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Research Article

Epidemiology of and Factors Associated with *Helicobacter Pylori* Infection and Proportion Requiring Treatment Among Symptomatic Children in Northwestern Tanzania

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Abstract

Background: *Helicobacter pylori* infection has been reported to affect more than half of the global population. The persistence of *H. pylori* infection results to chronic gastritis and peptic ulcer disease. Despite this burden there is limited published studies regarding proportion of *Helicobacter pylori* infected children that require treatment in many settings in low and middle-income countries (LMICs). Therefore this study aimed to determine the epidemiology of and factors associated with *Helicobacter pylori* infection and proportion requiring treatment among symptomatic children in northwestern Tanzania. Methodology: This was a hospital based cross-sectional study conducted at BMC hospital in Northwestern Tanzania from December 2021 and April 2022 among outpatient children aged 1 to 15 years with gastrointestinal symptoms. The main study outcome (event) was presence of *H. pylori* infection as evidence by positive stool antigen test. Independent factors associated with *H. pylori* infection were determined by logistic regression model. The significance level was set at p-value of <0.05. Oesophagogastroduodenoscopy (OGD) was performed to the randomly serially selected representative sample of symptomatic children with positive *H. pylori* stool antigen test to determine the proportion of children requiring treatment. Results: A total of 422 symptomatic children were included in the study. The median age was 7 [IQR 3 – 10] years. The prevalence of *H. pylori* infection was 105 (24.9%). More than half of the participants (56.4%) were males. The risk of *H. pylori* infection was significantly associated with increase in age (OR= 1.09; 95%CI; 1.03 – 1.15; P= 0.002), and abdominal pain (OR=2.2; 95%CI 1.2 – 4.0; P= 0.01). About 55 participants were randomly selected for OGD among 100 children above or equal 2 years of age with positive stool antigen for *H. pylori.* The majority were found to have lesion warranting treatment. These lesions included gastritis 47 (85.5%), duodenal ulcers 2 (3.6%) and gastric ulcers 1 (1.8%). Conclusion: About a quarter of the enrolled children had *H. pylori* infection. Increase in age and abdominal pain were independently associated with *H. pylori* infection. Most *H.*

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pylori stool antigen test positive children had endoscopic lesions that warranted treatment. Therefore every *H. pylori* stool antigen test positive child needs eradication therapy.

Keywords

Prevalence, Factors, Helicobacter Pylori Infection, Treatment, Symptomatic Children, Tanzania

1. Introduction

Helicobacter pylori (*H. pylori)* infection have been reported to be the most common human infection, affecting about 50% of the global population [1-3]. By the age of 5 years about 50% of children are infected and this rate has been reported to exceed 90% during adulthood [4]. A recently hospital based study in Uganda among children aged 1 to 15 years found the prevalence to be 24.3% and this increased with increasing age [1]. A previous study which was conducted in the Bugando Medical Center on *Helicobacter pylori* infection in children < 12 years of age reported a prevalence of 42.9%. It was clearly reported that the prevalence increased with increase in age [5]. Treating all children could expose them to unnecessary antibiotics therapy hence promoting antimicrobial resistance (AMR) development. On the other hand invasive tests to establish causes of symptoms are not widely available in many settings in LMICs. The joint ESPGHAN/NASPGHAN guidelines recommend confirmation of *H. pylori* infection by invasive methods such as upper gastrointestinal endoscopy, thereafter provision of eradication therapy preferably proton pump inhibitor plus two antibiotics for 14 days to the *H. pylori* infected children who have gastric or duodenal ulceration or erosions. Confirmation of eradication is performed at least 4 weeks after completion of antibiotic treatment and 2 weeks after proton pump inhibitors (PPI) cessation using the urea breath test or *H. pylori* stool antigen test [6]. Therefore this study aimed to determine the epidemiology of and factors associated with *Helicobacter pylori* infection and proportion requiring treatment among symptomatic children in northwestern Tanzania.

2. Methods

2.1. Study Design, Duration and Study Area

This was cross-section study conducted from December 2021 to April 2022. The study was conducted in the department of Pediatrics and Child Health outpatient clinic in the Bugando Medical Center (BMC), Mwanza -Tanzania.

2.2. Sample Size Estimation and Sampling Technique

A total of 422 children aged 1 to 15 years with gastrointestinal symptoms were enrolled by convenience sampling method. The sample size was estimated by Kish Leslie formula [7], using previous prevalence of 42.9% by Jaka *et al* [5].

2.3. Inclusion Criteria

Children aged 1 to 15 years with one of the gastrointestinal symptoms like abdominal pain, vomiting, nausea, bloating, heartburn, refusal to feed, or restlessness were included.

2.4. Exclusion

Children producing watery stool/diarrhea were excluded. It has been suggested before that unformed or watery stool results to low accuracy of HpSA test due to dilution of *H. pylori* specific antigens [8].

2.5. Data Collection

Socio-demographic and clinical data were collected using a pre-tested questionnaire. The questionnaire included socio-demographic characteristics such as age and gender of participants, place of residence, school attendance, type of home toilet, sources of drinking water at home, number of people and rooms in their house, family history of peptic ulcers, and the educational level of the parent/guardian. The clinical characteristics such as abdominal pain, vomiting, nausea, bloating, heartburn, passage of dark stool, refusal to feed, or restlessness were recorded. Parents/guardian provided the information on behalf of their children for those who were too young or fail to express themselves. Stadiometer was used to measure height. Body weight was measured using weighing scale. Oxygen saturation was measured by using pulseoxymeter and epigastric/right upper quadrant tenderness was assessed clinically by palpation and observing facial expression and response of participants.

2.6. Sample Collection

Participants were given clean, dry, stool containers and they were instructed to provide small amount size of the

peanut stool specimen, and not to contaminate the stool specimen with urine or toilet water during the time of collection. Specimen were taken to the laboratory immediately after collection, for processing by an entitled laboratory technician, to detect the presence of *H. pylori* antigens.

2.7. Laboratory Procedure

The test based on the principle of lateral flow immunochromatography for qualitative determination of *H. pylori* antigens in stool that uses *H. pylori* specific monoclonal antibodies coated on the membrane of the test device Lot: 1909052 manufactured by (Zhejiang orient biotech company China). According to the manufacturer recommendation the test device and samples were allowed to reach room temperature (15–30^{0}C) prior to testing. The package was opened when ready to perform the test. Using the applicator stick of the provided sample diluents vial, a small portion (5mm in diameter) of stool specimen was transferred into the sample diluents. Then shaken gently in order to unstuck and facilitate sample dispersion and 4 drops of the sample was added in the test device. Thereafter the result was interpreted at ten to fifteen minutes.

2.8. Upper Gastrointestinal Endoscopy

Due to financial restrictions we managed to do OGD to about 1/2 (55) of those who were *H. pylori* infected to have a picture on the proportion that required treatment.

Based on endoscopy unit at BMC can only perform upper gastrointestinal endoscopy for the children ≥ 2 years old, due to unavailability of endoscope size for those < 2 years old children. In this study 5 (4.8%) under 2 years old *H. pylori* infected children were excluded for OGD remaining with 100 children ≥ 2 years old. Randomly 55 *H. pylori* infected children, were serially selected for OGD by picking their registration number written in folded mixed-up pieces of papers. This was a representative sample in determining the proportion that required treatment. Endoscopies were done by experienced gastroenterologists to the children instructed to fast for 8 hours prior the procedure to prevent aspiration. The visualization of gastric and duodenal mucosal was done using endoscope (EPK-i 5010 manufactured by Pentax medical company Japan).

2.9. Data Quality Control

To ensure internal validity of the study the following precautions were taken into considerations:

The data-collecting tool was pre-tested.

The principal investigator ensured completeness and consistency of edited data collected.

Data was kept confidential under lock and key.

Internal quality controls were included in the test. A colored band appeared in the control region (C) was an internal positive procedural control, confirming sufficient specimen volume and correct procedural technique.

2.10. Data management and Statistical Data Analysis

Data was entered into Microsoft excel sheet then analyzed using STATA version 15. Continuous variables were summarized as median with interquartile range. Categorical variables were summarized using proportion and percent. Odds ratios with respective 95% confidence interval (CI) were reported and p-value < 0.05 was considered to constitute a statistically significant difference. Furthermore those factors with p-value < 0.05 on univariate analysis method were subjected to multivariate regression model to determine the independent factors associated with *H. pylori* infection.

3. Results

3.1. Study Enrollment

A total of 2105 patients visits were attended at pediatric outpatient department (POPD) clinic, 1636 children were not eligible to be enrolled in the study. Of those who were not eligible 674 (32.0%) were under one year of age, 962 (45.7%) had no gastrointestinal symptoms. About 469 (22.3%) children with gastrointestinal symptoms age 1 to 15 years were serially enrolled in our study, from which 47 participants were excluded of which 42 (1.9%) and 5 (0.2%) did not return stool sample. Remained with 422 participants who were tested for *H. pylori* stool antigens, of which 105 (24.9%) were infected. Of the *H. pylori* infected 5 (0.05%) children under 2 years of age were excluded for OGD due to unavailability of endoscope size for this age group at Bugando Medical Center. About 55 children were randomly selected from those above or equal to 2 years of age *H. pylori* infected for endoscopy. None of the participants were excluded due to lack of consent. Enrollment is described in the recruitment flow chart (Figure 1).

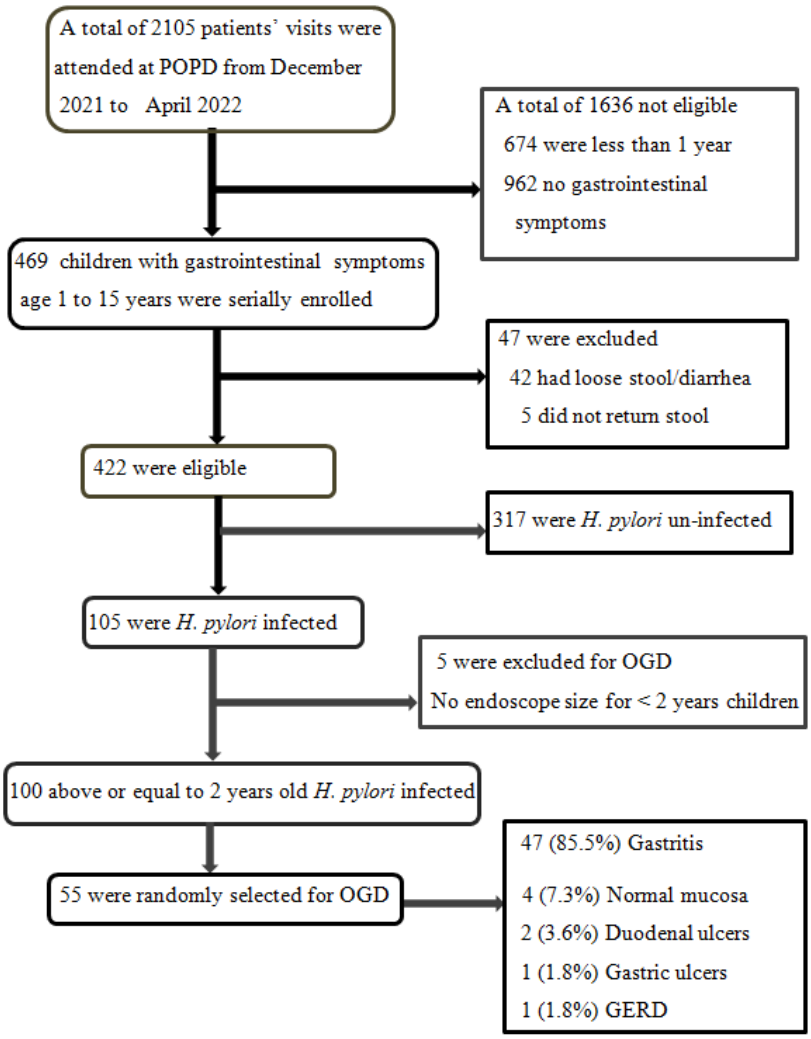


Figure 1. *Recruitment flow chart.*

3.2. Demographic and Clinical Characteristics of the Enrolled Participants

The median age was 7 [IQR 3 – 10] years. More than half of the participants (56.4%) were males. Majority of participants (79.4%) resided in urban areas and (70.4%) of all participants were school going. Approximately (90.3%) had flush toilets and (84.6%) used tap water. Minority (4.5%) were from households with more than three members per room. Slightly more than half of the parents (59.2%) had attained beyond primary education level (Table 1).

More than three quarters (76.1%) of the participant had abdominal pain, followed by vomiting (22.3%), bloating (13.5%), refusal to feed (13.3%), restlessness (10.4%), nausea (8.3%), dark stool (6.9%) and upper quadrant tenderness (2.6%) (Table 2).

Prevalence of and factors associated with of *Helicobacter Pylori* infection among symptomatic children aged 1 to 15 years.

The prevalence of *H. pylori* infection was 105 (24.9%) (Figure 2). As age increases by 1 year, the risk of *H. pylori* infection increases by 9% (OR=1.09; 95%CI 1.03 – 1.15; P=0.002), (Figure 3). In univariate logistic regression method the factors associated with *H. pylori* infection were age (OR=2.5; 95% CI 1.4 – 4.3; P=0.002), and abdominal pain (OR=2.4; 95% CI 1.4 – 4.2], P=0.002). Moreover, abdominal pain (OR=2.2; 95% CI 1.2 – 4.0 P=0.01) and age 11 – 15 years (OR=1.4; 95%CI 1.0 – 1.9; P=0.03) remained independently associated with *H. pylori* infection on multivariable analysis, (Table 3).

Proportion of *Helicobacter pylori* infected children that required treatment among symptomatic children aged 1 to 15 years.

Of 100 participants above or equal to 2 years of age, *H. pylori* infected children 55 randomly selected children did endoscopy, and 50 (90.9%) among those who had endoscopy done revealed gastrointestinal lesions that warranted treatment (Figure 4). The median age of the *H. pylori* infected children who required treatment was 10 [IQR 7 – 13] years. Our study also has suggested an algorithm for the management of children with *H. pylori* infection (Figure 5).

3.3. Pattern of Endoscopic Findings

About 55 (55%) children with *H. pylori* infection had endoscopy done. Majority had gastritis 47 (85.5%) that included 28 (50.9%) antral gastritis and 19 (34.5%) pangastritis, followed by 4 (7.3%) with normal mucosa, 2 (3.6%) duodenal ulcers, 1 (1.8%) gastric ulcer and 1 (1.8%) had gastroesophageal reflux disease (Table 4).

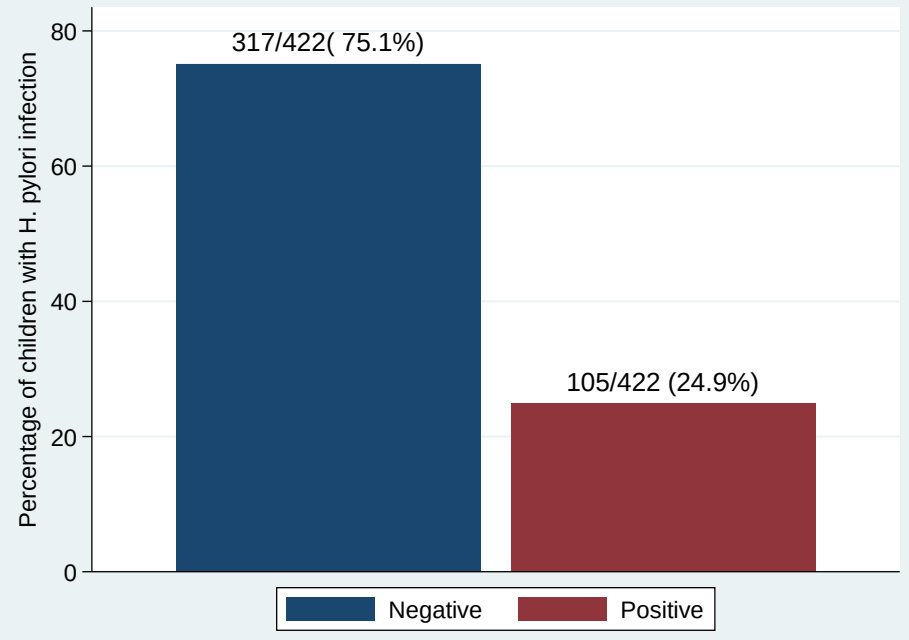


Figure 2. *Prevalence of Helicobacter pylori infection among study participants (N = 422).*

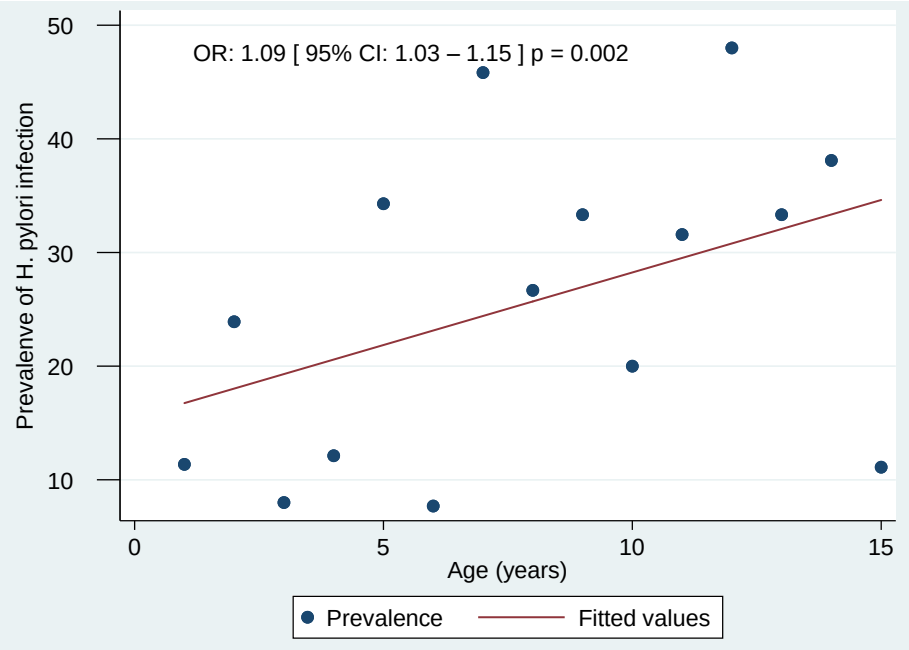


Figure 3. *Prevalence of Helicobacter pylori infection increases with increase in age.*

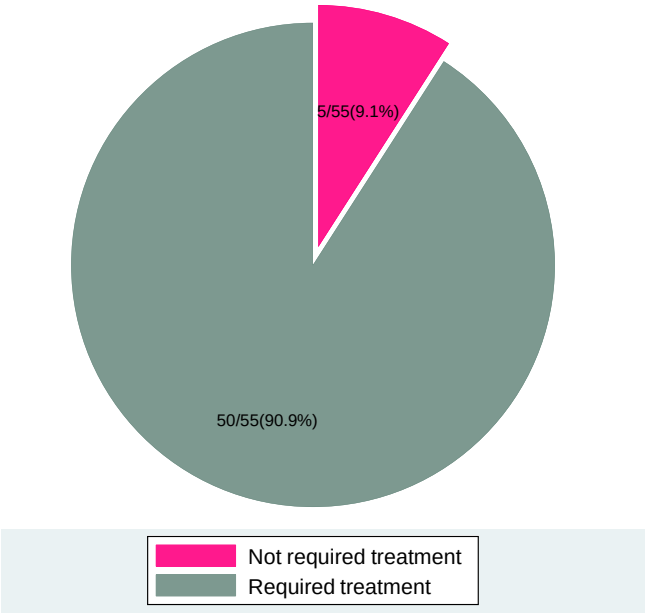
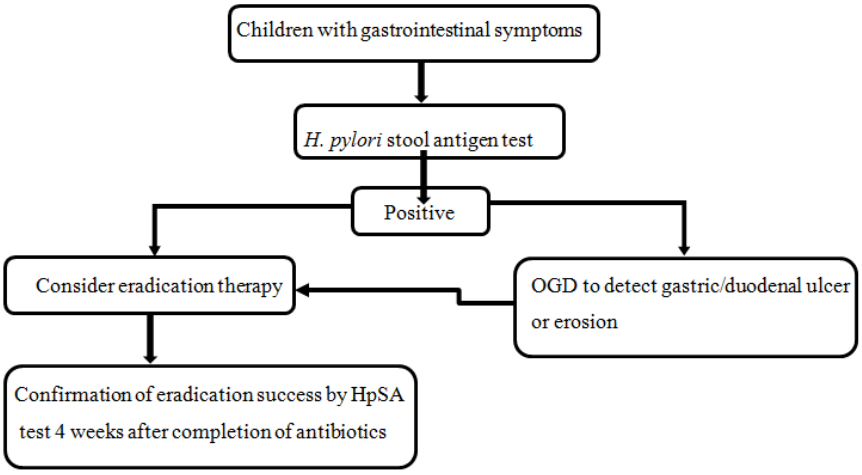


Figure 4. *Proportion of Helicobacter pylori infected children who required treatment (N = 55).*



Legends *H. pylori*: *Helicobacter pylori*; HpSA: *Helicobacter pylori* stool antigen; OGD: Oesophagogastroduodenoscopy.

Figure 5. *Algorithm for the management of children with Helicobacter pylori infection.*

Table 1. *Demographic and other baseline characteristics of 422 children aged 1 to 15 years attended outpatient clinic at Bugando Medical Centre from December 2021 to April 2022.*

Characteristics	**Number (%) or Median [IQR]n = 422**
Gender	
Male	238 (56.4)
Female	184 (43.6)
Age in years	7 [3 – 10]
Residence	
Urban	335 (79.4)
Rural	87 (20.6)
School attendance	

Characteristics	Number (%) or Median [IQR]n = 422
Yes	297 (70.4)
No	125 (29.6)
Overcrowding	
Yes	19 (4.5)
No	403 (95.5)
Source of water	
Tap	357 (84.6)
Non tap.	65 (15.4)
Type of toilet	
Pit latrine	41 (9.7)
Flush toilet	381 (90.3)
Education level of the parents	
≤ 7 years in school	172 (40.8)
>7 years in school	250 (59.2)
Family history of PUD	
Yes	91 (21.6)
No	331 (78.4)

Table 2. *Clinical characteristics of study participants (N = 422).*

Characteristics	Number (%) or Median [IQR] n = 422
Presenting symptoms and signs	
Abdominal pain	321 (76.1)
Vomiting	94 (22.3)
Bloating	57 (13.5)
Refusal to feed	56 (13.3)
Restlessness	44 (10.4)
Nausea	35 (8.3)
Dark stool	29 (6.9)
Upper quadrant tenderness	11 (2.6)
Antibiotic use in the past 30 days	35 (8.3)
Physical exam findings	
Saturation Oxygen in percentage	98 [97 – 99]
H. pylori positive	105 (24.9)
Age *H. pylori* infected in years	8 [5 – 12]
Age *H. pylori* un-infected in years	6 [3 – 10]
Children with gastrointestinal lesions warranted treatment	50/55 (90.9)
Age of children required treatment in years	10 [7 – 13]

Table 3. *Factors associated with Helicobacter pylori infection (N = 422).*

Variable	*H pylori* antigen test		Univariate		Multivariate	
	Positive (n=105) n (%)	Negative (n=317) n (%)	OR [95% CI]	p- value	OR [95%CI]	p-value
Age in years 1 – 5	33 (18.1)	149 (81.9)	1.0			
6 -10	40 (26.9)	109 (73.1)	1.7 [0.9 – 2.8]	0.06	1.4 [1.0 –1.9]	0.03
11 –15	32 (35.2)	59 (64.8)	2.5 [1.4 – 4.3]	0.002		
Gender Female	49 (26.6)	135 (73.4)	1.0			
Male	56 (23.5)	182 (76.5)	1.2 [0.8 – 1.8]	0.47		
Residence Rural	20 (23.0)	67 (77.0)	1.0			
Urban	85 (25.4)	250 (74.6)	0.9 [0.5 – 1.5]	0.65		
School attendance No	22 (17.6)	103 (82.4)	1.0			
Yes	83 (27.9)	214 (72.1)	1.8 [1.1 – 3.1]	0.53		
Overcrowding No	103 (25.6)	300 (74.4)	1.0			
Yes	2 (10.5)	17 (89.5)	0.3 [0.1 – 1.5]	0.16		
*Source of water*Non tap	13 (20.0)	52 (80.0)	1.0			
Tap	92 (25.8)	265 (74.2)	1.4 [0.7 – 2.7]	0.32		
Toilet Flush toilet	97 (25.5)	284 (74.5)	1.0			
Pit Latrine	8 (19.5)	33 (80.5)	1.4 [0.6 – 3.2]	0.41		
*Family history PUD*No	81 (24.4)	251 (75.6)	1.0			
Yes	24 (26.7)	66 (73.3)	1.1 [0.7 – 1.9]	0.66		
Parent education						
≤ 7 years in school	38 (22.1)	134 (77.9)	1.0	0.27		
> 7 years in school	67 (26.8)	183 (73.2)	1.3 [0.8 – 2.0]			
Abdominal pain No	11 (10.9)	90 (89.1)	1.0		2.2 [1.2– 4.0]	0.01
Yes	94 (29.3)	227 (70.7)	2.4 [1.4 – 4.2]	0.002		
Nausea No	98 (26.4)	285 (73.6)	1.0			
Yes	7 (20.0)	28 (80.0)	0.8 [0.4 – 1.9]	0.65		
Vomiting No	83 (25.3)	245 (74.7)	1.0			
Yes	22 (23.4)	72 (76.6)	0.9 [0.5 – 1.6]	0.70		
Bloating No	92 (25.2)	273 (74.8)	1.0			
Yes	13 (22.8)	44 (77.2)	0.9 [0.5 – 1.7]	0.69		
Dark stool No	95 (24.2)	298 (75.8)	1.0			
Yes	10 (34.5)	19 (65.5)	1.7 [0.7 – 3.7]	0.22		
Refusal to feed No	94 (25.7)	272 (74.3)	1.0			
Yes	11 (19.6)	45 (80.4)	0.7 [0.4 – 1.4]	0.33		
Restlessness No	103 (24.6)	315 (75.4)	1.0			
Yes	2 (50.0)	2 (50.0)	3.1 [0.4 – 21.9]	0.26		

Variable	*H pylori* antigen test		Univariate		Multivariate	
	Positive (n=105)	Negative (n=317)	OR [95% CI]	p- value	OR [95%CI]	p-value
	n (%)	n (%)				
Antibiotic use No	99 (25.6)	288 (74.4)	1.0			
Yes	6 (17.1)	29 (82.9)	0.6 [0.2 – 1.5]	0.27		
Upper- quadrant No	101 (24.6)	310 (75.4)	1.0			
tenderness Yes	4 (36.4)	7 (63.6)	1.8 [0.5 – 6.1]	0.38		

Table 4. *The patterns of endoscopic findings of 55 children aged 1 to 15 years attended outpatient clinic at Bugando Medical Centre from December 2021 to April 2022.*

Endoscopic findings	Number (%) n = 55
Gastritis	47 (85.5)
Normal findings	4 (7.3)
Duodenal ulcers	2 (3.6)
Gastric ulcer	1 (1.8)
Gastroesophageal reflux	1 (1.8)

4. Discussion

Our study found that the prevalence of *H. pylori* infection was 24.9% among 422 participants aged 1 to 15 years attending at Bugando Medical Center, Mwanza Tanzania. This is similar compared to the study done by Aitila *et al* 24.3% [1], this may be attributed by similar methodology used and age group of participants.

The higher prevalence from our study than that reported by Awuku *et al* 14.2% and Kirdy 16.5% *et al* [9, 10] may be ascribed by enrollment of smaller sample size of asymptomatic rural children by Awuku *et al*, also Kirdy *et al* used large sample size, inclusion of infants, different technique used for *H. pylori* detection.

Our study found lower prevalence than the study done by Jaka *et al* 42.9% and Galal *et al* 64.6% [5, 11], the difference may be accredited to multicenter study by Jaka *et al* [5] also involvement of large sample size children < 18 years of age in the study by Galal *et al* [11]. Also, it may reflect recent improvements in control and transmissions among children. However, the low prevalence in our study would have been attributed to the recruitment of participants with similar geographical characteristics. This could be due to influence by the environment factors on transmission of *H. pylori* infection [12].

In our study the median age of participants was 7 [IQR 3 – 10] years, risk of *H. pylori* infection increases with increase in age (OR= 1.09; 95%CI 1.03 – 1.15; P = 0.002). As age increases by 1 year the risk of *H. pylori* infection increases by 9%. This is also supported by Aitila *et al* [1] they reported the infection rate increase with increase in age. Age > 10 years was independently associated with *H. pylori* infection (OR=1.4; 95%CI 1.0 – 1.9; P = 0.03). This is supported by Galal *et al*, Hasosah *et al* [11, 13]. This could be explained by increased children's contact with the community and outdoor exposure with low knowledge on how to prevent transmissions. Also decreased parental care to these older children.

Abdominal pain occurred frequently 321 (76.1%) among the participant likewise in 95 (90.5%) of those with *H. pylori* infection with statistical significance (OR= 2.2; 95%Cl; 1.2 – 4.0; P= 0.01), this was supported by study done by Galal *et al* where by 310 (76.2%) among *H. pylori* infected had abdominal pain [11]. Hasosah *et al* reported that children with abdominal pain were 2.39 more likely to have *H. pylori* infection [13]. This could be explained by inclusion of symptomatic children that could be having gastrointestinal lesion following *H. pylori* infection causing these manifestations. Our finding was in contrast to the study by Spee L *et al* that reported no association between recurrent abdominal pain and *H. pylori* infection in children [14].

This study found that majority of the participants had antral gastritis 28/55 (50.9%) and pangastritis 19 (34.5%) this was supported by a study done by Kirdy *et al* which reported that superficial gastritis 46 (43.3%) and nodular gastritis 44 (41.5%) occurred in *H. pylori*-positive patients [10]. Also, Escobar *et al* reported that pangastritis in 18 (43.9%) and antral nodular gastritis in 15 (36.6%) among symptomatic *H. pylori*-positive Cuban patients [15]. This could be accredited to inclusion of symptomatic children. Our study found 4 (7.3%) had normal endoscopic findings. This could be explained by T cell downregulation of inflammation in children as it has been suggested in a previous study [16].

The joint ESPGHAN/NASPGHAN guidelines recommend treatment for *H. pylori* infection in children with gastric or duodenal ulceration or erosions [6]. American College of

Gastroenterology recommend treatment of *H. pylori* infection in those with active PUD, confirmed history of PUD (not previously treated for *H. pylori*), gastric mucosa associated lymphoid tissue lymphoma (low grade) or after endoscopic resection of early gastric cancer [17]. Of the 55 participants who had endoscopy done 50 (90.9%) revealed lesions that warranted treatment. The median age of the *H. pylori* infected children that required treatment was 10 [IQR 7 – 13] years.

5. Limitations of the Study

In our study we did not include infants as it has been suggested before that breastfeeding in infancy lowers the acquisition of *H. pylori* infection in early life.

About five under two years of age children could not undergo oesophagogastroduodenoscopy due to unavailability of appropriate size endoscope.

Only half of *H. pylori* infected children did oesophagogastroduodenoscopy, due to my financial restrictions.

In this study we did endoscopic diagnosis of gastritis instead of biopsy as a gold standard.

6. Conclusion

About a quarter of the enrolled children had *H. pylori* infection. Increase in age and abdominal pain were independently associated with *H. pylori* infection. Most *H. pylori* stool antigen test positive children had endoscopic lesions that warranted treatment.

7. Recommendations

Every symptomatic child with *H. pylori* stool antigen test positive should be treated according to the existing guidelines.

A call upon policy makers to facilitate availability of endoscopy to lower health facilities such as in regional referral hospitals, to exclude complications of *H. pylori* infection.

Follow up study should be done to determine treatment outcome post-eradication therapy.

Abbreviations

AMR: Antimicrobial Resistance

BMC: Bugando Medical Center

CI: Confidence Interval

CUHAS: Catholic University of Health and Allied Sciences

ESPGHAN: European Society of Pediatric Gastroenterology Hepatology and Nutrition

GERD: Gastroesophageal Reflux Disease

HpSA: *Helicobacter pylori* Stool Antigen

LMICs: Low and Middle-Income Countries

NASPGHAN: North American Society of Pediatric Gastroenterology Hepatology and Nutrition

OGD: Oesophagogastroduodenoscopy

OR: Odds Ratio

POPD: Pediatric Outpatient Department

PPI: Proton Pump Inhibitors

PUD: Peptic Ulcer Disease

UBT: Urea Breathe Test

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Authors Contributions

M. M: Conceived, designed, coordinated the study, wrote the manuscript, performed collection of data, laboratory sample collection, data analysis and interpretation. While H. J., N. K., S. M, D. M, T. M, I. N: Reviewed critically and provided major inputs of the proposal, dissertation and manuscript development; D. M, I. N: Performed endoscopy; B. K, S. M, R. R: Involved in data analysis; E. K: Performed laboratory sample processing.

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Ethical Considerations

Ethical clearance for the study with registration number CREC/512/2021 was obtained from the joint CUHAS/BMC research ethics and review committee. Then the permission for conducting study was obtained from BMC relevant authority. Prior participant's recruitment, the purpose of the study was explained to the participants and their parents/guardians. Information sheets were provided in Swahili version to ensure understanding by the participants. Participants and their parents/guardians were explained that anesthetic drug would be administered to provide sedation and anesthesia during endoscopic procedure. Also, participants were advised to fast for 8 hours prior the procedure to avoid

aspiration during procedure. Participants' parents/guardians were required to sign a written informed consents form and children > 7 years gave a verbal assent prior their enrollment. Confidentiality was ensured and important findings were shared with clinicians who attend those with *H. pylori* infection and the endoscopic findings so as to provide appropriate management according to the existing guidelines.

Conflicts of Interest

The authors declare no conflicts of interest.

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