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Endoscopic finding and treatment outcome of children with *Helicobacter pylori* infection in lower northern Thailand

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Abstract

Background: *Helicobacter pylori* infection is one of the predisposing factors for gastritis, peptic ulcer, and duodenal ulcer. Definite diagnosis of *H. pylori* infection is important in planning effective medical management. However, confirming the diagnosis through bacterial culture takes a number of days, and thus delays treatment.

Objectives: To examine endoscopic findings in children associated with chronic abdominal pain and *H. pylori* infection to aid in early diagnosis. We also evaluated treatment outcome of *H. pylori* infection.

Methods: A retrospective study was performed by reviewing the medical records of children under 15 years of age with chronic abdominal pain who underwent esophagogastroduodenoscopy (EGD) between 2011 and 2017. According to 2016 Joint ESPGHAN/NASPGHAN Guidelines, *H. pylori* infection was defined by positive tests for both histopathology test and rapid urease test (RUT). The EGD finding, RUT, histopathologic finding, and treatment outcome were recorded.

Results: Forty-eight children presented with chronic abdominal pain (male 47.9%, female 52.1%, mean age was 8.44 ± 2.97 years). Twelve children out of 48 had *H. pylori* infection (12/48, 25%). Eight among the 12 children had antral nodularity (8/12), wherein there was no antral nodularity in children without *H. pylori* infection (0/36). This difference was statistically significant ($P < 0.001$). Sensitivity and specificity of antral nodularity finding for *H. pylori* infection were 66.7% and 100%, respectively. Eradication of *H. pylori* infection with standard regimen improved the abdominal pain within 4 weeks.

Conclusion: The occurrence of antral nodularity in endoscopic finding was significantly associated with *H. pylori* infection. In addition, antral nodularity finding showed a good sensitivity and high specificity for the diagnosis of *H. pylori* infection.

Keywords: antral nodularity; chronic abdominal pain; esophagogastroduodenoscopy; *Helicobacter pylori*; rapid urease test


Helicobacter pylori infection acquired in early childhood increases the risk of *H. pylori*-related complications later in life, such as gastritis, peptic ulcer, duodenal ulcer, and chronic abdominal pain. The prevalence of *H. pylori* infection is higher in developing countries than that in developed countries. In

Thailand, the prevalence of *H. pylori* infection is 15%–20% that increases with age [1].

Diagnostic procedures are composed of the tissue biopsies from esophagogastroduodenoscopy (EGD) for the rapid urease test (RUT) and histopathology test. One of the abnormal

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endoscopic findings is antral nodularity, which defines as a cobblestone-like mucosa with nodules varying in size from 2 to 4 mm and are covered with smooth, non-ulcerated mucosa. A previous study [2] showed that the percentage of antral nodularity, erythematous mucosa, and normal endoscopic findings in *H. pylori* infection children are 47.4, 24.8, and 22.2, respectively.

H. pylori infection status is defined as positive RUT and histopathology test of gastric biopsy. Sensitivity and specificity of the RUT test were 75%–100% and 99–100%, respectively, and of the histopathology test were 66%–100% and 100%, respectively [3, 4]. Gold standard to diagnose *H. pylori* infection is bacterial culture, which is time consuming. Therefore, other diagnostic tools are being explored.

The purpose of this study was to examine endoscopic findings in children associated with chronic abdominal pain and *H. pylori* infection to aid in early diagnosis. We also evaluated treatment outcome of *H. pylori* infection.

Methods

The study was conducted in the Gastroenterology Unit, Department of Pediatric, Naresuan University Hospital, located in lower northern Thailand. This study was approved by the Institutional Review Board (IRB) of Naresuan University (certificate of approval no. 0225/61). We retrospectively reviewed medical records of 48 children below the age of 15 years with chronic abdominal pain who underwent EGD between 2011 and 2017. Each child underwent six gastric biopsies, two from the antrum and the body of stomach for RUT and four from esophagus, antrum, body, and duodenum for histopathology. No antibiotic and proton pump inhibitor (PPI) were taken within 4 weeks and 2 weeks, respectively, before the procedure. The abnormality of endoscopic finding was also recorded such as antral nodularity and erythematous mucosa. All infected children were treated with triple therapy using 14 days of amoxicillin (50 mg/kg/day) and clarithromycin (20 mg/kg/day), plus 30 days of omeprazole (2 mg/kg/day) [3].

Identification of *H. pylori* infection status

The positive RUT and histopathology test of gastric biopsy results determined the *H. pylori* infection status of the subjects. The gastroenterologist who performed the endoscopy interpreted the RUT at 1 hour and 24 hours. The color change from yellow to pink indicated positive RUT. Gastric biopsy specimens were stained with hematoxylin and eosin to

evaluate the severity of gastritis in reference of the updated Sydney histological scoring system. The same histopathologist also stained the specimens with Giemsa to detect *H. pylori* infection.

Statistical methods

Demographic data, EGD finding, histopathology, and the correlation with *H. pylori* infection were analyzed using Pearson's chi-square test and Fisher's exact test. The *P* values of less than 0.05 were considered as statistically significant.

Result

Among 48 children with chronic abdominal pain, there were 23 males (47.9%) and 25 females (52.1%), whose mean age was 8.44 ± 2.97 years. The most common age range was 6–10 years (62.5%). Twelve of 48 children were diagnosed with *H. pylori* infection (12/48, 25%). There were five males and seven females who had *H. pylori* infection with the mean age of 9.78 ± 2.16 years (**Table 1**).

Eight of 12 children were found to have antral nodularity (8/12), while there was no antral nodularity found in children without *H. pylori* infection (0/36). This difference was statistically significant (**Table 2**). In this study, sensitivity and specificity of antral nodularity finding for *H. pylori* infection were 66.7% and 100.0%, respectively.

Ten of 12 children who had *H. pylori* infection had normal appearance of esophagus and duodenum. However, 11 children with *H. pylori* infection had erythematous mucosa

Table 1. Demographic data of children with chronic abdominal pain and *Helicobacter pylori* infection

Demographic data	Chronic abdominal pain, n (%)	<i>H. pylori</i> infection, n (%)
Sex		
Male	23 (47.9)	5 (41.7)
Female	25 (52.1)	7 (58.3)
Total	48 (100.0)	12 (100.0)
Age (years)		
0–5	8 (16.7)	0 (0.0)
6–10	30 (62.5)	8 (66.7)
11–15	10 (20.8)	4 (33.3)
Total	48 (100.0)	12 (100.0)
Age range (years)	(1.0–14.0)	(6.1–14.0)

Table 2. Presence of antral nodularity in children with *Helicobacter pylori* infection

Antral nodularity	<i>H. pylori</i> infection, n		<i>P</i>
	Positive	Negative	
Positive	8	0	<0.001
Negative	4	36	
Total	12	36	

in their stomach. Among these 11 children with erythematous mucosa of stomach, 5 children had positive RUT at 1 hour and 6 children had positive RUT at 24 hours, respectively. Positive RUT at 1 hour and 24 hours was not significantly correlated with gastric erythematous mucosa ($P = 0.377$). In addition, the presence of antral nodularity was not significantly related to the presence of gastric erythematous mucosa ($P = 0.14$). Triple therapy alleviated the abdominal pain in all children with *H. pylori* infection within 4 weeks, 8.3% and 58.3% of which improved within 1 week and 2 weeks, respectively.

Discussion

H. pylori infection acquired in childhood years is one of the most common causes of chronic abdominal pain [5, 6]. In this study, the prevalence of *H. pylori* infection in chronic abdominal pain was 25%, which was higher than that in the previous study. This is likely because patients could access to pediatric gastroenterologist directly. This study found that the mean age of *H. pylori*-infected children was 9.78 ± 2.16 years, which is comparable to the study of Motamed et al. [2], showing the mean age of 7.91 ± 3.93 years among 3,031 children respondents.

The gold standard test for the diagnosis of *H. pylori* infection is a bacterial culture that takes 1 month to procure the result; therefore, other diagnostic tools are important to aid in early diagnosis and treatment. In this study, antral nodularity in endoscopic finding was significantly associated with *H. pylori* infection ($P < 0.001$) but not with gastric erythematous mucosa. This finding is congruent with the retrospective study conducted by Luzzza et al. [5] on 174 subjects showing antral nodularity associated with *H. pylori* infection. Several studies have reported sensitivity and specificity of antral nodularity for the diagnosis of *H. pylori* infection of 40%–91.6% and 85.7%–100%, respectively [5, 7, 8], which are comparable to our study showing sensitivity and specificity of 66.7% and 100.0%, respectively. Our study did not demonstrate the correlation between antral nodularity and gastric mucosal erythema.

Regarding *H. pylori* eradication, a retrospective study [9] conducted in 2004 showed that 70% of the 149 children treated with triple regimens (PPI with amoxicillin and clarithromycin) improved within 1 week and 81% of the same respondents improved within 2 weeks. This finding, however, is incomparable to our study, which revealed a slow improvement of 8.3% within 1 week and 58.3% within 2 weeks.

Our study was limited because of small sample size of children; therefore, we did not demonstrate the correlation between antral nodularity and gastric mucosal erythema. Moreover, the reason for slower improvement of triple therapy in *H. pylori*-infected children is not clear; somehow, the further study of antibiotic susceptibility testing would be beneficial to improve management.

Conclusion

The antral nodularity in endoscopic finding is significantly associated with *H. pylori* infection. In addition, the presence of antral nodularity is a good predictor of *H. pylori* infection.

Author contributions. CN and TN contributed substantially to the conception and design of this study. All authors contributed substantially to the acquisition and interpretation of the data. TN drafted the manuscript. All the authors contributed substantially to its critical revision, approved the final version submitted for publication, and take responsibility for the statements made in the published article.

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Conflict of interest statement. The authors have completed and submitted the International Committee of Medical Journal Editors Uniform Disclosure Form for Potential Conflicts of Interest. None of the authors disclose any conflict of interest.

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