

The Possible Role of Helicobacter pylori Infection in Hashimoto's Thyroiditis

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Abstract:

Background: Autoimmune thyroiditis is one of autoimmune thyroid diseases. The cause of Hashimoto's thyroiditis is not clearly identified; however, both genetic and environmental are suggested to play a role in pathogenesis of the disease. Helicobacter pylori (H pylori) is one of the possible causative agents.

Objectives: The aim of this study is to look for the association of H. pylori infection with Hashimoto's thyroiditis.

Patients and Methods: a case-control study involved patients with Hashimoto's thyroiditis (n=100) and control group (hyperthyroidism n=50, healthy persons n=50), the study groups were subjected to serological investigation of anti- H. pylori IgG antibodies, anti-thyroid peroxidase antibody, and anti-thyroglobulin antibody (anti-TG Ab) using ELISA technique; besides, demographic data were collected from study groups.

Results: Eighty two percent of Hashimoto's thyroiditis patients were females; 57% of Hashimoto's thyroiditis patients were positive for anti- H. pylori IgG antibodies while the positive result was detected in only 22% of control group and the results were statistically significant ($p < 0.05$). The strength and direction of the relationship between the concentrations of anti-HP IgG Abs and anti-TPO antibodies in Hashimoto's thyroiditis group revealed positive correlation ($r = 0.6241$).

Conclusion: the infection with H. pylori is one of the possible predisposing factors to etiology Hashimoto's thyroiditis. The association between H. pylori infection and other genetic and environmental factors that are related to Hashimoto's thyroiditis should be studied in depth.

Key word: Hashimoto's thyroiditis, H. pylori, Anti-TPO.

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Introduction:

Hashimoto's thyroiditis, also known as autoimmune thyroiditis, is a disease of unidentified etiology; however, many genetic and environmental factors are implicated in pathogenesis of this disease (1).

Yet studies have suggested a role for some infectious agents, in the pathogenesis of Hashimoto's thyroiditis (HT). Among the environmental factors, Helicobacter pylori (HP), Yersinia enterocolitica, and some foods are expected to participate in etiology of Hashimoto's thyroiditis (2,3).

Hashimoto's thyroiditis is usually diagnosed by a combination of clinical features plus measurement of thyroid auto-antibodies, particularly those directed against thyroid peroxidase (TPO) and anti – thyroglobulin antibodies (4).

Helicobacter pylori is the most commonly encountered bacterial infection in human, it is gram-negative, spiral, microaerophilic, and cosmopolitan bacterium that mostly found in mucous membrane of stomach and has been associated with common gastric diseases, especially with active and chronic gastritis as well as peptic ulcer disease and, in some cases, with gastric cancer (5).

The possibility of HP as a risk factor in development of Hashimoto's thyroiditis might be related to antigenic mimicry

between the bacterial antigens and thyroid gland antigens, and thus antibodies formed in relation to infection will also attack thyroid antigen and result in hypothyroidism phenomenon (6,7).

Researchers expect similar scenario of HP infection with primary biliary cirrhosis, primary migraine, primary Raynaud's phenomenon, cardiovascular, dermatological, hematological, neurological, immunological, ophthalmological and gynecological diseases, and organ specific autoimmune diseases (autoimmune thyropathies), as well as diabetes mellitus (8,9).

The aim of the current study is to investigate the possible association of HP infection with Hashimoto's thyroiditis.

Materials and Methods:

Study groups: This study involved out 100 Hashimoto's thyroiditis patients group and another control group which include 50 healthy individuals and another 50 patients with hyperthyroidism. The control group was age and sex matched with Hashimoto's patients group. The Hashimoto's patients were selected according to clinical criteria plus positive anti-TPO Ab. Moreover, any person with thyroid surgery or on HP treatment was excluded from the study.

In the control group, any individual with positive anti-TPO Ab were also excluded from the study.

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Study design: case – control study.

Setting of the study: The study was done in Al-Yarmok Teaching Hospital/Baghdad/Iraq.

Duration of the study: The sample collection started in February 2016 and lasted for 4 months.

Ethical consideration: Signed consent was taken from the participants in the study.

Laboratory procedures: Nearly 5 milliliters of venous blood were collected from each patient and the serum was used for quantitative measurement of IgG anti – H. pylori antibodies (ELISA kit manufactured by MonobindInc. company/USA), quantitative determination anti-TPO antibodies (GenWay ELISA kit/USA), and qualitative and semi-quantitative determination of anti-TG Abs (GenWay ELISA kit/USA). The procedures were performed as advised by the manufacturers. Any result of anti-HP antibodies > 20 U/ml were confirmed as positive, while anti-TPO antibodies above 35AU/ml were considered positive. The results of Anti-TG antibodies were regarded as positive if the index of ELISA test was >1.1 (> 150 IU/mL: Positive).

Statistical analysis: The analysis of data was performed by using SPSS (Statistical Package for Social Science) version 21; P<0.05 was considered as statistically significant.

Results:

The Hashimoto's patients (n=100) were randomly selected, most of them were females (82 % female and 18% male); the range of the ages in Hashimoto's thyroiditis patients was 28-40 and the mean age of patients was 36.6 ± 4.1 years.

The anti – HPIgG Abs test was positive in 57% of the Hashimoto's thyroiditis patients and 22% of control group (8 healthy individuals and 12 hyperthyroidism patients), there was significant statistical difference between the two groups (p value < 0.05), table (1).

Table (1): Anti – H. pylori IgG antibodies among the groups of the study

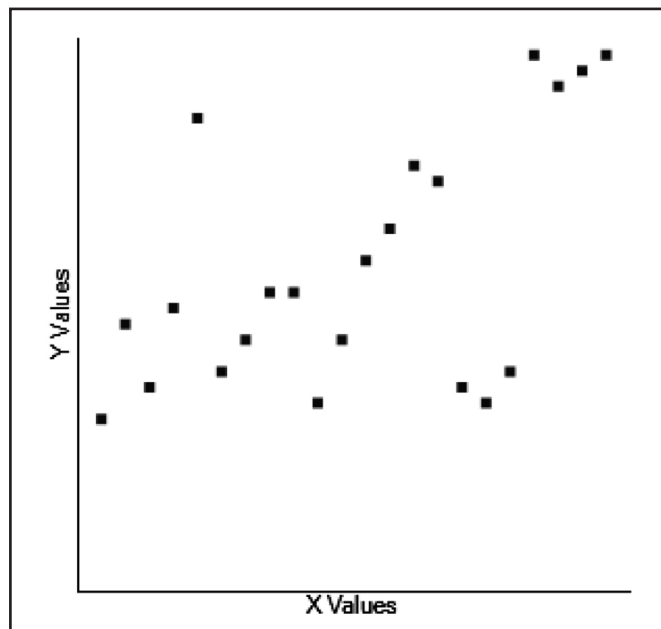
Study groups	Anti- H. pylori IgG antibodies	
	Negative	Positive
Hashimoto's thyroiditis (n=100)	43 (43%)	57 (57 %)
Control group (n=100)	88 (88%)	22 (22%)

Pvalue<0.05

The strength and direction of the relationship between concentrations of anti-HP Abs and anti-TPO antibodies in Hashimoto's thyroiditis group was measured using Pearson correlation coefficient calculator and the results revealed positive correlation coefficient , r = 0.6241 and the results were statistically significant (P<0.05).

The association between anti-HP Abs and ages of Hashimoto's thyroiditis patients revealed weak correlation (r=0.179).

The anti-TG Ab was positive in 59% of Hashimoto's thyroiditis patients, while 41% of them were negative. The index of positive anti-TG Abs showed moderate positive correlation to the concentration of anti-TPO antibodies (r=0.5648) (figure 1), and anti-HP Abs (r= 0.642) (figure 2).



Figure(1): the correlation between the concentration of anti-TPO Abs and anti-TG Abs in Hashimoto's patients with positive anti-TG Abs. X: anti-TPO Abs concentration, Y: index of anti- TG Abs.

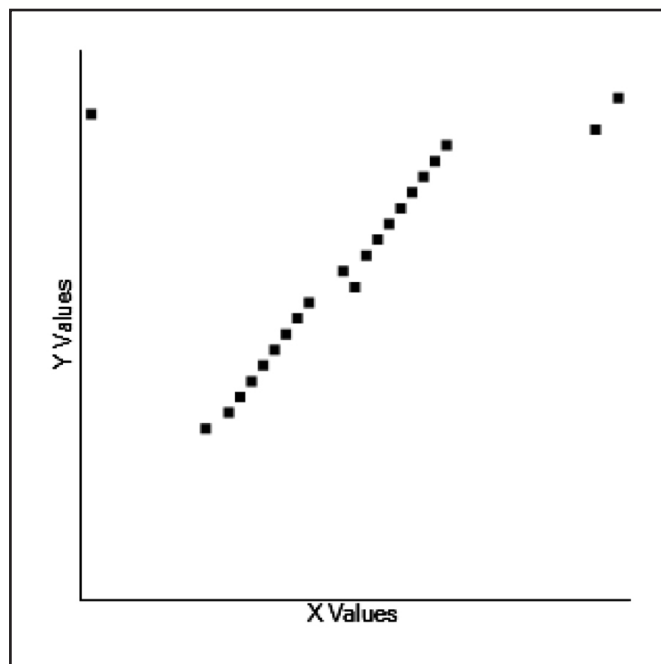


Figure (2): the correlation between the concentration of anti-HP Abs and anti-TG Abs in Hashimoto's patients with positive anti-TG Abs. X: anti-HP Abs concentration, Y: index of anti-TG.

Discussion

In the current study, most of the Hashimoto's patients are female. Sex hormones may play a role in this aspect, as described in several previous studies, sex hormones, like estrogen, progesterone, and testosterone believed to mediate the immune response to many of the sex – based differences in the prevalence of autoimmune diseases for sex differences (10,11). The sex hormone directly interacts with immune system cells via the receptor on or inside immune cells. Steroid hormones are known by their influence in antibody production and immune cell proliferation (12). The age range in this study was 28 – 40; it means that the autoimmune thyroid disease mostly occurs in adult age. This fact also confirmed by Akamizu T, et al., who argues that thyroid diseases occur especially from 30 to 50 during the decades but may be seen in any age group, including children (13).

The results of the present study showed that nearly half of Hashimoto's thyroiditis has positive anti – HP IgG Abs, and this result was significantly higher than control group. Our results are consistent with most of previous studies such as Sterzlet al., and Papamichaelet al., reported a connection between H. pylori infection and autoimmune thyroiditis (14-15). The same result were confirmed by Franceschiet al. and Arslanet al., who reported the presence of a link between H. pylori infection and thyroid disorders, including autoimmune thyroid disorders such Hashimoto's thyroiditis (16,17). The current study could not explain the mechanism by which H. pylori can evoke Hashimoto's thyroiditis; Muratori and Bogdanos agree with the result of the present study in that “the exact mechanisms by which exposure to a microbe elicits more than one autoimmune manifestation are not well defined” but cross reactive responses against a microbial mimic and several self-antigens have been documented (18,19).

There was a positive linear correlation between anti-HP Abs and anti-TPO antibodies which increase the possibility of the implication of H. pylori in pathogenesis of Hashimoto's thyroiditis. Bertalot, et al. also reported that there is a strong correlation between IgG anti-H. pylori antibodies and thyroid autoantibodies. It has also been observed that the eradication of H. pylori infection is followed by a decrease in the levels of thyroid auto-antibodies gradually (20).

On the contrary, other studies by Tomasi, et al., and Bassiet al., showed that there are no differences of the thyroid hormones or thyroid auto-antibodies levels in the serum in patients with and without H. pylori infection (21,22).

Vincenzo, et al. have another opinion when reported that the correlation between autoimmune thyroid diseases and H. pylori is present only in Graves's disease (23). Anti-TG Abs were detected in nearly half of Hashimoto's thyroiditis patients and this reveals the frequent detection of Anti-TG Abs, though their presence is not pathognomonic for Hashimoto's thyroiditis (24). Our results showed positive linear correlation

among anti-TG, anti-TPO, and anti-HP antibodies, similar results were also found by Lian XL, et al (25), this association might be related to the disease severity, and might reflect the need of adding anti-HP medications as additional choice in management of Hashimoto's thyroiditis.

Conclusion

In conclusion this research work could point for an important role and participation of the infection with H. pylori as one of the possible predisposing factors to etiology Hashimoto's thyroiditis. The association between H. pylori infection and other genetic and environmental factors that are related to Hashimoto's thyroiditis should be studied in depth.

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