

Haematological Correlates of *Helicobacter pylori* Infection Amongst Children Receiving Care in a Private Setting in Port Harcourt, Rivers State.

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ABSTRACT

Helicobacter pylori is a spiral shaped, gram-negative bacterium that basically colonizes the digestive tract of humans. It is an established cause of anaemia, leucopenia and thrombocytopenia and affects 70-95% of children in developing countries. We carried out a retrospective study of 140 children, presenting with abdominal discomfort and/or vomiting in a private hospital in Port Harcourt, South-South, Nigeria. Positive serology for *H.pylori* was established using IgG test kit and Full blood counts were done with an autoanalyzer. Sixty four (45.7%) of the children studied were serologically positive for *H.pylori* infection, while 54.3%(76) were negative. *H.pylori* was detected in virtually all age groups of children studied. Ten (15.6%) of the children with *H.pylori* positive serology had anaemia, 3.1%(2) had leucopenia and 12.5%(8) had leucocytosis. None of these was statistically significant. The overall seroprevalence of *H.pylori* in the children studied was high. Similarly, there was a high prevalence of haematologic derangements in the children with positive *H.pylori* assay compared to those children with negative serology for *H.pylori*. This was however not statistically significant. Routine screening of children with symptoms of abdominal discomfort for *H.pylori* and commencement of treatment for those with positive serology results is not recommended without confirmatory test.

Keywords: Anaemia, Leucopenia, Haematologic, *H.pylori*, Leucocytosis

INTRODUCTION

Helicobacter Pylori is a spiral shaped, gram negative highly motile bacterium¹. It was first identified in 1982 and named *Campylobacter pylori*.¹ However, the nomenclature was changed to *Helicobacter pylori* in 1989. It colonizes the stomach of children and adolescents, producing urease and lipopolysaccharides, both of which have been found to enhance survival of the organism despite the acidic environment of the stomach². Basically, *H.pylori* is acquired after birth, Transmission

from person to person can be through breastfeeding, oral-to-oral, and oral-faecal transmission³. Poor hygienic practices as well as overcrowding has been found to increase the risk of transmission⁴. Other risks of transmission include low socio-economic status, older age and proximity with pets^{5,6}.

H.pylori colonizes the gastrointestinal mucosa and can cause diarrhea, malabsorption, gastritis, peptic ulcer and in older people gastric carcinoma⁷⁻¹⁰.

The finding of *H.pylori* in salivary secretions, dental plaques, tonsils, oesophagus and treated drinking water is a clear indication that there is a possibility of human-to-human transmission occurring either through the oral-oral or the faeco-oral route¹¹. The prevalence of *H.pylori* infection globally is above 50%, with a higher prevalence in developing nations. (70-90% in, developing countries; 30-40% in developed countries)¹².

Although *H.pylori* is an established cause of gastritis and iron deficiency anaemia, its involvement in the haematological system is rather unclear¹³. *H.pylori* has however been associated with the development of iron deficiency anaemia, Vit B12 deficiency, immune mediated thrombocytopenia and neutropenia¹⁴. The aim of this study is to determine the prevalence of *H.pylori* infection amongst children presenting with abdominal pain and vomiting, as well as to determine the possible association between some haematologic parameters and *H.pylori* in these children.

MATERIALS AND METHODS

This was a retrospective study of patients aged between 1yr to 18yrs presenting with vomiting and or symptoms of abdominal discomfort to a private facility (St.Martins Hospital) in Port-Harcourt, South-South Nigeria. The hospital is a forty bedded hospital that offers care to basically pregnant women and children. It also renders specialist care to other category of patients. Port-Harcourt has an average estimated population of 1,865,000.¹⁵ Majority of the inhabitants are civil servants, while others are entrepreneurs.

Data from patients who were seen between October 2020 and April 2021 on account of recurrent abdominal pain/Suspicion of abdominal discomfort and/or vomiting, for which the clinician had requested *H.pylori* assay were taken and analysed. *H.pylori* assay was done using *H.pylori* rapid test kits, specifically prepared for point of care facilities, while FBC was done using an automated analyser¹⁶. Statistical analysis was performed using Statistical Package for Social Sciences version 20 (SPSS 20).

All data required (Age, sex, weight, Height, FBC and *H.pylori* seropositivity) were arranged into tables and analysed. WBC count of less than 4000 cells/mm³ was taken as leucopenia, while that greater than 11,000/mm³ was taken as leukocytosis. PCV values of less than 18%, 24% and 30% were taken as severe, moderate and mild anaemia respectively¹⁷.

The prevalence of *H.pylori* infection was determined and the statistical significance of the adjusted seropositive rates among comparison groups was also tested. P-value of less than 0.05 was set at level of significance.

RESULTS

One hundred and forty children with a mean age of 10.5 years (SD: ± 4.9), mean weight of 44kg (SD: ± 21), comprising 73 (54.3%) males with a F:M ratio of 1:1.04 had their serum samples tested for IgG antibody reaction to *H.pylori*. Sixty-four children (45.7%) were serologically positive for *H.pylori* IgG antibodies while seventy-six (54.3%) were negative. Overall, the mean packed cell volume/ haemoglobin concentration and total white blood cell count among the children included in this study were 35.6% (SD: ± 5.7) or (11.9g/dl; SD: ± 1.9) and 6.8×10^9 (SD: 2.75) respectively.

H.pylori seropositivity was detected in virtually all paediatric age categories presenting to this facility with gastrointestinal symptoms of recurring abdominal pain, discomfort or vomiting, with an increased proportion noted to be observed among early adolescent age group (figure1).

The *H.pylori* seropositive prevalence was 45.7%. The seroprevalence of *H.pylori* did not vary by age or sex distribution among the study population. The highest proportion of children that tested positive to *H.pylori* IgG test were among the 12 – 17 years age group when compared to their seronegative counterparts. The least however was among the < 1 -4 years age group.

There was no statistically significant mean difference in the mean total white blood cell counts and haemoglobin levels between the *H.pylori* positive children and the *H.pylori* negative counterparts (Table2).

Overall, there was no statistically significant difference in the total WBC count subgroups (leucopenia or leucocytosis) studied among children who were serologically positive for *H. pylori* IgG antibodies when compared to their serologically negative counterparts. However, female children who were *H. pylori* seropositive were more likely than their female

seronegative counterparts to have anaemia. Although, there was no significant difference in anaemia with regards to sex categories, there was an increasing trend towards worsening degrees of anaemia among children who were *H. pylori* seropositive when compared to their seronegative counterparts. This, albeit, was not statistically significant. (Table3)

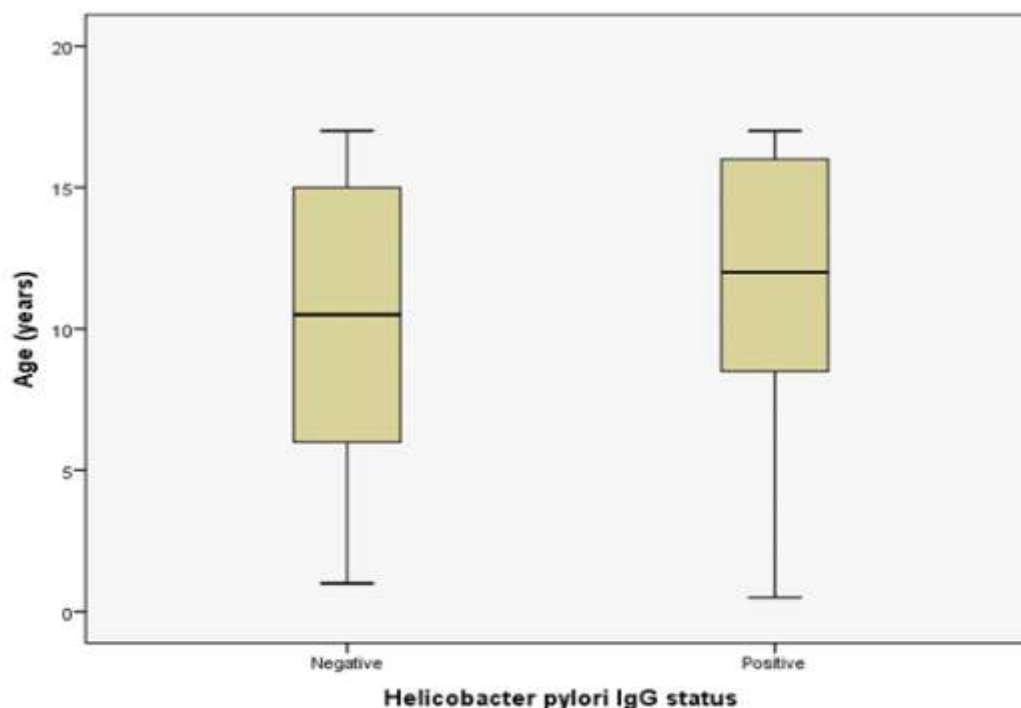


Figure 1: *H. pylori* status and age distribution of children

Table 1: Comparison of *H. pylori* status of children with age and sex distribution of children

	<i>H. Pylori</i>		χ^2	<i>p</i> - value
	Negative	Positive		
Male	37 (38.4)	34 (32.5)	0.274	0.601
Female	39 (37.5)	30 (31.5)		
<1 -4 years	16 (13.0)	8 (11.0)	2.160	0.340
5 – 11 years	28 (27.7)	23 (23.3)		
12 – 17 years	32 (35.3)	33 (29.7)		

* Statistically significant

Table 2: Comparison of Mean difference of haematologic parameters among *H. pylori* status of children

	<i>H. pylori</i> status		T	<i>p</i> -value
	Negative	Positive		
WBC	6.92±3.04	6.83±2.38	-0.197	0.844
Haemoglobin(g/l)	11.93±1.59	11.79±2.22	0.439	0.662

Table 3: Subgroup analyses of haematologic parameters and *H. pylori* status of children

	<i>H. Pylori</i>		χ ²	<i>p</i> -value
	Negative	Positive		
WBC				
Leucopenia	3 (2.7)	2 (2.3)	0.184 [?]	1.000
Leucocytosis	10 (9.8)	8 (8.2)		
Normal	63 (63.5)	54 (53.5)		
Haemoglobin levels				
Anaemia present	5 (8.1)	10 (6.9)	2.972	0.104
Anaemia absent	71 (67.9)	54 (57.1)		
Anaemia by Gender				
Males				
Anaemia present	3 (3.1)	3 (2.9)	0.012 [?]	0.914
Anaemia absent	34(33.9)	31(31.1)		
Females				
Anaemia present	2 (5.1)	7 (3.9)	4.955 [?]	0.035*
Anaemia absent	37(33.9)	23(26.1)		
Severity of Anaemia				
Severe Anaemia	1 (1.1)	1 (0.9)	4.565 [?]	0.177
Moderate Anaemia	0 (1.6)	3 (1.4)		
Mild Anaemia	4 (5.4)	6 (4.6)		
Normal	71 (67.9)	54 (57.1)		

[?]Fischer's exact * statistically significant P< 0.05

DISCUSSION

The true prevalence of *H. pylori* remains unknown, as it varies from country to country and also within the same country. The prevalence of *H. pylori* seropositivity in our study was 45.7%. Our finding is similar to the prevalence of 40% reported among children aged 6 – 15 years in Saudi Arabia by Al-Hussani *et al*¹⁸ who also used IgG serology test. It was however, higher than the 24.3% seropositivity reported by Aitila *et al*¹⁹ among 304 symptomatic children in Uganda and the 21.8% reported

by Abbas *et al*²⁰ among 431 children within ages 6 to 18 years in East Sudan. Also, the prevalence in this study, was higher than the reported 30.0% by Etukudo *et al*²¹ in Uyo; 36.3% by Daniyan *et al*²² in Abakiliki but lower than the 63.6% reported by Senbanjo *et al*²³ and 72.3% by Remi *et al*²⁴, in Lagos, Nigeria. Reports presented in this study, together with reports from other authors suggests a considerable variation in prevalence of *H. pylori* infections worldwide probably due to diagnostic differences.

In this study we found a high prevalence of *H.pylori* infections in children between ages of 12 to 17 years, and was comparable to the reports by Ozbey *et al.*,²⁵ that found that 75.8% of Turkish children aged 13 – 18 years were infected with *H. pylori*. It however, contrasted findings from a study by Daniyan *et al.*²² in Abakiliki, South East, Nigeria, which reported that children within the 6 – 12 years age group had the highest *H. pylori* seropositivity status. While the reason is not readily explainable from this study, some authors have suggested likely reasons for the variations in prevalence and age categories most affected by *H. pylori* infection to be due to differences in age, location, health and living conditions of the population of children being studied, as well as, low socioeconomic status, poor sanitary conditions, lack of formal education among others^{26,27}. The cohort of children in this study, however, were all from the middle and upper socioeconomic class and had parents who were enrolled in various company or privately affiliated health insurance schemes in Port Harcourt Metropolis.

In this study it was observed that the prevalence of *H. pylori* seropositivity increased with age, irrespective of age and sex and was apparently more prevalent among the early adolescent group. This has been similarly reported by other authors in Nigeria², Iran²⁹ and Uganda¹⁹ but nevertheless unnoticed in a study among children in East Sudan²⁰. Our findings simply exclude gender as a likely element for *H. pylori* infection in children and seems to agree with other authors who also reported that gender may not play a role in *H. pylori* infection acquisition in children^{22,29,30}.

The overall prevalence of anaemia in this study was 10% with a prevalence of 15.6 % in the *H.pylori* positive group and 6.6% in their *H. pylori* negative counterparts which was not statistically significant. Interestingly, it was observed that females with *H. pylori* infection were significantly more likely to have anaemia than their female *H. pylori* negative counterparts. Our findings were comparable to reports from Ruiz-Alvarez *et al.*³¹, which assessed the association between *H. Pylori* infection and anaemia among 269 children in Havana city that showed that despite having higher prevalence of

anaemia (20%), the *H.pylori* infection showed no association with the haemoglobin levels in all the children, yet, a significant association between iron-deficiency anaemia and *H. pylori* infection was found in girls but not in boys. Similarly, in a study by Wewer *et al.*³², which assessed the IgG seroprevalence of *H. pylori* among 438 Danish children with recurrent abdominal pain, with 91 healthy children control revealed no significant differences among the two groups according to the levels of haemoglobin. Conversely, the findings by Gilbert *et al.*³³ among a cohort of 105 Kenyan children (35 cases and 70 controls), aged 5 – 15years, which demonstrated that the mean haemoglobin level among the *H. pylori* seropositive cases was significantly lower than their controls, contrasted ours. The authors attributed their findings to the duo-effect of rapid growth and *H. pylori* infection which may have resulted in disturbances in iron metabolism and absorption causing iron deficiency. The haemoglobin levels in our study showed no association with *H.pylori* seropositivity in the children in this study when severity of anaemia was considered. Albeit, there was a slight trend towards more severe anemia occurring in children who had a positive *H. pylori* IgG test.

Likewise, in this current study, no significant difference was found between the levels of total white blood cell count between children who were *H. pylori* seropositive and their seronegative counterparts. There was no statistically significant difference between children with *H. pylori* positivity and negativity in regards to presence of leucocytosis or leucopaenia. Other authors^{32,34} had reported similar findings among children with no significant difference being observed while using surrogate markers of systemic inflammation like leucocytes, neutrophil/lymphocyte ratios or platelets. Authors therefore inferred that these parameters were unhelpful in the distinction between children with or without *H. pylori* infection, severity or pre/post treatment status.

The study is limited by its retrospective design and the fact that confirmatory tests according to the latest European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) guidelines were

not done and all the parameters of the Full blood count were not analyzed. This study nevertheless further adds to the scarcely existing literature in resource limited settings like ours where the recommended urea breath test or stool antigen analysis are not readily available; that, the relationship between recurrent abdominal pains in children, *H. pylori* seropositivity and haematologic parameters, is controversial as evidence is insufficient to support its utilization in clinical practice as 'stand-alone' to commence treatment with the recommended triple regimen for *H. pylori* infection. Also, the presence of elevated total white blood cell counts in children with abdominal pains does not necessarily imply child would have a positive IgG *H. pylori* test. Lastly, the high IgG seroprevalence of *H. pylori* in this study population does not actually depict active infection warranting treatment as confirmatory tests using urea breath test or stool antigen test were not done.

CONCLUSION

This study showed a high seroprevalence of *H. pylori* infection amongst children presenting with abdominal discomfort and vomiting. Furthermore, the prevalence of anaemia, and WBC derangement in the children with *H. pylori* infection was also high, although this was not statistically significant.

Recommendations

In light of the high prevalence of *H. pylori* infection amongst children with abdominal discomfort, all children presenting with symptoms of abdominal discomfort should be evaluated for *H. pylori* and treated if serology is positive.

Conflict of interest

None

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