Correlation of Clinical Symptoms of Gastritis with H. pylori Occurrence in Children

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Abstract

Background: *H. pylori* (*H. pylori*) infection is a problem worldwide, which is the most common cause of chronic gastritis, and it is strongly associated with gastric ulcer disease and gastric cancer. *H. pylori* cause gastritis in infected children with unspecified clinical manifestation and continue having non-specific symptoms along with their life. Currently, not many studies have examined specific clinical symptoms in gastritis caused by *H. pylori*.

Objective: To determine the correlation between clinical gastritis symptoms with *H. pylori* occurrence in children.

Method: A Cross-Sectional study in 2-18 years old patients with clinical symptoms of gastritis who came to the outpatient clinic and treated at H. Adam Malik General Hospital Medan and Educational Network Hospital from December 2019 to May 2020. Patients with clinical symptoms of gastritis got the endoscopic procedure and Campylobacter-like organism (CLO) test.

Result: 84 subjects were analyzed with 45 positive *H. pylori* and 39 negative *H. pylori*. There were no significant clinical symptoms differences between the *H. pylori* (+) group and the *H. pylori* (-) group. The most clinical symptom was recurrent abdominal pain, 26 patients (57.8%) in the *H. pylori* group (+) and 24 patients (61.5%) in the *H. pylori* group (-) (p-value = 0.726), vomiting 12 patients (26.7%) in the *H. pylori group* (+) and 5 patients (12.8%) in the *H. pylori* group (-) with p-value =0.115, haematemesis in 6 patients (13.3%) in the group *H. pylori* (+) and 7 patients (17.9%) in the *H. pylori* (-) group (p-value = 0.560) the least clinical symptoms were nausea in 1 patient (2.2%) in the *H. pylori* group (+) and 3 patients (7.7%) in the *H. pylori* (-) group with a p-value = 0.333

Conclusion: There is no significant correlation between clinical symptoms of gastritis and the occurrence of H. pylori infection in children.

Keywords: Clinical symptoms of gastritis, H. pylori, children

Background

Warren and Marshall found a new kind of bacteria in the stomachs of people with gastritis called *Helicobacter pylori* and found its role in chronic gastritis and peptic ulcer disease.[1] Moreover, severe atrophic gastritis, accompanying intestinal metaplasia caused by persistent *H. pylori* infection, is closely related to gastric cancer development.[2] *H. pylori* infection is a common, usually lifelong, infection and found worldwide, with infection rates vary according to geographic region, but the number of infected people has persisted or even increased over the past three decades because of population growth and because of reinfection and recrudescence due to unsuccessful eradication.[3] Infection of H. pylori is a health problem because it can cause bleeding, ulcers, and gastric cancer while in children H. pylori can cause gastritis with non-specific clinical manifestations and continue to have non-specific symptoms throughout their life.[1]

Approximately 80% of H. pylori infection occurs in children below 10 years old, which is found 10% in a developed country and 50% of the cases in developed country living in scant socioeconomic status. Generally, H. pylori infection does not have typical symptoms, and only 10% −15% will cause several diseases, such as gastritis, peptic ulcer and in the long term can cause gastric adenocarcinoma and mucosa-associated lymphoid tissue (MALT) lymphoma, iron deficiency anemia, can even cause growth disturbances.[4] In Indonesia, the prevalence of *H. pylori* infection vary: In Makassar 55%, Solo 51.8%, Yogyakarta 30.6%, Surabaya 23.5%, Bali 43%, and the lowest found in Jakarta 8% and this vary prevalence was influenced by socioeconomic status and host-agent-environment factor.[5]

Gastritis is an inflammatory process in the gaster caused by an irritation or infection in the mucosa or submucosa and the most common gastrointestinal problems encountered in clinics because the diagnosis is based on clinical symptoms only not by the histopathological procedure.[6] Gastritis is often considered a trivial thing, but gastritis can be the beginning of a disease that can interfere with a person's quality of life. The clinical symptoms of gastritis due to H. pylori infection include recurrent abdominal pain, nausea, vomiting, hematemesis, burning sensation epigastrial region, and Gastroesophageal Reflux Disease (GERD).[7-8] Studies have examined specific clinical symptoms in gastritis caused by *H. pylori* rarely found in Indonesia, so the author is interested in investigating the specific clinical symptoms in gastritis caused by *H. pylori*.

Method

The study was conducted at Gastroenterology Policlinic and Ward H. Adam Malik Medan Hospital, University of North Sumatera Hospital, and Columbia Asia Hospital Medan in December 2019 – May 2020. This is a prospective cross sectional study. With inclusion criteria: children 2 – 18 years old with suspected H. pylori infection with clinical manifestation recurrent abdominal pain, nausea, vomitus, and hematemesis, children who untaken medicine: Proton Pump Inhibitor (PPI), antibiotic and non-steroid anti-inflammatory drugs (NSAID) 1 month before the study, and had established with H. pylori diagnosis from the endoscopy with or without positivity of CLO test. Patients with metabolic diseases, liver diseases, renal diseases, inflammatory bowel diseases (IBD) and refuse endoscopic procedure are excluded. The subject who fulfil inclusion criteria will be informed about the study and will be fulfilling a questionnaire. The subjects will be done endoscopic and CLO test assessment (figure 1). The data will be analyzed using chi-square, Mann Whitney, Independent-T test, Kruskal Wallis, and Fischer Exact with SpSS v.20. Categoric data will be shown in frequency and percent while numeric data will be shown in mean ± standard deviation (SD). P-value significant if < 0.05.

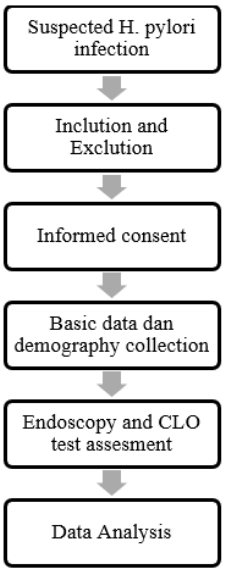

Figure 1. Subject recruitment

Result

From this study, we found a total of 84 children that meet the inclusion and exclusion criteria and from the endoscopy and CLO test, we found 45 children with H. pylori-positive and 39 children with H. pylori-negative. Female 66.7% with mean age 12.97 years old, body weight mean 33.78 kgs and body height mean 138.52 cms. From this study, we found the majority ethnic was Bataknese; the educational level majority was primary school, 35.7% (table 1). From the educational level, the majority of both father and mother was a college with 82.1% and 91.7%. In contrast, most of both father and mother were private employees at the occupational level, with good socioeconomic status of 86.9% (table 2).

Table 1. Subject Characteristic Study

Subject Characteristic	n = 84
Gender, n (%)	
Male	28 (33,3)
Female	56 (66,7)
Age, n (%)	
Mean	12,97
Body weight, kg	
Mean	37,78
Body height, cm	
Mean	138,52
Ethnic, n (%)	
Acehnese	10 (11,9)
Bataknese	34 (40,5)
India	1 (1,2)
Javanese	10 (11,9)
Melayunese	13 (15,5)
Minangnese	10 (11,9)
Papuanese	2 (2,4)
Chinese	4 (4,8)
Child educational level, n (%)	
Kindergarten	5 (6)
Primary school	30 (35,7)
Secondary school	22 (26,2)
Senior high school	20 (23,8)

Table 2. Parents Characteristic Subject Study

Parents Characteristic	n = 84
Father educational level, n (%)	
Senior high school	15 (17,9)
College	69 (82,1)
Mother educational level, n (%)	
Senior high school	7 (8,3)
College	77 (91,7)
Father's occupation, n (%)	
Private employee	42 (50)
Farmer	5 (6)
Government employee	11 (13,1)
Army/ police	5 (6)
Entrepreneur	21 (25)
Mother's occupation, n (%)	
Private employee	31 (36,9)
Farmer	7 (8,3)
Government employee	14 (16,7)
Entrepreneur	19 (22,6)
Housewife	13 (15,5)
Socioeconomic status, n (%)	
Scant	11 (13,1)
Good	73 (86,9)

Table 3 shows the characteristic subject base on the positivity of H. pylori. We found 45 children positive H. pylori with most girls (71.1%), while 39 children in negative H. pylori with most girls (61.5%). We analyze with chi-square, and we found no different significant proportion between the gender of two groups with p = 0.353. The mean age in group 1 was 11.79 years old, while in group 2 was 12.19 years old, and with the Mann Whitney test we found no significant age difference between the two groups (p = 0.594). Mean body weight and body height in positive H. pylori was 37.89 kg and 137.89 cm, while in negative H. pylori was 37.66 kg and 139.26 cm. We found no significant difference between mean body weight and mean body height both in the two groups (p > 0.05). In ethnic, we found Bataknese was dominant in H. pylori-positive group and negative group with 45.5% and 38.9%. We analyzed with Kruskal Wallis and found there are no significant differences between the two groups. In socioeconomic the good status was found in both of the two groups 84.4% and 89.7%, analyzed with Chi-square we found no significant differences between the two groups. In children educational level both in group H. pylori-positive and negative were primary school and when we analyzed with Kruskal Wallis we also found no significant differences with p = 0.893.

Table 3. Characteristic Study base on H. pylori infection

Subject Characteristic	H. pylori		P
	(+) n = 45	(-) n = 39	
Gender, n (%)			
Male	13 (28,9)	15 (38,5)	0,353[a]
Female	32 (71,1)	24 (61,5)	
Age, Mean (SD), year	11,79 (3,87)	12,19 (3,46)	0,594[b]
Body height, Mean (SD), kg	37,89 (15,67)	37,66 (11,79)	0,942[c]
Body height, Mean (SD), cm	137,89 (20,59)	139,26 (17,68)	0,829[c]
Ethnic, n (%)			
Acehnese	6 (13,6)	4 (11,1)	0,485[d]
Bataknese	20 (45,5)	14 (38,9)	
India	1 (2,3)	0	
Javanese	6 (13,6)	4 (11,1)	
Melayunese	5 (11,4)	8 (22,2)	
Minangnese	4 (9,1)	6 (16,7)	
Papuanese	2 (100)	0	
Chinese	1 (2,2)	3 (7,7)	
Socioeconomic status, n (%)			
Scant	7 (15,6)	4 (10,3)	0,473[a]
Good	38 (84,4)	35 (89,7)	
Child educational level, n (%)			
Kindergarten	2 (4,4)	3 (7,7)	0,893[d]
Primary school	18 (40)	12 (30,8)	
Secondary school	11 (24,4)	11 (28,2)	
Senior high school	10 (22,2)	10 (25,6)	

[a]Chi square, [b]Mann Whitney, [c]Indepedent T-test, [d]Kruskal Wallis

In table 4 we found that the majority of educational status father and mother both in the two groups were college and we analyzed with Chi-square we found no significant differences between the parents' educational status (p > 0.05). Table 5 shows that recurrent abdominal pain is the most clinical manifestation felt by 59.5% children, while vomitus 20.2%, haematemesis 15.5% and nausea 4.8%.

In table 6 show that 2.2% child felt nausea in group 1 while in group 2 7.7%, when we analyzed with Fischer exact test, we found there are no significant differences between two groups with p = 0.333. Vomitus found in 26.7% children in group 1 and 12.8% found in group 2, when we analyzed with Chi-square, we found no significant differences between two groups with p = 0.115. Hematemesis was found in 13.3% in group 1 and 17.9% found in group two, and we analyzed with Chi-square we found no difference significant between two groups with p = 0.560. Recurrent abdominal pain was felt by 57.8% children in group 1 and 61.5% children in group 2 and when we analyzed with Chi-square, we also found there are no significant differences between in the two groups with p = 0.726.

Table 4. Parents Characteristic Study base on H. pylori infection

Subject Characteristic	H. pylori		P
	(+) n = 45	(-) n = 39	
Father educational level, n (%)			
Senior high school	8 (17,8)	7 (17,9)	0,984[a]
College	37 (82,2)	32 (82,1)	
Mother educational level, n (%)			
Senior high school	5 (11,1)	2 (5,1)	0,442[a]
College	40 (88,9)	37 (94,9)	
Father's occupation, n (%)			
Private employee	21 (46,7)	21 (53,8)	
Farmer	4 (8,9)	1 (2,6)	
Government employee	6 (13,3)	5 (12,8)	
Army/ police	2 (4,4)	3 (7,7)	
Entrepreneur	12 (26,7)	9 (23,1)	
Mother's occupation, n (%)			
Private employee	14 (31,1)	17 (43,6)	0,187[a]
Farmer	6 (13,3)	1 (2,6)	
Government employee	10 (22,2)	4 (10,3)	
Entrepreneur	9 (20)	10 (25,6)	
Housewife	6 (13,3)	7 (17,9)	

[a]Chi square, [b]Mann Whitney, [c]Indepedent T-test, [d]Kruskal Wallis, [e]Fischer's Exact

Table 5. Subject Clinical Manifestation

Clinical Manifestation	n = 84
Nausea	4 (4,8)
Vomitus	17 (20,2)
Haematemesis	13 (15,5)
Recurrent abdominal pain	50 (59,5)

Table 6. Clinical Manifestation Correlation with H. pylori infection

Clinical manifestation	H. pylori		P
	Positive (n=45)	Negative (n=39)	
Nausea, n (%)			
Yes	1 (2,2)	3 (7,7)	0,333[a]
No	44 (97,8)	36 (92,3)	
Vomitus, n (%)			
Yes	12 (26,7)	5 (12,8)	0,115[b]
No	33 (73,3)	34 (87,2)	
Haematemesis, n (%)			
Yes	6 (13,3)	7 (17,9)	0,560[b]
No	39 (86,7)	32 (82,1)	
Recurrent abdominal pain, n (%)			
Yes	26 (57,8)	24 (61,5)	0,726[b]
No	19 (42,2)	15 (38,5)	

[a]Fischer's Exact, [b]Chi Square

Discussion

H. pylori is a gram-negative bacteria, spiral-shaped, often found on the gastric epithelium surface, and is considered the most common bacterial infection in the world.[9] *H. pylori* can colonize in the human gastrointestinal tract and is one of the causes of intestinal and gastric ulcers or one of the factors causing gastric malignancy.[10] Clinically, all humans infected with this organism can have gastritis symptoms in the form of abdominal pain that can last for years and can develop into chronic inflammation. *H. pylori* infection is known to be associated with various risks of chronic gastritis, peptic ulcer disease (PUD) in the stomach and/ or duodenum, gastric mucosal-associated lymphoid tissue (MALT) lymphoma, and gastric adenocarcinoma.[9] Gastritis caused by persistent *H. pylori* infection often accompanied by mucosal atrophy or intestinal metaplasia, closely related to gastric cancer development. In the last years, evidence suggests that endoscopy can be used to grade gastric intestinal metaplasia, shifting from random biopsies to "target biopsies" of those areas highly suspicious for intestinal metaplasia and increasing diagnostic accuracy of metaplastic chronic atrophy gastritis.[11] A recent study validated an endoscopic classification of intestinal metaplasia by endoscopy as compared to histology with promising results.[12]

H. pylori infections, if untreated, remain for the rest of an individual's life. Several data reports that H. pylori infection in children is mostly asymptomatic or exhibits non-specific gastrointestinal symptoms.[1,13] Gastritis often shows recurrent abdominal pain complaints in children, considered by some researchers as a clinical symptom associated with H. pylori infection. It is challenging to distinguish gastritis with H. pylori infection and non-H. pylori infection. The clinical manifestations of Helicobacter pylori infection are: Recurrent abdominal pain (at least once a week), pain in the epigastrial area, frequently vomit, decrease of body weight, growth disorder, iron deficiency anemia, recurrent diarrhea, and malnutrition.[1,13]

Among Asians, H. pylori infection confers a greater than two-fold increased risk for developing gastric cancer.[14] Several studies have investigated the risk factors associated with H. pylori infection. The major reported risk factors for infection in developing countries are poor socioeconomic conditions and poor hygiene during childhood. Socioeconomic factors associated with lower socioeconomic status, considered to have a higher impact on developing H. pylori infection. Furthermore, there is an inverse relationship between education level and H. pylori infection, it was found that individuals with low education levels have a higher risk than those who have higher education.[15] Another related factor is residence; those who live in rural areas, crowded homes, and having a source of contaminated drinking water are risk factors for H. pylori infection.[16]

Most of the studies reported no significant difference in H. pylori infection between men and women, both in adults and children. Stephen et al. found there is no significant difference between men and women who were suffering H. pylori gastritis (p=0.704).[7] Alimohammadi et al. in Iran also found gender did not have a statistical difference (p=0.8).[17] Our study found girls more dominant in the two groups: 71.1% in group 1 and 61.5% in group 2, but there is no significant difference between the two groups with p = 0.353. Hagag et al. in Egypt found the mean age of H. pylori infection 8.5 ± 1.65 years, and there is no significant difference between age and H. pylori infection with p = 0.743.[18] Our study found age mean H. pylori infection 11.79 years old and there is no significant difference between age and H. pylori infection with p = 0.594. The significance of gender and age of H. pylori infection possibly due to differences in geography and minim of sample sizes.Study in Taiwan by Chen at al. found there is no significant difference of body weight and body height between the infection of H. pylori infection with p=0.847 and p=0.132.[14] Our study also found that there is no significant difference of body weight and body height between the infection of H. pylori infection with p=0.942 and p=0.892.

The risk of H. pylori infection was influenced by many factors related to the host-agent-environment factor.[5] Ethnic is one of the factors that widely research abroad. Prevalence of H. pylori infection to be found higher in certain ethnic like Chinese. Based on migration and transmission theory, H. pylori infection was suspected brought by residents who live in high prevalence to the lower one like a study in Pontianak 2016 found that the prevalence of Chinese higher than Dayaknese related to H. pylori infection.[5] Uwan et al. also found certain ethnic have some relationship with H. pylori infection with p = 0.038.[19] Our study found Bataknese dominantly in the two groups either in group 1 gastritis with *H. pylori* (45.5%) or group 2 gastritis without *H. pylori* (38.9%). Our study also found no significant differences between ethnic and H. pylori infection with p = 0.485. Our study's result most likely because the origin ethnic in Medan is Bataknese and due to the lack of the subject number.

Hasosah et al. in Saudi Arabia found there were positively associated between socioeconomic status and H.pylori infection where the mostly incidence to be found at low socioeconomic status with p = 0.016.[20] Contrary to Hasosah, Chen et al. found that the most cases of H. pylori were founded in good socioeconomic status related with most occupational status of fathers and mothers were private employee, but there was significant difference between socioeconomic status with p = 0.007.[14] Our study found that there was no significant difference between father's occupation and mother's occupation with p = 0.187. A study in Pontianak by Uwan et al. found there was no significant difference between the educational level with H. pylori infection. Our study in line with Uwan that there was no significant difference between the academic level of children, fathers and mothers with the occurrence of H. pylori infection with p = 0.893.

A study in America found that H. pylori infection to be found in low educational level and low socioeconomic levels. Basically, socioeconomic status is not limited to income and social class but must also consider living standards, sanitation, urbanization, and education levels. The high prevalence of H. pylori infection in the group with low education levels is associated with socioeconomic levels, hygiene-sanitation, and high occupancy of living. These conditions can lead to very close contact between individuals and easier transmission of agents' diseases. The level of education of patients with H. pylori infection is more likely to be found at lower levels of education 63.3%.[21]

Hagag et al. found the most clinical manifestation between the two groups was recurrent abdominal pain 75.3% in gastritis with H. pylori group and 71.4% in gastritis without H. pylori group.[18] Our study found that recurrent abdominal pain was founded in the two groups with 57.8% in group 1 and 61.5% in group 2. Our study in line with study by Ramayanthi et al. and Simadibrata et al. that were gastrointestinal symptoms that similar in children infected with H. pylori and those who are not infected, so H. pylori infection generally does not have distinctive symptoms.[22,23]

The prevalence of infection caused by H. pylori, which is more than 80%, is founded in developing countries. In contrast, it is much lower in industrialized countries, and the prevalence is reported to be steadily decreasing.[24,25] *H. pylori* prevalence estimates show a significant variation globally, with rates varying from 15.1% in developed countries (Australia) to 87.7% in developing countries (Nigeria).[26] *H. pylori* infection that found in early childhood and causes a variety of gastrointestinal and extragastrointestinal diseases. Chronic colonization with H. pylori may significantly increase the risk of gastric adenocarcinoma in children.[27] Habib et al. in Arab Saudi found that children infected with H. pylori had a more prominent clinical manifestation of upper gastrointestinal as recurrent abdominal pain (p<0.001), anorexia (p<0.001), nausea (p=0.026) compared with children without H. pylori infection.[27]

Our study found that there is no significant relationship between gastritis clinical manifestation with *H. pylori* infection with nausea (p = 0.333), vomitus (p = 0.115), haematemesis (p = 0.560), recurrent abdominal pain (p = 0.726). Our study in line with the theory that H. pylori infection may have unspecific clinical manifestation.[28]

Conclusion

There are various characteristics of pediatric patients with clinical symptoms of gastritis at Haji Adam Malik General Hospital and educational network hospital. Our study found no significant relationship between children's characteristic and gastritis clinical manifestation with or without H. pylori infection. The majority of clinical manifestation is recurrent abdominal pain, and there is no significant manifestation between gastritis with or without H. pylori infection, so not all children with gastritis needed therapy such as antibiotics and PPI.

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Conflicts of interest

The author declares that there are no conflicts of interest.

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