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Original Research Article

Helicobacter pylori seropositivity and its associated factors in children from suburban area in Yangon

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ABSTRACT

Background: *H. pylori* has infected about 50% of the global population. The infection rate in children differs across countries, being lower in high-income nations (34.7%) compared to low- and middle-income countries (50.8%). This study aimed to assess the risk factors associated with the seroprevalence of *H. pylori* infection among individuals aged 2 to 16 in Insein Township, Yangon Division, Myanmar.
Methods: A community-based cross-sectional study was conducted in Insein Township. A total of 193 children, aged 2 to 16 years and of both genders, were randomly selected. An in-house enzyme-linked immunosorbent assay (ELISA) was used to determine serum *H. pylori* IgG antibodies. Statistical analysis was performed using chi-squared tests, and mean scores between groups were compared using two-sample t-tests.
Results: Out of 193 children, 130 (67.36%) were tested positive for *H. pylori* antibodies. The average age of the participants was 7.6±3.85 years. Although *H. pylori* positivity was highest (71.01%) among those with birth order 1 and lowest (56.52%) in those with birth order 4 and above, it was not statistically significant. There was a higher percentage of *H. pylori* seropositivity among children with recurrent abdominal pain (87.77%). The rate of *H. pylori* antibody positivity was higher among those with a family history of peptic ulcer (85.71%).
Conclusions: The infection rate of *H. pylori* remains high among children in developing countries, highlighting the need for comprehensive prevention and treatment programs. Early diagnosis can greatly reduce complications later in adulthood and could have a significant impact on the country's socio-economic status.

Keywords: Family history, Gender preponderance, *Helicobacter pylori*, Nutritional status, Recurrent abdominal pain

INTRODUCTION

Helicobacter pylori (*H. pylori*) is a spiral, flagellated Gram-negative bacterium that uniquely inhabits the human stomach.[1] *H. pylori* has infected about 50% of the global population. The infection rate in children differs across countries, being lower in high-income nations (34.7%) compared to low- and middle-income countries (50.8%). The bacterium is more prevalent in adults than in children and its distribution can differ across regions within the same country.[2] This infection is particularly prevalent in low-income countries and areas lacking proper sanitation facilities. The incidence of infection is greatly influenced by socioeconomic status.[3] It is believed that *H. pylori* infections are predominantly acquired during childhood, with the frequency gradually rising with age after the initial years of life.[4]

The clinical symptoms of *H. pylori* infection are non-specific and may sometimes be explained by complications.[5,6] A significant association with nausea has been noted, but no clear link has been established

between infection and gastrointestinal symptoms, pain, or pain characteristics.[7] Some studies have reported that symptoms can lessen in frequency and severity, or even disappear, with or without bacterial eradication. A meta-analysis aimed to explore the connection between infection and symptoms but found no link to vomiting, diarrhea, flatulence, chronic functional abdominal pain, halitosis, regurgitation, constipation, or nausea, although a significant association with epigastric pain was observed.[8] *H. pylori* is the causative agent of peptic ulcer disease and chronic gastritis. It is also linked to the onset of gastric mucosa-associated lymphoid tissue (MALT) lymphoma and gastric cancer.[9] *H. pylori* is a major infectious contributor to cancer globally, with approximately 80% of adult gastric cancers being linked to this infection.[10]

Research on seroprevalence and identifying potential risk factors linked to *H. pylori* infection is crucial for developing effective health strategies to prevent *H. pylori*-related diseases in the community. The number of research on *H. pylori* infection is escalating globally. However, there remains a shortage of data specifically concerning the study of *H. pylori* infection in children in Myanmar. Thus, this study aimed to assess the risk factors associated with the seroprevalence of *H. pylori* infection among individuals aged 2 to 16 in Insein Township, Yangon Division, Myanmar.

METHODS

A community-based cross-sectional study was conducted in Insein Township in 2008. A total of 193 children, aged 2 to 16 years and of both genders, were randomly selected from a list covering 21 wards in the township. Data were collected using a validated questionnaire by trained interviewers. Written informed consent was obtained from the parents or guardians. The approved questionnaire was employed, and trained interviewers gathered the data. Information regarding demographic characteristics such as age, gender, place of residence, number of family members, number of siblings were collected. We also took history of recurrent abdominal pain and family history of duodenal ulcer in each subject.

Recurrent abdominal pain (RAP) is defined as abdominal pain on three or more occasions over a period exceeding three months, and the pain is sufficiently intense to disrupt regular activities.[11]

The weight and height measurements were also carried out and nutritional status classification was done according to WHO z scores tables.

Under strict aseptic measures, two milliliters (mls) of blood were collected and transferred to the laboratory on the day of collection to be processed and stored at 2-8°C. An in-house enzyme-linked immunosorbent assay (ELISA), developed by Miyoshi et al, was used to determine serum *H. pylori* IgG antibodies. Both the sensitivity and specificity of the test were 90%. The test was carried out at the Experimental Medicine Unit of the Department of Medical Research located in Yangon.

The data analysis included various tabulations and cross-correlations. Statistical analysis was performed using chi-squared tests, and mean scores between groups were compared using two-sample t-tests. The significant level was set at p values below 0.05.

The study received approval from the Master's Degree Protocol Board at the University of Medicine 2, Myanmar, in 2005-2006 academic year. Consent for the children's participation was obtained from their caregivers.

RESULTS

The study involved 193 children, whose ages ranged from 2 to 16 years. Among them, 130 of them (67.36%) were tested positive for *H. pylori* antibodies. The average age of the participants was 7.6±3.85 years. The mean age of boys was 7.584±3.735 years, whilst that of girls was 7.618±3.971 years. Among children who tested positive for *H. pylori*, the average age was 8.18±3.8 years, whereas for those who tested negative, it was 6.41±3.7 years (p=<0.05). It is worth nothing that those children positive for *H. pylori* infection were significantly older than those negative for *H. pylori* infection (Table 1).

In the examined group, there were 92 males and 101 females. It was observed that 64 out of 92 males (69.57%) and 66 out of 101 females (65.35%) tested positive for *H. pylori* antibodies. However, no significant distinction was observed between males and females (p = 0.532). These results suggest that *H. pylori* infection can affect both sexes equally, without any sex predilection (Table 1).

In the studied group, there were 167 children between median and -1 SD and 26 children between -2 and -3 SD. Among them, 111 children in the group between median and -1 SD (66.47%) and 19 children in the group between -2 and -3 SD were found *H. pylori* antibody positive. Although there is no statistical difference, it was found that prevalence of *H. pylori* infection was higher in malnourished children (73.08%) than the well-nourished ones (66.47%) (Table 1).

69 children in birth order 1, 65 children in birth order 2, 36 children in birth order 3, 23 children in birth order 4 and above, were studied. Among them, 49 (71.01%), 45 (69.23%), 23 (63.89%), 13 (56.52%) in birth order 1, 2, 3 and 4 and above respectively, were found to be *H. pylori* antibody positive. The mean birth order of *H. pylori* positive children was 2.03±1.06 and that of negative ones 2.29±1.24 (p-0.163). Although there was no significance statistically (p-0.583), it is worth to note that *H. pylori* positivity was highest among those with birth order 1 (71.01%) and lowest in those of birth order 4 and above (56.52%) (Table 2 and Figure 3).

Table 1: Characteristics of the studied participants (n=193).

Variables	*H. pylori* antibodies		P values	Odd ratio (95% confidence interval)
	Positive, n=130 (%)	Negative, n=63 (%)		
Age (years)				
Age (mean±SD)	8.18±3.8	6.41±3.7 years	0.0025	
Birth order (mean±SD)	2.03±1.06	2.29±1.24	0.163	
Sex				
Male	64 (63.57)	28 (36.43)	0.5327	1.212 (0.66 to 2.21)
Female	66 (65.35)	35 (34.65)		
BMI for age z score				
Thin	111 (66.47)	56 (33.53)	0.5050	0.73 (0.28 to 1.84)
Not thin	19 (73.08)	7 (26.92)		
Recurrent abdominal pain				
Yes	21 (87.77)	6 (22.23)	0.2182	1.83 (0.69 to 4.79)
No	109 (65.66)	57 (34.34)		
Family history of PU				
Yes	12 (85.7)	2 (14.3)	0.1467	3.1 (0.67 to 14.30)
No	118 (65.92)	61 (34.08)		

Table 2: Distribution of *H. pylori* infection according to the birth order.

Birth order	*H. pylori* antibodies		Chi-square	P value
	Positive	Negative		
1st	49 (71.01)	20 (28.99)	1.948	0.58313
2nd	45 (69.23)	20 (30.77)		
3rd	23 (63.89)	12 (36.11)		
4th and above	13 (56.52)	10 (43.48)		

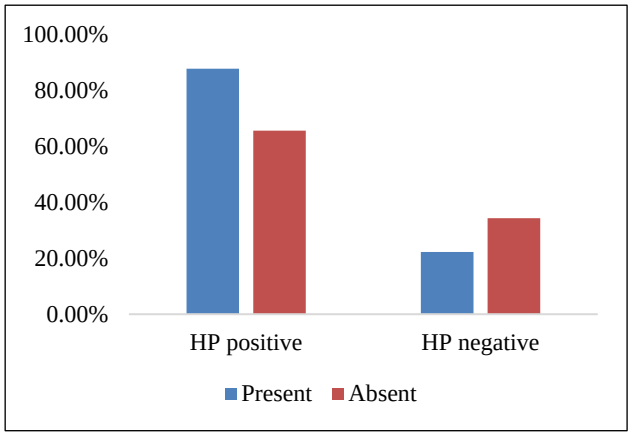

Figure 1: Association of *H. pylori* infection and recurrent abdominal pain in children.

Among the 193 children, 27 reported experiencing recurrent abdominal pain (RAP), while 166 did not. In the group experiencing recurrent abdominal pain, 21 participants (87.77%) tested positive for *H. pylori* antibodies, while in the other group, 109 (65.66%) were found to be *H. pylori* positive. While the result lacks statistical significance, it is worth mentioning that there was a higher percentage of *H. pylori* seropositivity among children with recurrent abdominal pain (Figure 1).

Out of the 193 children, 14 had a family history of peptic ulcer, while the remaining 179 did not. Among those with a family history of peptic ulcer, *H. pylori* antibodies were detected in 12 children (85.71%), whereas in the other group, 118 children (65.92%) tested positive for *H. pylori*. It is evident that the rate of *H. pylori* antibody positivity was higher (85.71%) among those with a family history of peptic ulcer (Figure 2).

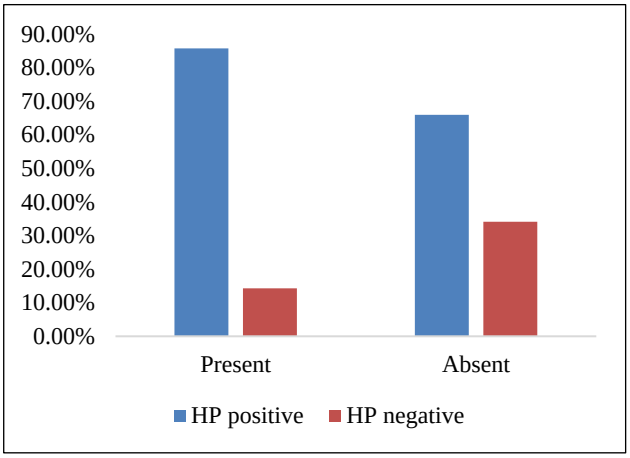

Figure 2: Association of *H. pylori* infection and family history of peptic ulcer (PU) in children.

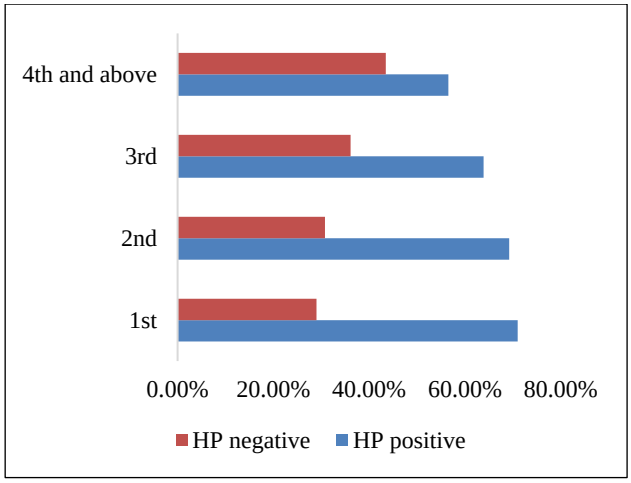

Figure 3: Distribution of *H. pylori* infection according to birth order.

DISCUSSION

Myanmar faces a significant burden of *H. pylori* in the Southeast Asian region, with infection rates of 67.7% in asymptomatic adults and 48.0% in patients with dyspepsia.[12,13] Over the past two decades, an increase in *H. pylori* infections has been observed among children in Myanmar, with various diagnostic methods used across studies. In 2015, the prevalence of *H. pylori* based on fecal tests among asymptomatic school children at a high school in Mandalay, Upper Myanmar, was found to be 17.8%.[14] The prevalence rate (64.36%) observed in our study was not different from the study in adults (67.7%).[12]

Globally, there are a wide range differences in the prevalence rate in various regions. Compared to the findings in Asia, our finding was similar to that documented in Yemen (65%), Nepal (75%) and Bangladesh (84%) but different from that observed in China (18.6%), Korea (12.5%-28.9%) and Japan (18.8%).[15-20] The difference might be related to the diagnostic methods, socioeconomic and sanitation status of the studied population.

This study found no gender predominance in *H. pylori* infection, accounting 63.57% in males, while 65% in females. Similarly, Wangda et al study in Bhutan and Aitila et al study in South West Uganda did not reveal significant differences in the prevalence of *H. pylori* infection between boys and girls.[21,22] Contrariwise, another report from Uganda and Sudan stated that boys are more likely to be infected with *H. pylori* compared to girls.[23,24] Whereas, the discoveries in Yemen, Nepal and China revealed that girls were more frequently infected than boys.[15,25-27] The relationship between *H. pylori* infection and gender remains a subject of debate.

The prevalence of *H. pylori* infection decreased with birth order. Among the firstborn children, the prevalence was 71%, 69% for the second child, declining to 63% for the third child, followed by a decrease to 56% for the fourth and younger ones, although this trend was not statistically significant (p value=0.583). The study conducted in Nigeria also reported comparable finding.[28]

The current study found no correlation between *H. pylori* infection and BMI. However, a recent meta-analysis indicated that *H. pylori* infection negatively affected growth outcomes in children, particularly height-for-age Z (HAZ) scores.[29] In Eastern Sudan, where the prevalence of *H. pylori* infection was high (21.8%), the majority of children (84%) had BMI scores below the normal range.[23] In the present study, although the difference was not statistically significant, the prevalence of *H. pylori* infection was found to be higher in malnourished children compared to those who were well-nourished.

The present study did not reveal the association between *H. pylori* infection and recurrent abdominal pain. Likewise, a Romanian study demonstrated similar finding.[30] However, it pointed out the positive association between *H. pylori* infection and epigastric pain. The present study did not include the history of epigastric pain. A study carried out in Europe by Kori et al reported that the most common presentations of children came for endoscopy were dyspepsia and abdominal pain.[31] Similarly, an African study also demonstrated significant association between *H. pylori* infection and abdominal pain.[23]

Although it is not statistically significant, the seropositivity of children with family history of peptic ulcer disease was significantly higher (85.71%) than their counterparts (65.92%). A Romanian study also found no significant statistical association between *H. pylori* infection and a family history of upper digestive disorders.[30]

The main limitations of this study include the small number of participants from a single geographical region-Insein Township in Yangon Division. So, it cannot represent the Myanmar children from various parts of the country.

CONCLUSION

Pediatric *H. pylori* infection has distinct epidemiology, clinical characteristics, associated conditions, and approaches to diagnosis and treatment. In Myanmar, specific risk factors for pediatric *H. pylori* infection include inadequate sanitation in schools and homes, as well as overcrowded living conditions. The infection rate of *H. pylori* remains high among children, highlighting the need for comprehensive prevention and treatment programs. Early diagnosis can greatly reduce complications later in adulthood and could have a significant impact on the country's socio-economic status. Future research should be carried out at the various regions of the nation and concentrate on the influence of

lifestyle and environmental factors in children and their families that may contribute to the prevalence of *H. pylori* infection.

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