abnormalities, as females were more susceptible to thyroid abnormalities than males. the value of the Chi-square test (18) at a significant level (0.000), this indicates homogeneity, independence, and the effect of the positive hormone by gender in the selected sample at a level ($p < 0.010$) (Table 3). Additionally, the comparison between patients and control hormones levels were displayed in Table 4, 5 and Figure. 2, 3.

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Table 3. Thyroid hormones levels differences in gender

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.000[a]	2	0.000
Likelihood Ratio	12.558	2	0.002
Linear-by-Linear Association	8.500	1	0.004
N of Valid Cases	18		
a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 22.			

Table 4. high hormone levels

subjects	TSH	T_3	T_4	Total
Patients	2	0	0	2
Control	2	0	1	3
Total	4	0	1	5

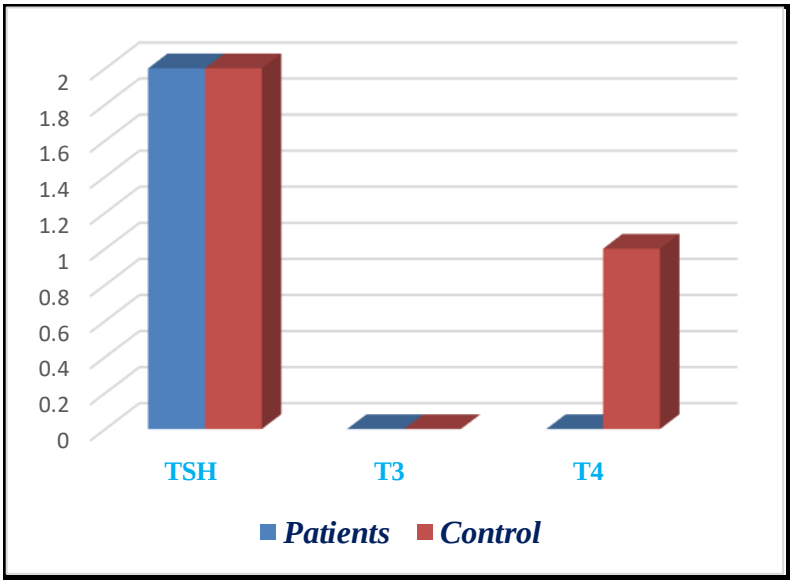

Figure 2. Shows the high hormone levels

Table 5. Shows the low hormone levels

subjects	TSH	T_3	T_4	Total
Patients	0	8	8	16
Control	0	3	5	8
Total	0	11	13	24

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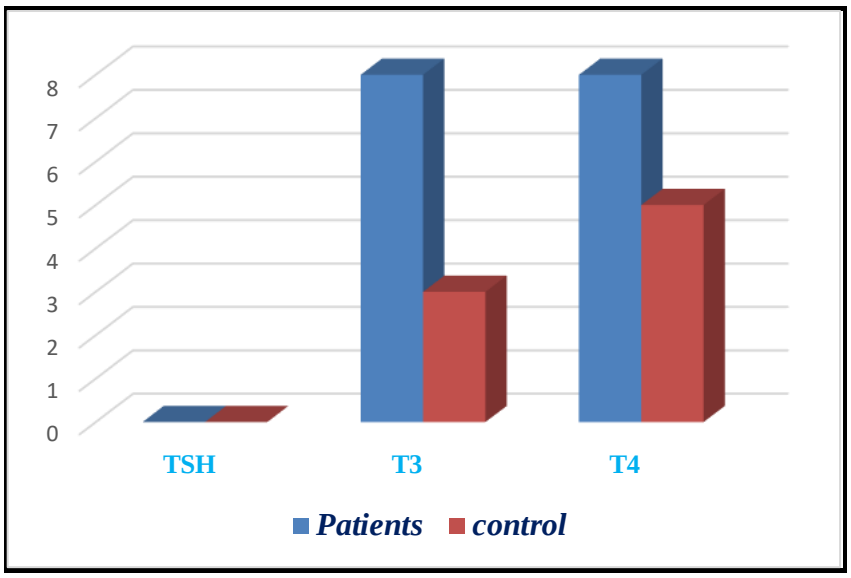

Figure 3. Shows the low hormone levels

Discussion

Long-term *H. pylori* infection was significantly associated with aberrant thyroid hormones in the current investigation, particularly in female patients, which might be related to sex hormones. First, prospective of previous study in china showed that, among Chinese women, particularly those in their middle and later years, *H. pylori* infection was significantly linked to the likelihood of subclinical hyperthyroidism, regardless of dietary factors (10). However, an investigation conducted in Egypt in 2019 revealed a strong positive correlation between *H. pylori* infection, Hashimoto's disease (HT), and Graves' disease (GD) (11). According to a 2022 Brazilian study, the infection might damage the thyroid's hormonal balance, not the hypothalamic-pituitary-thyroid axis's ability to function. Even while the prevalence of CH is not insignificant and *H. pylori* infection is extremely common, more research is necessary to validate our findings and pinpoint the processes at play (3). Long-lasting *H. pylori* infection is linked to AITD in the female adult population, according to a 2023 study conducted in Italy with 8322 patients that examined the connection between *H. pylori* infection and thyroid disorders (12). Serum IgG against *H. pylori* (or against *H. pylori* CagA-positive) was a reliable marker of an *H. pylori* infection, either past or present. Since antibody tests continue to produce positive findings even after an infection has been properly treated, a positive test result cannot be used to identify whether a patient was infected. Lastly, antibodies were necessary to differentiate between a short-term and long-term *H. pylori* infection (13). Both organ-specific and non-organ-specific autoimmune disorders have been linked to virulent strains that was distinguished by the presence of CagA (14).

Conclusion

In conclusion, thyroid abnormalities were linked to *H. pylori* infection, and eliminating the infection is crucial to preventing the development of thyroid autoantibodies.

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No conflict of interest related with publishing of this article.

Ethics statement

The author approved that this research follows the journal's ethical guidelines as appeared on the journal's author guidelines page.

Author contributions

The author did all the work Conception, design, acquisition of data, analysis, interpretation, drafting revision and proofreading.

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