

Spectrum of paediatric *Helicobacter pylori* infection in a tertiary care hospital

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Abstract

Background: *Helicobacter pylori* infection affects more than half of the global population. The infection is typically acquired during childhood but can be asymptomatic, with long-term clinical consequences including gastritis, peptic ulcer disease, and stomach cancer.

Objective: To evaluate the clinicodemographic and laboratory profile of paediatric *Helicobacter pylori* infection.

Materials and Methods: This hospital-based cross-sectional study included 218 children with *H. pylori* infections from Bangladesh Shishu Hospital and Institute (BSH&I)'s, Department of Paediatric Gastroenterology, Hepatology, and Nutrition from March 2024 to February 2025. According to the ESPGHAN/NASPGHAN guidelines for children, all study participants between 3 to 18 years of age who had at least one of the following nonspecific abdominal symptoms—abdominal pain, nausea, vomiting, or bloating for more than four weeks were enrolled, had endoscopy, and had the Rapid Urease Test. Two gastric biopsies from the stomach's body and two from the antrum were taken for histological analysis. The traditional Giemsa procedure-stained stomach tissue for *H. pylori*.

Results: Most participants were over 6 (77.9%) years old and male (55.9%). Regarding maternal education, 50.9% had primary education. Many households had more than five individuals (67.9%) and were rural (62.8%). Caregivers helped 87.1% to use toilets. They mostly used partially boiled (45.8%), tube well (32.1%), and tap water (11.9%). Handwashing was low at 63.8%. Most children (61.1%) had a healthy body mass index (BMI); however, 35.4% were underweight. Abdominal pain (83%), vomiting (72%), epigastric tenderness (67.9%), and heartburn (66.9%) were the most common clinical findings. Nearly half (48.1%) had mild anaemia, and microcytic hypochromic (72.0%) was the most common type. The rapid urease test (RUT) was positive in 94.04% of patients. Endoscopy showed erythema in 85.7% of cases, erosion to the tissue in 55.0%, and nodular lesions in 38.0% of cases. Histopathology revealed chronic gastritis in 88.9% of cases and an active *H. pylori* infection in 48.1% when using Giemsa staining.

Conclusion: A *Helicobacter pylori* infection is common in older children and usually associated with gastrointestinal discomfort, anaemia, and poor hygiene. The rapid urease test and histopathology help in early diagnosis.

Keyword: *Helicobacter pylori*; Children; Therapeutics; Diagnosis

Introduction

Helicobacter pylori infection is recognized as one of the most prevalent GI infections worldwide, especially in low-resource countries like Bangladesh. People often acquire this infection in early childhood.¹ While most infected children remain asymptomatic or present with non-specific symptoms, some may develop significant complications. *H. pylori*-associated gastroduodenal ulcers are responsible for abdominal pain and upper GI bleeding.² It can cause chronic gastritis, gastric ulceration, and, in the long term, gastric cancer.³ Bacterial eradication is crucial to prevent long-term complications such as gastric cancer.⁴ Children differ from adults and have a low rate of severe disease associated with *H. pylori* and almost an absence of gastric malignancies. Several studies have shown a lack of evidence regarding the relationship between abdominal pain or other abdominal symptoms in children and an *H. pylori* infection.⁵

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The prevalence is known in children worldwide and varies among countries. It is lower in high-income countries (34.7%) than in low-income and middle-income countries (50.8%) and more prevalent in adults than in children. The *H. pylori* bacterium has infected approximately 50 percent of the total population.⁶ The occurrence of *H. pylori* transmission varies by age, race, ethnicity, and geographic area. In developing countries, it is the most common cause of chronic gastritis and peptic ulcers. For decades, *H. pylori* have colonized the gastric mucosa of children and adults. Transmission takes place via the gastro-oral, faeco-oral, or oro-oral routes.⁷

School-going children in developing countries are at higher risk of *H. pylori* infection. Several factors control the transmission in developing countries, including low socioeconomic status, poor quality of drinking water, overcrowding, poor personal and environmental hygiene, and food contamination.⁸⁻¹¹ In Bangladesh, data on the prevalence of *H. pylori* infection in children are scanty. To the best of our knowledge, there is no available published information on the prevalence of *H. pylori* infection in Bangladeshi children. The primary objective of this study was to determine the risk factors and clinicodemographic profile of *H. pylori* infection among children at Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh.

Materials and Methods

This was a hospital based cross sectional study carried out among 218 children with *H. pylori* infection attending the Department of Paediatric Gastroenterology, Hepatology & Nutrition, Bangladesh Shishu Hospital and Institute (BSH&I), between March 2024 and February 2025. This study assessed risk factors for *H. pylori* infection among children aged between 3 and 18 years. All study participants visited the Paediatric Gastroenterology, Hepatology & Nutrition Department from March 2024 up to February 2025 with at least one of the following nonspecific abdominal symptoms: abdominal pain, nausea, vomiting, and bloating persisting for more than 4 weeks were selected by fulfilling the exclusion criteria, like children who had been treated with any combinations of medicines used to treat *H. pylori* infection, including metronidazole, clarithromycin, amoxicillin, omeprazole or any other proton pump inhibitor in less than two weeks prior to the visit; any cognitive impairments secondary to neurologic problems such as cerebral palsy; functional abdominal pain; acute hepatitis; GERD; functional constipation; cholelithiasis; acute chronic pancreatitis; or whose parents refused participation.

All participants completed a standard questionnaire that collected sociodemographic and environmental information. This questionnaire included general demographic characteristics of the child (e.g., age, sex, anthropometric measurement, number of siblings, number of people in the

household, child feeding methods, and whether the child had any GI-related problems in the past month before the survey). Their dietary habits, socioeconomic variables (e.g., parents' education, family size, and employment status), and behavioral characteristics (e.g., water source and supply, whether water was boiled before consumption, the incidence of hand washing, and toilet type). Regarding clinical symptoms & signs, the investigators assessed the following: loss of appetite, nausea, and vomiting, haematemesis, melaena, heartburn, pallor, hepatomegaly, and epigastric tenderness.

Data were collected and entered into SPSS (Version-23) for descriptive and statistical analysis. To check for *H. pylori* infection, all the participants had an endoscopy; they took a Rapid Urease Test (RUT) and collected 2 tissue samples from the main part of the stomach and 2 from the lower part for further examination, following the guidelines for children. Standard Giemsa staining of the gastric tissue was performed to detect *H. pylori* infection.¹² For lab tests, anaemia was classified according to severity¹³ and morphological classification.¹³ A stool test was done, and then preparations were made for an upper GI endoscopy with sedation. A positive RUT was noted, and tissue samples were sent for further examination. After collecting the samples, they were placed in a tube with 10% formalin. The doctor valued a positive RUT and sent biopsy specimens for histopathology. A report was collected, and nonspecific chronic gastritis other than *H. pylori* infection was excluded.

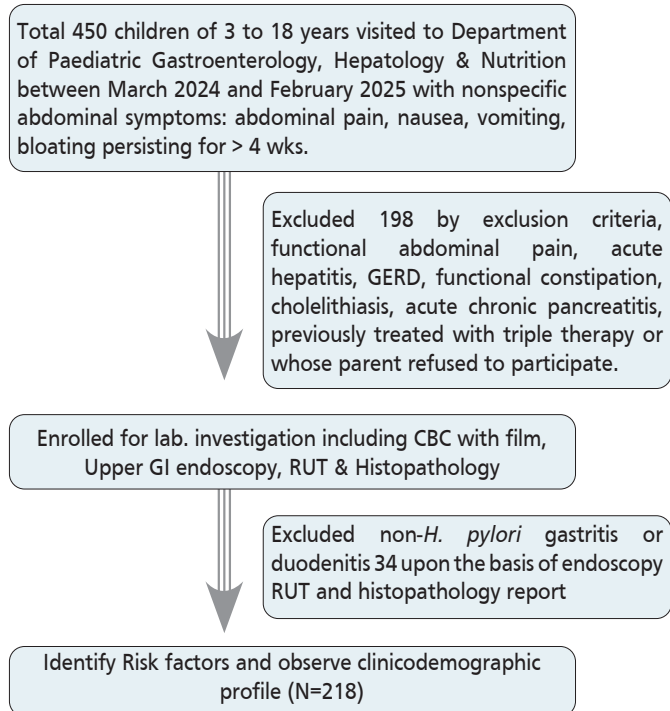


Figure 1: Study flow chart

Results

Most participants were aged over 6 years (77.9%), with a male predominance (55.9%). Half of the mothers had primary education (50.9%). Nuclear families (40.8%), households with more than five members (67.9%), and rural residents (62.8%) were common. The majority used toilets with caregiver assistance (87.1%). Most of them relied on partially boiled (45.8%), tube well (32.1%), and tap water (11.9%). Handwashing practices were poor with 63.8%. Most children had a healthy BMI (61.1%), though 35.4% were underweight (Table I).

Table I: Demographic characteristic of the study patients (N=218)

Variable	No.	%
Age (yrs.)		
3-6	48	22.1
7-12	83	38.0
>12	87	39.9
Sex		
Male	122	55.9
Female	96	44.1
Maternal educational		
Primary	111	50.9
SSC	83	38.0
HSC and above	24	11.1
Family type		
Nuclear	89	40.8
Expended	129	59.2
Number of people in household		
≤ 5	70	32.1
> 5	148	67.9
Residence		
Urban	81	37.2
Rural	137	62.8
Used to toilet		
Diaper	4	1.8
By child	24	11.1
By caregiver	190	87.1
Source of drinking water		
Tap water	26	11.9
Tube well water	70	32.1
Boiled water (proper)	22	10.2
Boiled water (partial)	100	45.8
Hand washing practice before eating and after toilet		
Yes	79	36.2
No	139	63.8
BMI		
Under weight	77	35.4
Healthy	133	61.1
Over weight	5	2.2
Obesity	3	1.3

Abdominal pain (83%), vomiting (72%), and heartburn (66.9%) were reported in most of the cases. Epigastric tenderness (67.9%) and anaemia (59.2%) were the most common examination findings. Less frequent symptoms included loss of appetite (23%), haematemesis (9%), melaena (7%), and hepatomegaly (14.2%). Only 11.9% had a family history of peptic ulcer disease (PUD) (Table II).

Table II: Clinical findings of the study patients (N=218)

Characteristics	No.	%
Loss of appetite		
Yes	50	23
No	168	77
Abdominal pain		
Yes	181	83
No	37	17
Vomiting		
Yes	157	72
No	61	28
Haematemesis		
Yes	20	09
No	198	91
Melaena		
Yes	15	07
No	203	93
Heartburn		
Yes	146	66.9
No	72	33.1
Anaemia		
Yes	129	59.2
No	89	40.8
Hepatomegaly		
Yes	31	14.3
No	187	85.7
Epigastric tenderness		
Yes	148	67.9
No	70	32.1
Family history of PUD		
Yes	26	11.9
No	192	88.1

Nearly half of the participants had mild anaemia (48.1%), while 33.1% had moderate anaemia; none had severe anaemia. Microcytic hypochromic anaemia was the most common type (72.1%). RBCs were present in stool samples of 11.1%. The rapid urease test (RUT) was positive in 94.1% of patients. Endoscopy showed redness in 85.7% of cases, erosion to the tissue in 55.0%, and nodular lesions in 38.0%, while fewer cases had ulcers (12.8%) and redness in the duodenum (17.8%). Histopathology results showed that 88.9% of patients had chronic gastritis, and 48.1% were confirmed to have an active *H. pylori* infection using both Giemsa stain and histopathology. No metaplasia or dysplasia was found (Table III).

Table III: Lab investigation findings of the study subject

Lab investigation	No.	%
Hb%		
Normal $\geq 12\text{gm/dl}$	41	18.8
Mild 11.0-11.9gm/dl	105	48.1
Moderate 7.0-11.0gm/dl	72	33.1
Severe $<7.0\text{gm/dl}$	0	0.0
RBC morphology		
Microcytic hypochromic	157	72.1
Normocytic normochromic	61	27.9
Macrocytic	00	00.0
RBC in stool		
Yes	24	11.1
No	194	88.9
Rapid Urease Test (RUT)		
Positive	205	94.1
Negative	13	5.9
Endoscopic findings		
Erythema	187	85.7
Erosion	120	55.0
Nodular lesion	83	38.0
Ulceration	28	12.8
Duodenal erythema	39	17.8
Histological findings		
Chronic gastritis	194	88.9
Giemsa Stain positive	105	48.1
Active <i>H. pylori</i>	105	48.1
Chronic duodenitis	24	11.0
Metaplasia	00	0.0
Dysplasia	00	0.0

Discussion

In this study, most participants were over 6 years old (77.9%), and there was a male predominance (55.9%). More than half of the mothers had only primary education (50.9%), which may limit knowledge of hygiene practices and disease prevention factors previously linked to *H. pylori* infection.^{14,15} Nuclear families (59.1%) and households with more than 5 members (67.9%) were common, supporting the association between overcrowding and faecal-oral transmission.¹⁶ These findings were similar to the Aitila et al study.¹¹

With nearly 62% of participants being from rural areas, poor sanitation, unsafe drinking water, and hygiene were consistent with findings from studies in Southwestern Uganda¹¹, Peru¹⁶, Congo¹⁷ and Bangladesh.¹⁸ Most children used toilets with caregiver assistance (87.1%) and consumed boiled water with visible particles (45.8%), highlighting risks from improperly treated water an established source of *H.*

pylori transmission, which was stated in the Mahalanabis et al¹⁸ and Goodman et al¹⁹ study. Poor handwashing was prevalent (63.8%), further facilitating faecal-oral spread.²⁰ While 61.1% of children had a healthy BMI, undernutrition (35.4%) is notable, as *H. pylori* can impair gastric function, and nutrient absorption corresponds to the Kato et al study.²¹

The most common symptoms were abdominal pain (83%), vomiting (72%), and epigastric tenderness (67.9%), followed by heartburn (66.9%) and anaemia (59.2%). These symptoms are consistent with those reported by Abbas et al,²² who found nausea (24%), gastric pain (23%), and heartburn (19%) as frequent complaints in infected children. In comparison to Tibasima et al,¹⁷ our cohort had higher rates of vomiting and anemia but lower rates of diarrhoea and weight loss. Only 11.9% had a family history of PUD, which contrasts with 37.8% in the Tibasima study indicating possible differences in genetic or household risk factors.¹⁷

Nearly half of the patients had mild anaemia (48.1%), and a third had moderate anaemia (33.1%), with microcytic hypochromic anaemia being predominant (72.1%). This supports previous evidence that *H. pylori* can contribute to iron deficiency anaemia by increasing gastric hepcidin and impairing iron absorption.²³ Red blood cells in stool were found in 11.1% of cases less than Tibasima's 47.7%, but still clinically relevant.¹⁷ Chronic gastritis was identified in 88.9% of histology samples, with 48.1% testing positive for *H. pylori* by Giemsa stain similar to results in the Democratic Republic of Congo.¹⁷ Endoscopic findings such as erythema (85.7%), erosion (55.0%) and nodular lesions (38.0%) reflect common presentations in pediatric *H. pylori* gastritis, which is similar to the Done et al²⁴ study. No cases of metaplasia or dysplasia were observed, aligning with earlier pediatric studies that show rare progression to premalignant lesions, like the Ricci et al²⁵ study.

Conclusion

Helicobacter pylori infection remains a significant health concern in older children, linked to inadequate maternal education, expanded and large families, poor hygiene & sanitation, unsafe drinking water, and lack of hand-washing practice. Gastrointestinal discomfort, including abdominal pain, vomiting, heartburn, epigastric tenderness, and anaemia, were the prominent clinical presentation.

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