

Colonization of *Helicobacter pylori* in Tonsillectomy Materials

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Abstract: To detect the presence of *Helicobacter pylori* in tonsillar tissue, and to investigate the difference in *Helicobacter pylori* colonization in patients with tonsillary hypertrophy and chronic tonsillitis. One hundred twenty-two patients underwent tonsillectomy due to chronic tonsillitis, or tonsillary hypertrophy was included in our retrospective study. The tonsillectomy materials of the patients were stained with the Giemsa stain and evaluated under light microscopy. The data obtained in the study were evaluated statistically and results with a p-value of <0.05 were accepted as significant. The mean age of the patients included in the study was 11.9 years. Ninety-three (76.2%) patients were in the pediatric age group, and 29 (23.8%) were adults. Fifty-five (45.1%) patients were female and 67 (54.9) were male. Eighty patients underwent tonsillectomy due to tonsillary hypertrophy and 42 due to chronic tonsillitis. In our study, the presence of *Helicobacter pylori* was detected in 21 (17.2%) patients. The presence of *Helicobacter pylori* colonization in patients with chronic tonsillitis and tonsillary hypertrophy indicates that tonsils are an extra-stomach reservoir for *Helicobacter pylori*.

INTRODUCTION

Tonsils, a component of the Waldeyer ring, serve as the first mucosal line of defense against pathogens. Tonsillectomy in patients with sleep apnea and chronic tonsillitis (CT) due to tonsillary hypertrophy (TH) is one of the most common surgical procedures performed in otorhinolaryngology clinics¹. The presence of *Helicobacter pylori* (HP) colonization may play a role in infection of tonsillary tissues. Numerous studies have reported an association between CT and HP colonization²⁻³.

HP is a common and difficult to treat health problem. It is a spiral-shaped Gram-negative urease-producing bacterium. Researchers have reported that transmission occurs most often via fecal-oral, oral-oral, and gastro-oral pathways^{4,5}. Due to the similarity of tonsillary tissue to gastric mucosal lymphoid tissue, it is thought that HP colonization here may play an important role in the infection of tonsils. Recently, tonsil and adenoid, which are lymphoid tissues in children, have been reported as a secondary reservoir for HP.

The presence of HP can be shown with polymerase chain reaction (PCR), bacterial culture, and immunohistochemical and histochemical methods. It is difficult to produce HP in tonsil in culture due to the transformation of HP in tonsils into the coccoid form. Immunohistochemical tests and PCR are financially burdensome investigations. In the histochemical view, bacteria are detected using modified Giemsa staining. A combination of diagnostic methods is recommended to improve diagnostic reliability⁶.

The aim of this study was to detect the presence of HP in tonsillar tissue, and to investigate the difference in HP colonization in patients with TH and CT.

METHODS

The tonsillectomy materials of 122 patients who underwent tonsillectomy due to CT or TH causing upper respiratory tract obstruction in the otorhinolaryngology clinic between 2018 and 2020 were retrospectively examined.

Age, sex, and tonsillectomy indications were recorded. The patients underwent tonsillectomy under general anesthesia. Surgically removed tonsil tissues were fixed with 10% formalin and embedded in paraffin and stained with the modified Giemsa stain. Preparations were evaluated under light microscopy and histopathologic findings were recorded. Our retrospective study was approved by Alanya Alaaddin Keykubat University Institutional Review Boards and Ethics Committee (Ethics no:20-12, 06/18/2020).

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Means and standard deviations of groups were calculated. Fisher's exact test was used to determine significant differences between non-parametric data from the groups. The data obtained in the study were evaluated statistically and the results with a p value of <0.05 were evaluated significantly.

RESULTS

A total of 122 patients, 67 men (54.9%) and 55 women (45.1%) who underwent tonsillectomy were included in the study. The median age was 11.9 (range, 3-60) years. Ninety-three (76.2%) patients were in the pediatric age group, and 29 (23.8%) were adults. Forty-two (34%) patients underwent tonsillectomy due to CT and 80 (65.6%) due to TH. The presence of HP was detected in 21 (17.2%) patients. The presence of HP was detected in 22.4% of males and in 10.9% of females; the difference between these ratios was not statistically significant ($p=0.089$) (Figure 1). There was a higher rate of HP detected in patients who underwent tonsillectomy due to TH compared with the others. HP was more detected in patients aged under 16 years (20.4%), but this difference was not statistically significant ($p=0.074$) (Table 1).

Table 1. Age and *H.pylori*

		Age		Total
		≤16	>16	
H.pylori ---	Count	74	27	101
	% within Age	79,6%	93,1%	82,8%
	% of Total	60,7%	22,1%	82,8%
H.pylori +++	Count	19	2	21
	% within Age	20,4%	6,9%	17,2%
	% of Total	15,6%	1,6%	17,2%
Total	Count	93	29	122
	% within Age	100,0%	100,0%	100,0%
	% of Total	76,2%	23,8%	100,0%

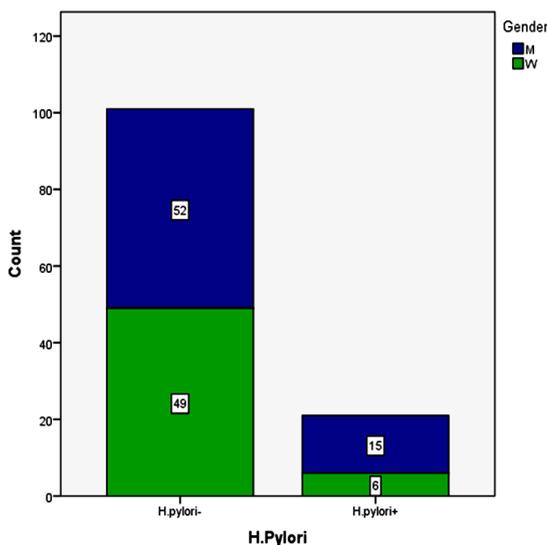


Figure 1. *H.pylori* and Gender

DISCUSSION

H. pylori is a known pathogen of the gastric mucosa and infection caused by HP is a common and difficult-to-treat health problem. Since its discovery in 1983, it has been implicated in the pathology of duodenal ulcers, atrophic gastritis, chronic gastritis, mucosa-associated lymphoid tissue (MALT) lymphoma, and stomach cancer^{3,7}. The affinity of the bacterium to lymphoid tissues may explain its presence in tonsillary and adenoid tissue. It is also known

to be active in non-gastrointestinal diseases such as IgA nephropathy⁸. The presence of HP in the middle ear suggests that it may play a role in the pathogenesis of otitis media with effusion⁹.

There is no standard identification system for HP in the upper respiratory tract. Histochemical and immunohistochemical examinations, production in culture, rapid urease test (RUT), PCR are the techniques used to investigate the presence of HP¹⁰. The rate of false-positive results in tests based on detection of the products of urea hydrolysis is high. Culture is the gold standard for HP, as it is for all bacteria, with 80-90% sensitivity and 90-100% specificity. However, due to other bacteria in the pharynx flora, it is quite difficult to produce HP in culture. Molecular methods are valuable but expensive tests for the detection of HP¹⁰⁻¹⁴. The sensitivity of histopathologic examinations performed with Giemsa staining was stated as 91%, with specificity 100% and accuracy 95%¹⁵. However, histopathologic examination is fast, inexpensive, and reliable.

It is assumed that about 50% of adults in developed countries and 80-90% of adults in developing countries are affected by HP¹³. In the literature, the presence of HP colonization has been reported between 30-68.6%^{14,15}. Kraus et al. reported a very high value of 98% in their study by using PCR¹⁶. We determined the presence of tonsillary HP colonization to a lesser extent (17.2%) than in the literature. This difference may be due to the fact that studies were conducted using different techniques with different patient groups. The methods used to detect HP give clear results for the stomach, but there is no standard to detect tonsillary HP. A combination of diagnostic methods is recommended to improve diagnostic reliability⁶.

Vilarinho et al. identified HP in 24 (39%) patients in their study performed in 62 pediatric patients[14]. We found HP in 20.4% of the pediatric group and in 6.9% of the adult group. This difference was not statistically significant. Siupsinskiene et al. identified more HP in adults in their research. They found HP in 11 of 36 child patients and 35 of 61 adult patients¹⁵. A study in which PCR was used showed the presence of HP in 98% of children¹⁶. Lin et al. reported the presence of HP in 35% of adults¹⁷. It is thought that intensive antibiotic use at a pediatric age may affect the colonization of this bacterium. We also think that this high proportion in the adult population in the literature is due to the increased risk of encountering bacteria at an advanced age of life.

Usually in the pediatric age group, patients experience infection, which continues in the form of chronic disease. First in 1989, Krajden et al. reported the isolation of HP from dental plaques for the first time in the oral cavity¹⁸. Researchers reported that transmission occurred most often via fecal-oral, oral-oral and gastro-oral pathways⁴. The bacterium is thought to colonize in palatine and pharyngeal tonsils via the gastro-oral route. Later studies showed the colonization of HP in tonsillary and adenoid tissues. Although the use of antibiotics for different reasons eliminates the gastric reserve, familial transition and the presence of HP in dental plaques cause recurrence. There are therefore researchers who argue that eradication will fail¹⁸. In one study, the frequency of gastric HP colonization was reported to be lower in patients who underwent tonsillectomy in subsequent years. That study suggested that tonsillar tissue served as a reserve for HP. It was reported that the risk of gastric HP infection decreased in patients undergoing tonsillectomy¹⁹. However, the issue of tonsils being a reservoir for HP and being the cause of recurrent systemic infection remains controversial. There is no consensus on this issue in the literature.

Researchers investigate as to whether tonsils were a reservoir for HP or if they were involved in the pathogenesis of CT. However, different results were found in studies. Suipisinke et al. showed HP in 40.7% of patients with CT, whereas detected no HP in any patients with TH in their study performed in 36 pediatric patients¹⁵. In another study, using a rapid urease test, the presence of HP was detected in

38.5% of pediatric patients who underwent tonsillectomy due to CT²⁰. Jelavic et al. showed HP in 45% of patients with CT, whereas they found no HP in any patients with TH in their study performed in 77 pediatric patients²¹. However, there are studies that identified HP in very few patients with CT²². Bulut et al. found HP in 33% of patients who underwent tonsillectomy due to chronic infection and in 20% of patients who underwent tonsillectomy due to TH in a study where they used PCR²³. We found HP in 36.8% of our pediatric patients who underwent tonsillectomy due to CT and in 29.7% of our pediatric patients who underwent tonsillectomy due to TH. This difference was not statistically significant. These ratios are in line with the literature.

Nartova et al. reported that there was no difference in terms of the prevalence of HP among those with CT or TH in their study in adult patients²⁴. Lukes et al. found HP in 70% of patients with CT and in 69% of patients with TH¹¹. Lin et al. showed that the presence of HP was significantly higher in their recurrent tonsillitis group than in the TH group¹⁷. In another study in 61 adult patients, the presence of HP was significantly higher in CT than in TH¹⁵. In our study, we found no HP in patients undergoing tonsillectomy due to sleep apnea caused by TH in adult patients, whereas we found HP in 12.5% of patients who underwent surgery due to recurrent tonsillitis. Chronic inflammation of tonsils histologically causes hyperparakeratosis of the crypt epithelium. It may be thought that morphologic changes in crypt epithelium and changes in immune mechanisms predispose patients to HP colonization²⁵. Patients with CT having HP may suggest that HP plays an important role in the development of tonsillitis. However, these data may also suggest that HP does not play an important role in recurrent tonsillitis.

Conclusions

These data suggest that HP infection has no significant effect on the pathogenesis of chronic tonsillitis. In cases of chronic tonsillitis, it can be concluded that treatment of HP with antibiotics or proton pump inhibitors is not necessary.

Conflict of interest

The authors declare that there is no conflict of interest in the research.

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