



**ORIGINAL ARTICLE**

## Frequency of H.Pylori Infection With Correlation To Anthropometric Measures In Children Aged(2-12) years In Zagazig University Hospital

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**ABSTRACT**

**Background:** H. pylori infection is the most common microbial infection in the world. It has a long history of a relationship with individuals, so the accurate and early diagnosis of H. pylori infection is a relevant problem. H. pylori stool antigen test is a reliable, very good, and reasonably priced screening test for H. pylori infection, both before and after eradication that could identify foreign proteins (antigens) in stool samples that are related with H. pylori infection. Therefore, this test has been proposed for the diagnosis of infection. **Objective:** This study aimed to evaluate the frequency of H. pylori infection and its correlation to anthropometric measures in children aged (2-12) years in pediatric outpatient clinic in Zagazig University Hospital. **Methods:** This cross sectional study comprised 67 children their ages were from two to twelve years. H. pylori stool antigen test was done for all children recruited in this study, by a microplate-based ELISA assay. **Results:** Among studied group, a total of 36 children (53.7%) had positive H. pylori stool antigen test who suffered from gastro intestinal symptoms especially recurrent abdominal pain. There was no statistically significant difference between H. pylori +ve & H. pylori -ve infected children as regarding all the anthropometric measures. H. pylori infection was correlated with abdominal distension. **Conclusion:** frequency of H. pylori infection in children still high and a prevalent condition. We need further studies in this subject. H. pylori infection did not affect growth.

**Keywords:** H. pylori ; diagnosis; Growth.

### INTRODUCTION

The infection of Helicobacter pylori (H.pylori) in children is common throughout the world and more than fifty percent of the population around the world is infected. The prevalence shows a great variability among different countries [1].

The frequency of the infection varies among populations, extends from below 15% to more than 85% of the population [2].

The prevalence of the infection all over the schoolchildren in Egypt is 72.38% [3].

The infection of H. pylori occurs early in children and persists forever [4,5].

The infection of children with H. pylori leads to chronic gastritis, gastric ulcer, duodenal ulcer, gastric adenocarcinoma and

gastric mucosa-associated lymphoid tissue (MALT) lymphoma [6].

Moreover, it causes extra gastro duodenal manifestations such as hematological, metabolic, cardiovascular, neurodegenerative and allergic disorders [7].

H. pylori infection is related with iron deficiency anemia, although the degree of anaemia in the absence of peptic ulcer is usually modest [8,9].

The diagnosis of H. pylori infection can be by invasive methods like endoscopy of the upper gastrointestinal tract and tissue staining using gastric tissues gained by the endoscope. It may be diagnosed by non-invasive methods that include rapid urease test, culture for H. pylori, urea breath

test(UBT) and H. pylori stool antigen test (HPSAT) [10].

Though the children acquire the infection during childhood, it is not obvious whether it affects the health of the children [4].

The infection of H. pylori which gained in early childhood may have adverse impact on linear growth at school age later [11].

So, the available data regarding H. pylori infection and its impact on growth in children remains controversial. Acute and chronic infections may impede linear growth by affecting the absorption of micronutrient, appetite, metabolism, and associated factors [12].

Although the growth of human is also influenced by factors such as diet, socioeconomic status, other infections, and genetics [13].

Hence, the estimation of the effect of the infection with H. pylori on growth precisely is difficult owing to the number of potential confounders, many of which are insufficiently controlled in studies. There have been a lot of cross-sectional studies [14]. that point to either the presence of significant association between H. pylori and decreased height, weight, or growth or not. These studies all are restricted by the inability to establish temporal precedence [15].

Fecal antigen testing stays a reliable, very good, and reasonably priced screening test for H. pylori infection, both before and after eradication [16]. This laboratory test can identify foreign proteins (antigens) in stool samples that are related with H. pylori infection. Stool samples have high specificity and sensitivity, similar to the UBT, and they can likewise evaluate infection status after treatment. In any case, stool samples need patient compliance, are difficult to handle, and results are not promptly known [17].

Similarly, its sensitivity and specificity rely upon types of commercial test used, cut-off value, treatment status, and the interpretation of weakly positive results.

The European Society of Pediatric Gastroenterology and Nutrition (ESPGHAN) and The North American Society for Pediatric Gastroenterology and Nutrition

(NASPGHAN) guidelines show that approved Enzyme linked immunosorbent assay(ELISA) for H. pylori identification in stool can reliably decide whether H. pylori has been eradicated in children [10].

The aim of this study was to evaluate the frequency of H. pylori infection and its correlation to anthropometric measures in children.

## SUBJECTS AND METHODS

**Study Design and Population:** This cross sectional study was conducted at the pediatric outpatient clinic in Zagazig University Hospital during the period from Mai 2018 to November2019. A total sample of 67 children with gastro intestinal tract (GIT) symptoms was included in the present study. After detailed history, clinical examination, investigations and examination of stool samples collected from all children .we divided these children according to the presence or absence of H.pylori in their stools into two main groups :H.pylori positive(+ve) & H.pylori negative(-ve) children.

Written informed consent was obtained from all participants` parents and the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University. The work has been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for students involving humans .

### Subjects included in study:

Children aged from two to twelve years and Children suffering from GIT symptoms (recurrent abdominal pain, nausea, vomiting, and no weight gain).

### Exclusion criteria:

Children age below 2 years old and more than 12 years old, Children with recent history of taking anti H. pylori treatment and Children suffering from recurrent abdominal pain due to appendicitis.

**All children enrolled in this study were subjected to full medical history taking including family history, clinical examination including general examination including (pulse, temperature, blood pressure, respiratory rate) , anthropometric measures including (weight, Length, Head circumference, Chest circumference, abdominal circumference, Mid-arm**

circumference, Upper segment). We used weight for age and length for age UK growth charts (218) years RCPCH (Royal college paediatrics and child health) in girls.

We used stature for age and weight for age percentiles in boys (2- 20) years developed by the national centre for health statistics in collaboration with the national centre for chronic disease prevention and health promotion. We also use WHO head circumference for age percentiles in boys and girls. We also use WHO arm circumference for age percentiles in boys and girls. We also use WHO chest circumference for age percentiles in boys and girls. We also use abdominal (waist) circumference for age percentiles Baby and kids size chart UK. We also use WHO upper segment for age percentiles in boys and girls. And complete clinical examination to detect any associated clinical signs.

The laboratory investigations which were done to all children were Complete blood count, C-reactive protein (CRP), liver function tests, Kidney function tests, Stool analysis and H. pylori antigen in stool.

#### Laboratory Procedures:

Complete blood counts were done by cell counter. The CRP was measured using CRP Quantikine ELISA kits (R&D, Minneapolis, MN, USA) and H. Pylori antigen in stool was measured for all cases included in this study by a micro plate-based ELISA assay (Epitope Diagnostics, Inc. (EDI) Fecal Helicobacter pylori Antigen ELISA kit).

#### 3- Statistical analysis:

Data were checked, entered and analyzed by using (SPSS version 22) (Statistical Package for the Social Sciences). Data were expressed as mean, standard deviation (SD) for quantitative variables, number and percentage for qualitative variables. Chi-squared test and student t test were used when appropriate  $P < 0.05$  was considered statistically significant.

#### RESULTS

The present work was conducted on 67 children their ages were from two to twelve years of which 32 males and 35 females.

The prevalence of H. pylori infection among the studied children who suffered from abdominal pain which is (53.7%). Table (1)

There was a statistically significant difference ( $p=0.04$ ) between H. pylori +ve & H. pylori -ve infected children as regarding Family history with a higher percentage of +ve family history in H. pylori -ve infected children (63.6%). Also, There was no statistically significant difference between H. pylori +ve & H. pylori -ve infected children as regarding age, sex, socio economic status. Table (2)

The percentages of distribution of different symptoms among the studied children suffering from abdominal pain and loss of appetite had the highest percentage (100%) followed by those suffering from no increase of weight (62.7%). Table (3)

There was a statistically significant difference ( $p=0.04$ ) between H. pylori +ve & H. pylori -ve infected children as regarding Abdominal distension with a higher percentage in H. pylori +ve infected children (81.8%).

There was a statistically significant difference ( $p=0.016$ ) between H. pylori +ve & H. pylori -ve infected children as regarding diarrhea with a higher percentage of diarrhea in H. pylori -ve infected children (88.9%).

There was no statistically significant difference between H. pylori +ve & H. pylori -ve infected children as regarding Abdominal pain, Vomiting, Fever, No increase of weight, Loss of weight and decrease appetite. Table (4)

There was no statistically significant difference between H. pylori +ve & H. pylori -ve infected children as regarding all the anthropometric measures. Table (5)

There was no statistically significant difference between H. pylori +ve & H. pylori -ve infected children as regarding laboratory investigations (Red blood cells (RBCS), White blood cells (WBCS), Hemoglobin (HB), Platelets (PLT). Table (6)

The percentages of distribution of stool examination among the studied children suffering from Entamoeba Histolytica cyst alone had the highest percentage (70.1%) followed by those suffering from Entamoeba Histolytica & giardia cysts (23.9%) and normal (6%). (table 7)

**Table (1): H. pylori antigen in stool .**

H. pylori	No	%
-ve	31	46.3
+ve	36	53.7

**Table (2) : Relationship between H. pylori infection and demographic data of the studied children.**

Variables	H. pylori				X <sup>2</sup>	P
	-ve		+ve			
	No	%	No	%		
<b>Age (years)</b>						
<8	21	51.2	20	48.8	1.04	0.3NS
8	10	38.5	16	61.5		
<b>sex</b>						
Male	12	37.5	20	62.5	1.89	0.16NS
Female	19	54.3	16	45.7		
<b>Family history</b>						
-ve	17	37.8	28	62.2	39.97	0.04*
+ve	14	63.6	8	36.4		
<b>Socioeconomic status</b>						
Low	9	47.4	10	52.6	0.01	0.09NS
Moderate	22	45.8	26	54.2		

\*p value < 0.05 means statistical significant difference.(\*) means significant as P value < 0 .05.

X<sup>2</sup> : Chi-square test.

NS: means non -significant as p value> 0.05

**Table (3): History and clinical presentations of the studied children.**

Variables	No	%
<b>Clinical data:</b>		
Abdominal pain	67	100.0
Decrease appetite	67	100.0
No increase of weight	42	62.7
Loss of weight	25	37.3
Vomiting	18	26.9
Abdominal distention	11	16.4
Diarrhea	9	13.4
Fever	0	0.0

**Table (4): Relationship between H. pylori infection and clinical symptoms of the studied children .**

	H. pylori				X <sup>2</sup>	P	OR (95% CI)
	-ve		+ve				
	No	%	No	%			
<b>Abdominal pain</b>							
Yes	31	46.3	36	53.7	0.0	1.0NS	
<b>Abdominal distension</b>							
No	29	51.8	27	48.2	4.18	0.04*	4.83
Yes	2	18.2	9	81.8			
<b>Vomiting</b>							
No	24	49.0	25	51.0	0.54	0.46NS	1.5 (0.44-5.3)
Yes	7	38.9	11	61.1			
<b>Diarrhea</b>							
No	23	39.7	23	60.3	5.75	0.016*	
Yes	8	88.9	1	11.1			
<b>Fever</b>							
No	31	46.3	36	53.7	0.0	1.0NS	
Yes	0						
<b>Weight</b>							
No increase	20	47.6	22	52.4	0.08	0.77NS	1.16 (0.38-3.56)
Loss of weight	11	44	14	56			
Loss of appetite	31	46.3	36	53.7	0.0	1.0NS	

\*p value < 0.05 means statistical significant difference.

(\*) means significant as p value < 0.05

X<sup>2</sup> : Chi-square test.

NS : means non -significant as p value > 0.05

**Table (5 ): Relationship between H.pylori infection and anthropometric measures among the studied children.**

Variables	H. pylori		t	P
	-ve	+ve		
<b>Weight,Kg</b>				
XSD	25.28.8	24.910.7	0.12	0.89NS
Range	14-45	10-50		
<b>Length,Cm</b>				
XSD	120.712.7	118.318.8	0.6	0.54 NS
Range	94-141	83-156		
<b>Head circumference,Cm</b>				
XSD	511.5	51.13	0.09	0.92NS
Range	48-53	45-55		
<b>Chest circumference,Cm</b>				
XSD	62.38.9	628.5	0.12	0.9NS
Range	52-82	49-82		
<b>Abdominal circumference,Cm</b>				
XSD	60.36.8	60.78.1	0.22	0.82NS

Range	53-75	48-77		
<b>Mid-arm circumference, Cm</b>				
XSD	19.22.5	19.46.2	0.18	0.85NS
Range	15-24	13-52		
<b>Upper segment, Cm</b>				
XSD	55.16.4	5.36.4	1.3	0.18NS
Range	41-64	42-63		

NS: means non- significant as p value > 0.05

t : student t test .

\*p value < 0.05 means statistical significant difference.

**Table (6): Relationship between H.pylori infection and laboratory investigations among the studied children:**

Variables	-ve	+ve	t	P
WBCs	7.62.4	8.02.7	0.6	0.5 NS
RBCs	4.70.3	4.6.3	0.4	0.68 NS
Hb	12.50.7	12.40.7	0.34	0.72 NS
PLT	325.249.6	313.966.8	0.7	0.4 NS

NS: means non -significant as p value > 0.05.

t : student t test .

\*p value < 0.05 means statistical significant difference.

**Table (7): Stool examination of the studied children.**

Variables	No	%
Normal	4	6.0
Entamoeba Histolytica cyst	47	70.1
Entamoeba Histolytica & giardia cysts	16	23.9

## DISCUSSION

H.pylori is a common microbial infection and infects approximately half of the total population all over the world. The frequency of infection with H. pylori in the world is variable and relies upon various factors for example, age, ethnicity, geographical and socioeconomic status [18].

It influences about 20% of the population in developed countries and over 90% in the developing world [19].

Testing H.pylori antigen in stool stays a reliable, screening test for H. pylori infection, both pre and post eradication [16].

This laboratory test can identify foreign proteins in fecal samples that are correlated with H. pylori infection. Fecal samples have high specificity and sensitivity, as the UBT, and they can also evaluate infection state post treatment. In any case, Fecal samples need patient compliance, are

not easy to handle, and results are not promptly identified [17].

Fecal identification of H. pylori by approved ELISA can reliably detect whether H. pylori has been eradicated in children [10].

Our study aimed to evaluate the frequency of H. pylori infection and its correlation to anthropometric measures in children aged (2-12) years in pediatric outpatient clinic in Zagazig University Hospital.

The data obtained show that the prevalence of H. pylori infection among the studied children who suffered from abdominal pain is (53.7%)(36 children from 67 children) which is lower than results detected by Abu-Zekry et al. [20]. who studied the frequency of helicobacter pylori infection among Egyptian children presenting with gastrointestinal manifestations and revealed that it was 70%.. Simultaneously, our data is much higher than data published by Awuku et

al. [21]. who studied the Prevalence of helicobacter pylori infection in children between the ages of 5–16 years living in two rural communities in the Upper West region of Ghana and revealed that it was 14.2%. but this finding is nearer to the data published by Yousab Feiby et al. [22]. who studied the prevalence of H. pylori infection among Egyptian children and it was 58,3%.

There was a statistically significant difference ( $p = 0.04$ ) between H. pylori +ve & H. pylori -ve infected children as regarding family history with a higher percentage of +ve family history in H. pylori -ve infected children (63.6%). In our study, 14 children (63.6%) who were H.pylori stool antigen test(HPSAT) negative, had a positive family history of the same gastrointestinal symptoms, So there was no a significant association between the H. Pylori infections and the positive family history of the same gastrointestinal symptoms. this data is not concomitant with that published by Mahmud et al. [23]. who found that there was a significant association between the H. Pylori infections and the positive family history of gastrointestinal symptoms.

There was no a significant difference between H. pylori +ve and H. pylori -ve groups regarding the sex as we had 20 male (62.5%) and 16 female (45.7%) H. pylori +ve children simultaneously we had 12 male (37.5%) and 19 female (54.3%) H. pylori -ve children. In our study, males were more likely to have H. pylori infection (62.5%) in comparison to the females (45.7%). This finding is in consistent with a study carried out in East of Sudan by Abbas et al. [24]. In contrary to these findings, Bin Mohanna et al. [25]. found that girls in Yemen were more affected than boys. However, Biernat et al. [26]. showed that no differences in the prevalence of infection between boys and girls.

There is no significant difference between H. pylori +ve and H. pylori -ve children regarding the age as the p value was 0.3. In our study, the incidence of H. pylori infection was common among the two age groups of studied children although H. pylori infection was more in children above 8 years (61.5%). In East of Sudan, Abbas et al. [24].

showed the prevalence of infection was higher in the age group more than 15 years (23.1%).this shows that the prevalence of h. pylori infection increases with age.

Also there was no significant difference regarding the socioeconomic status between H. pylori +ve & H. pylori -ve infected children as ( $P = 0.09$ ). In our study, the incidence of H. pylori infection was common among all studied children. Although 54.2% of the children with HPSAT positivity belonged to moderate socioeconomic status this data is not concomitant with that published by Mahmud et al. [23]. who found that 78.9% of the children with HPSAT positivity belonged to low socioeconomic class. This may be explained by there may be other risk factors leading to acquisition of infection which may be sanitary conditions, level of educational background.

The infection of H. pylori in children may be either clinically silent or associated with nonspecific sign or symptoms, which are seen in various childhood complaints [27].

Regarding the clinical point of view, the studied children were suffering from abdominal pain, loss of appetite (100%) no increase of weight (62.7%), loss of weight (37.3%), vomiting (26.9%), abdominal distention (16.45%) and diarrhea (13.4%).although the majority of h. pylori infection was associated with Abdominal distension (81.8%). the prevalence of h. pylori infection among the children suffering from abdominal pain or loss of appetite was (53.7%).

In contrary to these findings, a study carried out in East of Sudan by Abbas et al[24].who found that the most frequent symptoms associated with H. pylori infections were nausea (25.5%), followed by gastric pain (24.5%) and heart pain (20.2%).

There was a statistically significant difference ( $p = 0.04$ ) between H. pylori +ve & H. pylori -ve infected children as regarding Abdominal distension with a higher percentage in H. pylori +ve infected children (81.8%).This is consistent with Castillo-Montoya et al. [28]. who found that a significant positive association between H. pylori and bloating ( $p = 0.016$ ).

There was a statistically significant difference ( $p=0.016$ ) between *H. pylori* +ve & *H. pylori* -ve infected children as regarding diarrhea with a higher percentage of diarrhea in *H. pylori* -ve infected children (88.9%).our study found that *H. pylori* infection was not associated with diarrhea in contrary to Castillo-Montoya et al. [28]. who found that a significant positive association between *H. pylori* and diarrhea ( $p = 0.0389$ ).

There was no statistically significant difference between *H. pylori* +ve & *H. pylori* -ve infected children as regarding Abdominal pain, Vomiting, Fever, No increase of weight, Loss of weight and decrease appetite. This is in concomitant with Abu-Zekry et al. [20]. who found no statistically significant differences were found between the  $^{13}C$ -UBT result among patients with vomiting ( $P=1.00$ ). Similarly, Castillo-Montoya et al. [28]. who found that no significant association between *H. pylori* infection and weight loss .In our study there was no significant association between *h. pylori* infection and abdominal pain .this is in concomitant with Badr et al. [29]. who found that there was no a direct role for *H. pylori* infection as a causative agent for Recurrent Abdominal Pain (RAP) in children .also Mansour et al. [30]. who found that there was no association between RAP and *H. pylori* infection .In contrary to Castillo-Montoya et al. [28]. who found a significant positive association between *H. pylori* and epigastric pain ( $p < 0.001$ ), recurrent peri-umbilical pain ( $p < 0.001$ ).

In our study, there was no statistically significant difference between *H. pylori* +ve & *H. pylori* -ve infected children as regarding all the anthropometric measures i.e. *H. pylori* infection does not affect growth. Similarly Xu et al. [31]. found that *H. pylori* infection was not associated with overweight/obesity observed from the retrospective study in this Chinese population. In contrary to Abbas et al. [24]. who found that most of the positive cases were underweight. According to Kopacova et al. [32]., the chronic infection of *H. pylori* appeared to be associated with short stature in children. *H. pylori* infection did not influence body weight and body mass index either in adults or children and adolescents. Many factors can affect the growth in children

and stature, such as nutrition, chronic inflammation, and gastrointestinal disease.

There was also no statistically significant difference between *H. pylori* +ve & *H. pylori* -ve infected children as regarding laboratory investigations (RBCS, WBCS, Hb, PLT).In contrary to Yu et al. [33]. who found that a significant difference was found between various WBC quartiles for *H pylori* infection ( $P = 0.001$ ).This may be explained by our study was cross sectional study in contrary to their cohort study which enabled them to follow the children properly. Also Baxendell et al. [34]. found that *H. pylori*-infected children had lower red blood cell counts ( $p=0.005$ ) compared with non-infected .also found that an association between *H. pylori* infections and reduced platelet indices in young Ethiopian school children.

In our study, we examined stool samples of all studied children and showed that 4 children (6%) revealed normal stool examination, 47 children (70.1%) revealed *Entamoeba histolytica* cyst, 16 children (23.9%) revealed *Entamoeba Histolytica* & *giardia* cysts. *Entamoeba histolytica*, *Giardia lamblia* and *H. pylori* are considered the most common infectious agents affecting human beings in developing countries [35]. In our study, intestinal parasites were detected in 94% of upper gastrointestinal symptomatic patients with *Entamoeba histolytica* cyst (70.1%) being the most prevalent. This is consistent with results of other studies established in Egypt revealing that *Entamoeba histolytica* was the most prevalent protozoan infection followed by *Giardia lamblia* infection [36,37]. In contrary to Kazemian et al [38]. who found that among 37 children with *H. pylori* infection in Iran, they reported *Giardia lamblia* and *Entamoeba. histolytica* 29.7%, & 10.8% respectively. This study showed that *Giardia lamblia* was the most prevalent parasite associated with *H. pylori* infection.

## CONCLUSION

The frequency of *H. pylori* infection in children still high and a prevalent problem .We need more further studies in this subject to know all predisposing factors of *H. pylori* infection. *H. pylori* infection did not affect growth of children.

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