

Original Article

Helicobacter pylori infection in pediatrics with gastrointestinal complaints

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Abstract: Background: Helicobacter pylori is one of the most important pathogenic bacteria in gastric mucosa both in adults and pediatrics. Here we aimed to investigate the prevalence of Helicobacter pylori in pediatrics with gastrointestinal complaints by the endoscopic method and using pathology reports. Methods: This is a cross-sectional study that was performed in 2019-2020 in Imam Hossein hospital affiliated to Isfahan University of Medical Sciences on medical documents of pediatrics that underwent gastric or duodenal biopsy via endoscopy. We collected data regarding patients' age, gender, place of residence, type of gastrointestinal complaints, and prevalence of Helicobacter pylori infection from the medical reports. We also investigated the possible correlation between the presence of Helicobacter pylori and the type of complaints among patients. Results: A total number of 400 pediatrics entered the study. Abdominal pain was the most common complaint (42%). Helicobacter pylori infection was found in 31 cases (7.8%). The prevalence of Helicobacter pylori infection in boys (10.7%) was significantly higher than in girls (4.6%) ($P = 0.02$) and was significantly related to the age group of children ($P < 0.001$) in the way that Helicobacter pylori infection was more common in higher ages. There was no significant relationship between the prevalence of Helicobacter pylori infection and the type of complaint ($P = 0.29$). Conclusion: We showed that the prevalence of Helicobacter pylori infection is low among pediatrics with gastrointestinal complaints and this issue could cast doubt on the high prevalence rates and importance of this infection in children.

Keywords: Helicobacter pylori, infection, prevalence, pediatrics, endoscopy

Introduction

Helicobacter pylori is one of the most important pathogenic bacteria in the gastric mucosa that plays an important role in causing diseases such as chronic gastritis, gastric and duodenal ulcers, metabolic syndrome, and gastrointestinal cancers in pediatrics and adults [1]. Although many people with this bacterium have no clinical symptoms, Helicobacter pylori is one of the leading causes of recurrent heartburn in children and dyspepsia in adults [2].

The prevalence of Helicobacter pylori is higher in developing countries than in developed countries. The prevalence of this infection has been reported from less than 20% in European countries to more than 80% in Eastern Mediterranean countries [3, 4]. The prevalence

of Helicobacter pylori infection in Iran is 54% [5] and in studies related to the prevalence of Helicobacter pylori infection in Iran, there was a statistical variation of 17-9% to 82% in different cities [5-7].

The reported prevalence of this infection varies according to the age of the population. In a systematic review study, the prevalence of Helicobacter pylori under the age of 20 years was 50.3%, and among patients with 20-40 years was 60.1% in Turkey [8]. The method of measuring Helicobacter pylori infection has been different in different studies and has been effective in the results [9]. There are different ways of testing for Helicobacter pylori infection including stool antigen exam, urease breath test and tissue sampling. The stool exam is considered as most frequent method in our region.

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In developed countries, antibiotic treatment begins with a positive result [10].

Nowadays, the treatments of *Helicobacter pylori* infection are conducted by a combination of antibiotics and an acid-reducing proton pump inhibitor. Amoxicillin, clarithromycin, metronidazole and tetracycline are the most effective antibiotics from which, usually two will be prescribed [11]. The effectiveness of this treatment is reported from 69 to 96% in different studies based on the patient's compliance [12].

Lack of specific clinical manifestations of *Helicobacter pylori* infection in children is one of the causes of over-diagnosis and unnecessary antibiotic treatment, which leads to high costs and the development of antibiotic resistance [13]. On the other hand, in developing countries where the prevalence of this infection is high, the patient has not treated asymptotically [14].

Given that certain statistics on the prevalence of *Helicobacter pylori* in children in Isfahan are not available and it seems that a low percentage of children with gastrointestinal disorders are infected with *Helicobacter pylori* and considering that early treatment will be useful in preventing chronic complications of this disease -with the note that unnecessary treatments could lead to changes in normal bacterial flora and high costs and lack of disease amelioration-, in the present study, we decided to investigate the prevalence of *Helicobacter pylori* in pediatrics with gastrointestinal disease in Isfahan by the endoscopic method.

Methods and material

Study design

This is a cross-sectional study that was performed in 2019-2020 in Imam Hossein hospital affiliated to Isfahan University of Medical Sciences. The current study was conducted on medical documents of pediatrics that underwent gastric or duodenal biopsy via endoscopy. The study protocol was approved by the Research Committee of Isfahan University of Medical Sciences and the Ethics committee has confirmed it (Ethics code: IR.MUI.MED.REC.1399.300).

Inclusion and exclusion criteria

The inclusion criteria were age less than 18 years, undergoing endoscopy due to gastroin-

testinal complaints, presence of pathology reports in the medical records, and signing the written informed consent by the parents to participate in this study. The exclusion criterion was incomplete data of the patients.

Helicobacter pylori detection method

Infections with *Helicobacter pylori* were diagnosed by gastric biopsies during endoscopy. Other lesions were also evaluated including atrophic gastritis, intestinal metaplasia, dysplasia, and MALT lymphoma. Based on the study of Wright and colleagues, biopsies for histology should be taken from both the antrum and body of the stomach, especially when looking for evidence of multifocal atrophic gastritis and/or intestinal metaplasia. The accuracy of histologic diagnosis of *H. pylori* infection can be improved by using special stains such as Giemsa or specific immune stains [15].

Data collection

We collected data regarding patients' age, gender, place of residence, type of gastrointestinal complaints, and prevalence of *Helicobacter pylori* infection from the medical reports. We also investigated the possible correlation between the presence of *Helicobacter pylori* and the type of complaints among patients.

We should note that diagnosis of *Helicobacter pylori* infection has been made by microbiologic studies of samples from endoscopy in children.

Data analysis

The obtained data were entered into the Statistical Package for Social Sciences (SPSS) (version 24, SPSS Inc., Chicago, IL). Quantitative data were reported as mean \pm standard deviation and qualitative data as frequency distribution (percentage). Chi-square and Mann-Whitney U tests were used to analyze the data. *P*-value <0.05 was considered as a significance threshold.

Results

Study population

A total number of 400 pediatrics entered the study. The study population consisted of 194 girls (48.5%) and 206 boys (51.5%) with the mean age of 6.4 ± 4.5 years ranging from 1

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Table 1. Frequency distribution of age group, address of residence, and complaint

Variable		Number	Percent
Age group	<1 year	113	28.3
	2-6 years	93	23.3
	10-7 years	100	25
	>10 years	94	23.5
Residence place	Isfahan	224	56
	Isfahan suburb	137	34.3
	Lorestan	6	1.5
	Chahar-Mahal	23	5.7
	Khuzestan	4	1
	Other	6	1.5
Complaint	Abdominal pain	168	42
	Weight loss	20	5
	Bloody vomiting and bloody diarrhea	40	10
	Non-bloody vomiting and non-bloody diarrhea	81	20.3
	GERD	20	5
	Anorexia	10	2.5
	Hematochezia	8	2
	Other	53	13.2

GERD: Gastroesophageal reflux disease, Data is presented as frequency distribution (percentage).

Table 2. Frequency distribution of Helicobacter pylori infection by sex, place of residence, and age group of children

Variable		Not infected		Infected		P-value
		Number	Percent	Number	Percent	
Gender	Girl	185	95.4	9	4.6	0.02*
	Boy	184	89.3	22	10.7	
Age group	<1 year	111	98.2	2	1.8	<0.001**
	2-6 years	87	93.5	6	6.5	
	7-10 years	91	91	9	9	
	>10 years	80	85.1	14	14.9	
Residence place	Isfahan	211	94.2	13	5.8	0.03*
	Isfahan suburb	126	92	11	8	
	Other	32	82.1	7	17.9	

*Using chi-square test, **using Mann-Whitney U test.

month to 17 years. Helicobacter pylori infection was found in 31 cases (7.8%) of all participants.

The age classification, place of residence, and gastrointestinal complaints leading to endoscopy are indicated in **Table 1**. As shown, most cases were residents of Isfahan city (56%) and abdominal pain was the most common complaint (42%).

The prevalence of Helicobacter pylori

The Chi-square test showed that the prevalence of Helicobacter pylori infection in boys (10.7%) was significantly higher than in girls (4.6%) ($P = 0.02$). The prevalence of Helicobacter pylori infection in children living in Isfahan and suburbs of Isfahan was significantly lower than other children living in other areas ($P = 0.03$). Mann-Whitney U test showed that the prevalence of Helicobacter pylori was significantly related to the age group of children ($P < 0.001$) in the way that Helicobacter pylori infection was more common in higher ages (**Table 2**).

Distribution of Helicobacter pylori infection by complaint

The Chi-square test with likelihood ratio showed that there was no significant relationship between the prevalence of Helicobacter pylori infection and the type of complaint ($P = 0.29$) (**Table 3**).

Discussion

Prevalence and associated factors of Helicobacter pylori infection in pediatrics could have high clinical importance and regional studies have reported various results. Based on our results, Helicobacter pylori infection was found in 7.8% of cases that were more common among boys compared to girls, and also more common in pediatrics with higher ages. Abdo-

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Table 3. Frequency distribution of Helicobacter pylori infection by complaint

Complaint	Not infected		Infected		P-value*
	Number	Percent	Number	Percent	
Abdominal pain	150	89.3	18	10.7	0.62
Weight loss	19	95	1	5	0.33
Bloody vomiting and bloody diarrhea	36	90	4	10	0.29
Non-bloody vomiting and non-bloody diarrhea	78	96.3	3	3.7	0.18
Reflux	20	100	0	0	0.09
Anorexia	9	90	1	10	0.21
Hematochezia	7	87.5	1	12.5	0.15
Other	50	94.3	3	5.7	0.44

*Using chi-square test.

Abdominal pain was the most common gastrointestinal complaint but there was no significant relationship between the prevalence of Helicobacter pylori infection and the type of gastrointestinal complaint.

These data could have high clinical importance and could be used by pediatricians in gastroenterology and general pediatrics clinics. Previously, some studies have been conducted in this regard evaluating the prevalence and importance of this infection in children. Various studies have investigated the prevalence of Helicobacter pylori in the general pediatric population and some have assessed the symptomatic children. In 2011, a study was conducted by Oleastro and colleagues in Portugal on 844 asymptomatic children. In this study, they evaluated the general infection rate for Helicobacter pylori and reported that the global prevalence of Helicobacter pylori infection was 31.6%, increasing with age but similar among genders [16]. It was explained that this prevalence rate was higher than in other regions. In 2019, Mišak and colleagues evaluated Helicobacter pylori in pediatrics and showed that this disease still poses a significant health burden worldwide. It was mentioned that the prevalence of Helicobacter pylori infection was reported from 6-15% in cases with previous gastrointestinal complaints. Based on this study, the high resistance of H pylori and, consequently, low eradication rates, is still a major concern and susceptibility testing before treatment has again been highlighted [17]. These studies show the high prevalence rate and importance of Helicobacter pylori infection in pediatrics with no symptoms.

Studies assessing symptomatic patients and cases with gastrointestinal issues have claimed that Helicobacter pylori infection could be a serious issue that should be diagnosed and treated as soon as possible. Jozefczuk and colleagues evaluated the prevalence of Helicobacter pylori infection in pediatric celiac disease in 2015 in Poland. They reported that 5.4% of pediatrics with celiac disease had Helicobacter pylori infection but the prevalence rate, gender distribution, and age categories of this infection were similar among pediatrics with celiac disease and healthy subjects [18]. The role of gender as a risk factor for H pylori infection was reviewed by de Martel and Parsonnet in a meta-analysis of large, population-based studies [19]. Those authors found that male gender was significantly associated with H pylori infection (OR: 1.16, 95% CI: 1.11-1.22) and that this male predominance of H [20].

Zabala Torres and colleagues conducted a review study in 2017 investigating the prevalence and dynamics of Helicobacter pylori infection during childhood. They showed that the infection prevalence estimates ranged from 20% to 50% in children ≤5 and 38% to 79% in children >5 years based on noninvasive direct detection methods. On the other hand, they showed that based on model estimates of cross-sectional direct detection studies in symptomatic children, the prevalence of Helicobacter pylori infection was very wide-ranging from 7 to 54%. They also showed that this rate was 7 to 76% among pediatrics with gastrointestinal symptoms [21]. The results of our study were in line with these findings.

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The prevalence of H pylori infection in our study could be lower than most previous reports that might be due to the regional prevalence rates and population differences. We should note that most previous studies have assessed the presence of Helicobacter pylori via stool exams or serology examinations and therefore, reported a higher prevalence rate. But in the present study, we used data of direct biopsy of symptomatic children. These data could also cast doubt on the high prevalence and importance of Helicobacter pylori infection in children.

A longitudinal study also assessed the Helicobacter pylori infection in symptomatic children as detected by histology in Belgium. By assessing 992 children, they showed that the H. pylori prevalence in children <6 years was 18.2%, and in 12-17-year-olds was 49.3% [22]. In 2014, Cai and others reported that 20% of children with chronic gastritis suffer from Helicobacter pylori infection that is estimated to be a lower rate compared to other studies [23]. These reports emphasize the high prevalence of Helicobacter pylori infection in symptomatic children and the use of invasive diagnostic tools. The results of our study were not in line with these reports. Based on our data, Helicobacter pylori infection was more prevalent in the male gender and in higher ages that were also consistent with previous data.

A review study was performed by Ibrahim and colleagues in 2017 that assessed the association between sex and Helicobacter pylori infection in pediatric and adult populations. They evaluated 244 studies and reported that the male sex was associated with a greater prevalence of H. pylori infection, both in children and adults. It was also explained that the prevalence of this infection could be variables between 5-15% among pediatrics with gastrointestinal complaints [24]. These data were also in line with the findings of our study that show a low prevalence rate based on the biopsy method. We believe that immediate treatment and antibiotic administration in children with positive stool exams or serology tests could be unnecessary and further studies should be conducted in this regard assessing the exact prevalence rate of Helicobacter pylori infection in symptomatic children.

Another point is that regarding a low prevalence rate of infection among symptomatic children,

this rate could be significantly lower in the asymptomatic population. Therefore, Helicobacter pylori infection could be a non-important problem among pediatrics. We also recommend that children with gastrointestinal complaints should be assessed for other diseases and also functional disorders by experts.

Taken together, we reported a lower prevalence rate of Helicobacter pylori infection among pediatrics compared to other regions. Based on our results, Helicobacter pylori infection was detected more frequently in male gender and also in higher ages. The limitations of our research were restricted study population and limited research center. We believe that further studies on larger populations and in multiple centers should be conducted in our region.

Conclusion

Taken together, we showed that the prevalence of Helicobacter pylori infection is low among pediatrics with gastrointestinal complaints and we believe that these children should be initially assessed for other diseases.

Disclosure of conflict of interest

None.

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