

RELATIONSHIP OF HALITOSIS WITH HELICOBACTER PYLORI INFECTION IN CHILDREN

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ABSTRACT

Background: Halitosis is a common term used to describe anything an unpleasant odor emanates from the oral cavity, regardless of the cause, affects a large proportion of the global population and may be the cause of a significant social or psychological handicap. **Aim:** To assess the relationship of halitosis with H. pylori infection in children. **Material and methods:** An Observational Descriptive Cross-Sectional Study. This study included 51 children (54.9% boys) aged 3 to 15 years (mean, 8.67±2.9 years) they are selected from Pediatric Clinic, Tishreen University Hospital between February 2021 and February 2022. They were diagnosed with H. pylori infection. The patients were divided into two groups: 42 patients with halitosis, 9 patients without halitosis. Patients with halitosis were treated with H. pylori eradication therapy. **Results:** After two weeks of H. pylori eradication treatment, the halitosis of 40 patients (95.2%) completely resolved and persisted in 2 patients (4.8%) (p<0.0001), The prevalence of halitosis among H. pylori positive children was 82.4%. **Conclusion:** Halitosis is an important and common symptom of H. pylori infection and the eradication treatment of H. pylori is very useful to get rid of halitosis, more attention should be paid to this complaint and refer these patients to pediatric gastroenterologists.

KEY WORDS: Halitosis, Helicobacter Pylori infection.

INTRODUCTION

Helicobacter pylori (H. pylori) is a gram -negative type bacterium that colonizes the mucosa of stomach and responsible for the most common chronic bacterial infection in humans.^[1] The prevalence of infection varies widely according to different geographic areas, in which the rates are higher in developing compared with developed regions of the world.^[2] In addition to, age and socioeconomic status of the family are considered important factors that affect prevalence of H. pylori. H. pylori is acquired in early childhood, and most infections occur prior to the age of three years especially in resource-limited countries.^[3]

The routes of H. pylori transmission are considered to be oral-oral, fecal-oral, or gastro-oral. The pathophysiology includes producing of the enzyme urease that converts urea to ammonium and bicarbonate, neutralizing gastric acid. In addition to, it releases catalase and phospholipase and inducing inflammation and ulcerations.^[4] Majority of children affected with H. pylori are asymptomatic, and most of them have gastric

mucosal inflammation which described as nodular gastritis. Peptic ulcers additionally may occur and is also associated with gastric mucosa-associated lymphoid tissue lymphoma. Upper gastrointestinal endoscopy and taking biopsy material for tests is considered the initial diagnostic procedure for H. pylori.^[5] Treatment of H. pylori is increasingly becoming more difficult due to antibiotic resistance, and achieved best by proton pump inhibitor and two antibiotics administered for a minimum of two weeks.^[6]

Halitosis is a common problem in pediatric practice with large social and economic impacts. It may be multifactorial origins, but oral cavity represents the source of majority of cases.^[7] Respiratory system infections, gastrointestinal diseases, hepatic diseases, and metabolic conditions represent the extra- oral etiologies for halitosis.^[8] A growing area of research interest investigate the hypothesis that H. pylori infection may be a causative factor for halitosis.^[9] Absent of local studies prompted us for implementation this study. Therefore, the objective of this review was to: 1- investigate the

association of halitosis with *H. pylori* infection in children, 2- determine resolution of halitosis after the therapy of *H. pylori*.

PATIENTS AND METHODS

Study Population

After approval by local research ethics committee, an Observational Descriptive Cross Sectional Study was conducted in patients older than 3 years seen at Pediatric Gastroenterology Clinic, Tishreen University Hospital over a period of one- year from February 2021 to February 2022 with a proven diagnosis of *Helicobacter Pylori* infection depending on either histological findings of biopsies taken from the mucosa of the gastric during upper gastrointestinal endoscopy or by non-invasive tests.

Exclusion Criteria: Patients with other one the following: renal or liver failure, acute upper or lower respiratory infections, using of antibiotic, proton pump inhibitors(PPIs) or antihistamine drugs during previous three weeks. Complete history, review of systems, concurrent diseases, physical examination. *Helicobacter Pylori* infection was diagnosed based on one of the following: upper gastrointestinal endoscopy, stool antigen test, and serum antibody titration. Patients were divided according to presence of halitosis into two groups: positive (42), and negative (9). Patients were treated by the following regimen: omeprazole 1 mg/kg/day (one month), clarithromycin 15 mg/kg/day (two weeks), metronidazole 30 mg/kg/day (two weeks). They were followed for two weeks with monitoring halitosis resolve.

Statistical Analysis

Statistical analysis was performed by using IBM SPSS version20. Basic Descriptive statistics included means, standard deviations(SD), median, Frequency and percentages. To examine the relationships and comparisons between the two group, chi-square test was used. All the tests were considered significant at a 5% type I error rate($p < 0.05$), β :20%, and power of the study:80%.

RESULTS

The study included a group of 51 patients with a proven diagnosis of *helicobacter pylori* infection. The baseline characteristics of patients were as shown in Table (1). Age ranged from 3 to 15 years, with a mean age of 8.67 ± 2.9 years. Patients were divided into two groups according to age: ≤ 6 -years in 13 cases (25.5%) and > 6 -years in 38 cases (74.5%). Males represented 54.9% of the study sample and female 45.1%.

Table 1: Demographic characteristics of the study population.

Variable	Result
Age (years)	8.67±2.9
Age groups (n %)	
≤6	13(25.5%)
>6	38(74.5%)
Sex	
Male	28(54.9%)
Female	23(45.1%)

As shown in table (2), the most common symptoms associated with *H. pylori* infections were chronic abdominal pain (64.7%), followed by growth failure (23.5%), emesis (19.6%), and loss appetite (7.8%). Other less frequent symptoms were: chronic urticarial, dysphagia, flatulence, and anemia on average 2 cases (3.9%) of each symptom. Failure to thrive, eosinophilia, nausea, belching, and diarrhea were found on average one case (1.9%) of each symptom. Patients were diagnosed either by invasive (41 cases) or non-invasive (10 cases) tests; 41 patients (80.4%) underwent conventional endoscopic exam with obtaining specimens from gastric mucosa which confirmed diagnosis of *H. Pylori* infection. Antibody based test was the technique that diagnosed *H. Pylori* in 6 cases (11.8%), and stool antigen test was the diagnostic procedure in 4 cases (7.8%).

Table 2: Distribution of the study population according to the clinical symptoms and diagnostic tests.

Variable	Result
Clinical manifestations	
Chronic abdominal pain	33(64.7%)
Growth failure	12(23.5%)
Emesis	10(19.6%)
Loss appetite	4(7.8%)
Chronic urticarial	2(3.9%)
Dysphagia	2(3.9%)
Flatulence	2(3.9%)
Anemia	2(3.9%)
Diagnostic procedures	
Gastric biopsy	41(80.4%)
IgG serology	6(11.8%)
Stool antigen test	4(7.8%)

Halitosis was present in 42 cases (82.4%) of the study sample, which presented in figure (1).

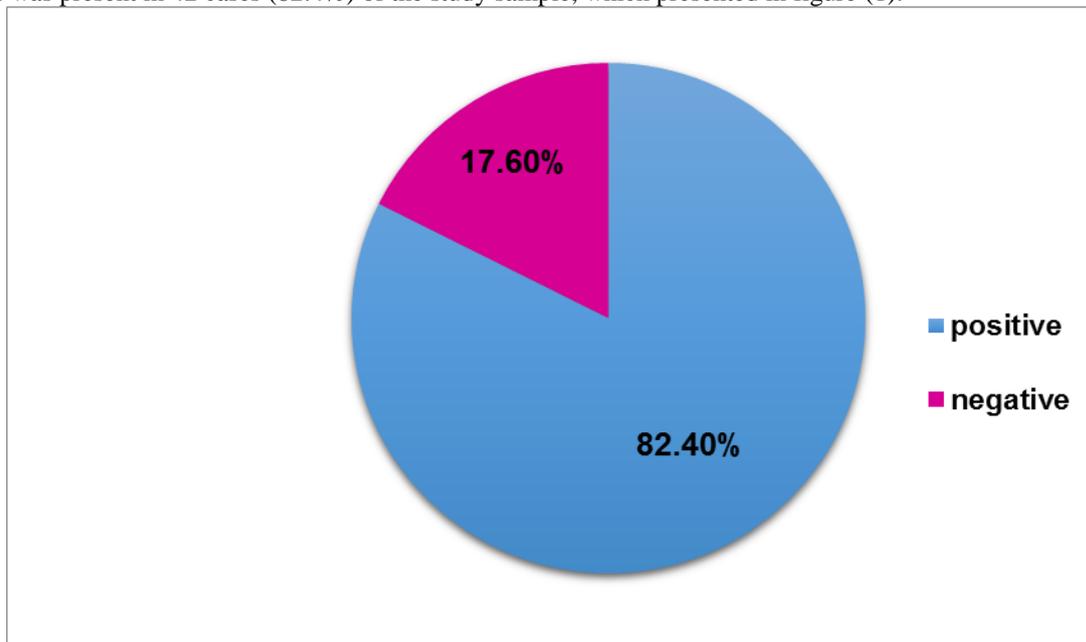


Figure (1): Distribution of the study sample according to presence of halitosis.

We studied the relationship between presence of halitosis and the response to therapy, we found that 42 cases of *H. pylori* patients have halitosis; improvement to therapy

was observed in 40 cases (95.2%), and persistent in 2 cases (4.8%) who didn't response to treatment, p: 0.0001.

Table 3: Association between halitosis and response to treatment.

Response to therapy	Halitosis		P value
	Present	Absent	
Present	40 (95.2%)	0(0%)	0.0001
Absent	2(4.8%)	9(100%)	

DISCUSSION

Halitosis represents a major health problem that reduce the quality of life and self-esteem, so it is imperative to understand the origin of halitosis as multidisciplinary therapy is required with emphasis on the causative factor. The role of *H. pylori* as a cause of halitosis is controversial, and there still a large debate around this association. The result of the current study revealed that majority of patients were older than six years and males represented approximately 60% of the patients. There were various clinical manifestations of *H. pylori* infection and chronic abdominal pain was the most frequent symptom. Infection was diagnosed depending on the findings of biopsy in more than three-quarters of the patients. Halitosis was present in majority of the patients and the response to treatment was occurred in 95% of the patients represented in resolve of halitosis in the first days of initiating therapy. The impact of *H. pylori* infection on occurrence of halitosis appear to be related to the differing effects that include: *H. pylori* was shown to produce volatile sulfur compounds such as H₂S and CH₃SH, major oral malodor, inducing VSCs. There were limited studies that provided evidence for the association between *H. pylori* infection and halitosis in children.

Serin et al (2003) found in a study included 148 children with positive diagnosis of *H. pylori* infection that frequency of halitosis was 61.5%, and the most frequent symptoms which disappeared with treatment was halitosis.^[10]

Chen et al (2007) demonstrated in a study conducted in 50 children with a diagnosis of *H. pylori* infection that halitosis was present in 58% of the cases.^[11]

Yilmaz et al(2011) found in a study conducted in 72 patients that halitosis was resolved in 72.7% of the patients with a positive diagnosis of *H. pylori* infection.^[12]

Due to the limitations of the studies around the correlation between halitosis and *H. pylori* infection in pediatric, we will compare our results with studies that performed in adults.

Alder et al (2005) demonstrated that 88.1% of the patients with a complaint of halitosis have proven diagnosis of *H. pylori* infection which confirmed by the histological findings of the biopsy.^[13]

Katsinelos et al (2007) found in a study conducted in 18 patients that halitosis was resolved in 88.9% after eradication of *H. pylori* infection, which agree with the current study.^[14]

Farnaz et al (2015) showed presence of strong correlation between halitosis and *H. pylori* infection, in which *H. pylori* infection was present in 91% of the patients who experienced of halitosis versus 30% of the cases in control group.^[15]

In contrast to the results of current study, Tangerman et al (2011) demonstrated in a study conducted in 49 patients that there was no correlation between *H. pylori* infection and presence of halitosis.^[16]

In summary, the current study demonstrated that halitosis is an emerging symptom in children affected by *H. pylori* infection which might be explained by high rate of association between *H. pylori* treatment and resolve of halitosis. In addition to, we emphasis the importance of surveillance the infection in any child who had halitosis for treatment and preventing occurrence of complications.

Declarations

Competing of Interests

All the authors do not have any possible conflicts of interest.

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Author contributions

All authors performed the measurements and wrote the article. Literature review was done by Sawsan Ahmad Ahmad, and all authors performed analytic calculations and performed the numerical simulations.

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