

1.1. Association of H pylori infections and abdominal symptoms

A causal relationship between H. pylori infection and abdominal pain of childhood is still not proven. In addition, there seems to be a relationship between ulcer disease and abdominal symptoms but it is still unclear whether chronic gastritis causes symptoms in children (18). A study from India found a possible association of H. pylori with recurrent abdominal pain in H. pylori positive children (age: 3–12 years) with recurrent abdominal pain. In this study, 83% of the children had complete symptomatic relief after eradication therapy (5, 11).

However other studies suggest that early acquisition of H. Pylori may play a role in the development of recurrent abdominal pain in children less than 5 years of age. In addition symptoms of nausea associated with vomiting are quite likely to be caused directly by a stomach condition and can be symptoms of H. pylori infection. If the vomit is initially clear and subsequently contains blood, it is likely to be caused by a tear in the lower part of the oesophagus caused by the initial vomiting. If blood is present in the vomiting, it can also be caused by a bleeding ulcer in the stomach (8, 16). Vomiting, diarrhea and nausea are very common in pediatric population as general. They are non-specific and can be a symptom of various organic diseases and, more often, of functional gastrointestinal disorders. Whether H. pylori infection without PUD can cause recurrent abdominal pain remains a matter of debate. Recently published studies indicate that further testing for H. pylori should only be performed when, based on alarm features, organic disease is suspected. (4, 12)

1.2. Diagnosis

The diagnosis of H. pylori-associated diseases in children can reliably be made through gastro-duodenal endoscopy with biopsies as gold standard test. Studies demonstrated the efficacy of the C-urea breath test and monoclonal stool antigen tests for the noninvasive diagnosis of pediatric H. pylori infection. (3, 5) The diagnostic accuracy of different tests was as follows: culture 98.1%, RUT (rapid urea test) 96.2%, pathology 98.1%, PCR 94.3%, serology 84.9%, UBT (urea breath test) 100% and HpSA (H. pylori stool antigen) 96.2%. According to this study, all the above-mentioned methods, except serology, are considered valuable diagnostic methods in the diagnosis of H. pylori in children. (1)

1.3. Stool Antigen Detection:

An enzymatic immunoassay which detects the presence of H pylori antigen in stool specimens has become available and has undergone testing in the initial diagnosis of H pylori infection and in the confirmation of eradication after treatment. A polyclonal anti-H pylori capture antibody absorbed to micro wells is the most widely used test but a monoclonal antibody test has recently been described and is under investigation. (2, 10)

1.4. Stool Versus Other Method

The performance of stool detection of HpSA (H. pylori stool antigen) is an alternative and reliable substitute for the UBT test as a non-invasive diagnostic method in children. Secondly, the test is not expensive and doesn't require a blood sample.

1.5. Objective

The purpose of this work was to evaluate the association between abdominal symptoms and positivity of H pylori in their stool, and to estimate the incidence of H pylori infection in the group. (1)

2. Methodology

2.1. Design

A hospital based cross-sectional study, done in the period of April to June, 2014, in pediatric gastroenterology clinic in Omdurman Military Hospital in Sudan.

2.2. Patient

A total of fifty children were recruited according to specific selection criteria, any child presented to the clinic with abdominal symptoms (recurrent abdominal pain, diarrhea, vomiting or more than one symptoms) were included, while those who had acute diarrhea with any degree of dehydration or had taken antibiotic, acid suppressive drugs (proton pump inhibitors, H2 receptor antagonists, antacids, bismuth preparations) within the last four weeks were excluded. The age of the study group was between one month and 15 years they were divided into three groups, group A: from one month up to five years, group B: from five up to ten years and group C: from ten to 15 years old

2.3. Data

A questionnaire was filled by the investigators with the cooperation of the parents of each child to obtain demographic information, and to gather data retrospectively on the presence and frequency of the child's abdominal symptoms during the previous three months. The symptoms were assessed by a physician, and unclear answers were clarified by interviewing parents again. Elicited symptoms included recurrent abdominal pain in isolation, or in association with diarrhea/vomiting, or isolated diarrhea/vomiting. The questionnaire scored abdominal symptoms as present if they occurred more than once per week during the previous three months. For vomiting and diarrhea, the criteria were an episode of 5–8 days of length once or more in the last three months, family history of similar condition, socioeconomic status also were collected, Informed consent was obtained from children's parents for participation in the study, and the study protocol was approved by the Ethics Committee of the hospital.

2.4 Detection of H pylori Antigen in the stool

The stool antigen test was performed according to the manufacturer's recommendations; those performing and

reading the test were unaware of the *H pylori* status of the tested children. ICT kit from Chinese (zjdfjy.en.alibaba.com) company was used. This is a sandwich solid phase immunochromatography assay. To perform the test an aliquot of diluted stool sample is added to the sample well of the test cassette. The sample flows through a labeled pad containing *H pylori* antibody coupled to red colored colloidal gold. If the sample contains *H pylori* antigen, the antigen will bind to the antibody coated on the colloidal gold particles to form antigen-antibodies-gold complexes, these complexes move on the nitrocellulose membrane by capillary action towards the test line region on which the *H. pylori* antibodies are immobilized. As the complexes reach the test line, they will bind to the antibodies on the membrane in the form of line. A second red control line will always appear in the result window to indicate that the test has been correctly performed and the test device function properly. If *H. pylori* antigen is not present or lower than the detection limit of the test, only the control line will be visible. If the control line doesn't develop, the test is considered invalid. For quality control a positive and a negative control sample were used in the study

2.4 Statistics

Analysis was performed using computer IBM SPSS program (version 20). Frequencies and demographic data along with the correlation between abdominal symptoms and the results of stool *H. pylori* antigen were calculated.

3. Results

Fifty children were included in this study, demographic data showed nearly equal male to female distribution, male were 27(54%) of the group, their age was distributed between one month and 15 years divided into three group, group A: under five years were 25(50%), group B: between 5-10 years were 19(38%) and group C: above ten years were 6(12%), their mean age was 7.5 years. 44(88%) of the studied group lived in poor or very poor socioeconomic status, Distribution of the abdominal symptoms showed 20(40%) of the studied group had only recurrent abdominal pain, 15(30%) presented with concomitant abdominal pain and diarrhea, and 3(6%) had both abdominal pain and vomiting, while 4(8%) had tripled symptoms of abdominal pain, diarrhea, and vomiting, just 6(12%) presented with isolated diarrhea, also 2(4%)

presented with isolated vomiting (**Figure 3**). On the other hand 11(22%) of the whole group had family history of quite similar symptoms.

Positivity of *H. pylori* in the stool and its correlations:

Positive helicobacter pylori antigen in the stool was 29(58%) of the whole group (**Figure1**), male were dominating 17(58.5%), in addition 20(70%) of those had positive *H. pylori* were under five year (**Figure 2**).

Furthermore 7(63.6%) of those had family history of similar condition were harboring the *H. pylori* antigen in their stool, also 27(93%) of those had positive stool test lived in very poor or poor socioeconomic conditions, indicating existence of strong and significant correlation between presence of the antigen and their living condition.

25 out of 29 of those positive for the *H. pylori* antigen presented with recurrent abdominal pain in isolation or association with vomiting/diarrhea or both, while just 4 cases out of 29 who had the antigen were presented with isolated one symptom (diarrhea or vomiting) and this showed statistically significance correlation between abdominal pain+/- other symptoms and the presence of the stool *H pylori* antigen ($P<0.05$) (**Table 1**).

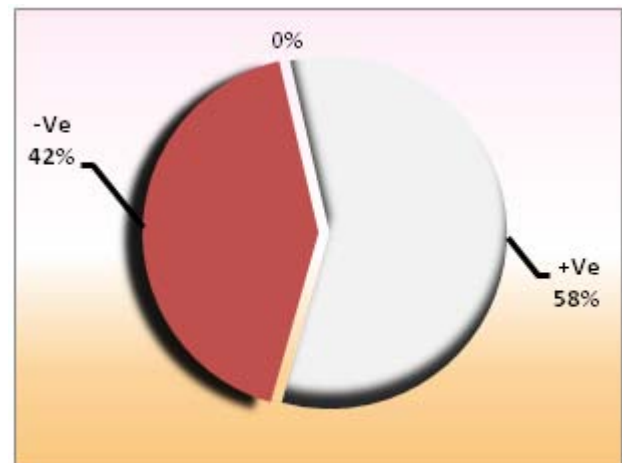


Figure1: Distribution of the studied population according to the result of stool *H. pylori* antigen

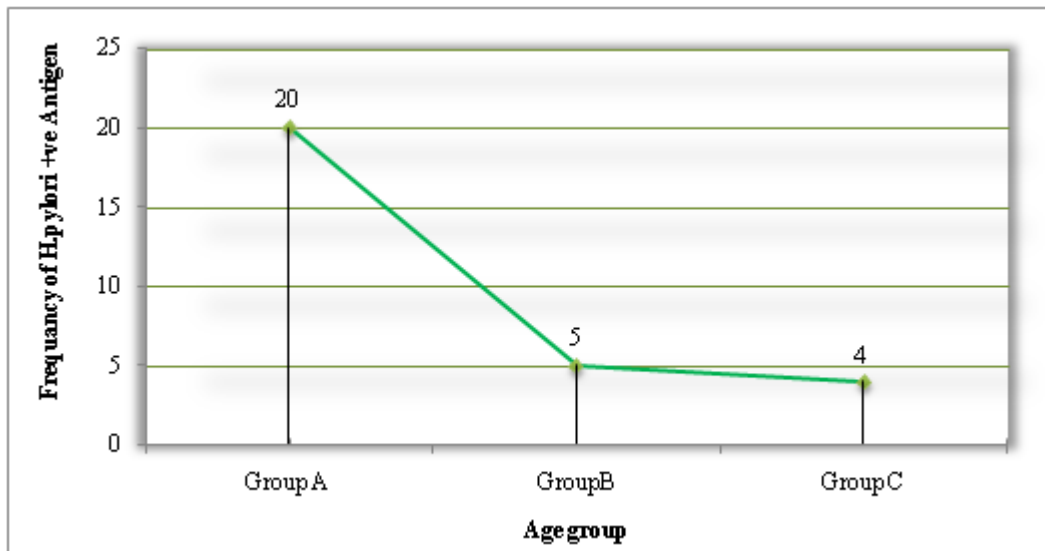


Figure 2: Age distribution in the positive H. pylori antigen group

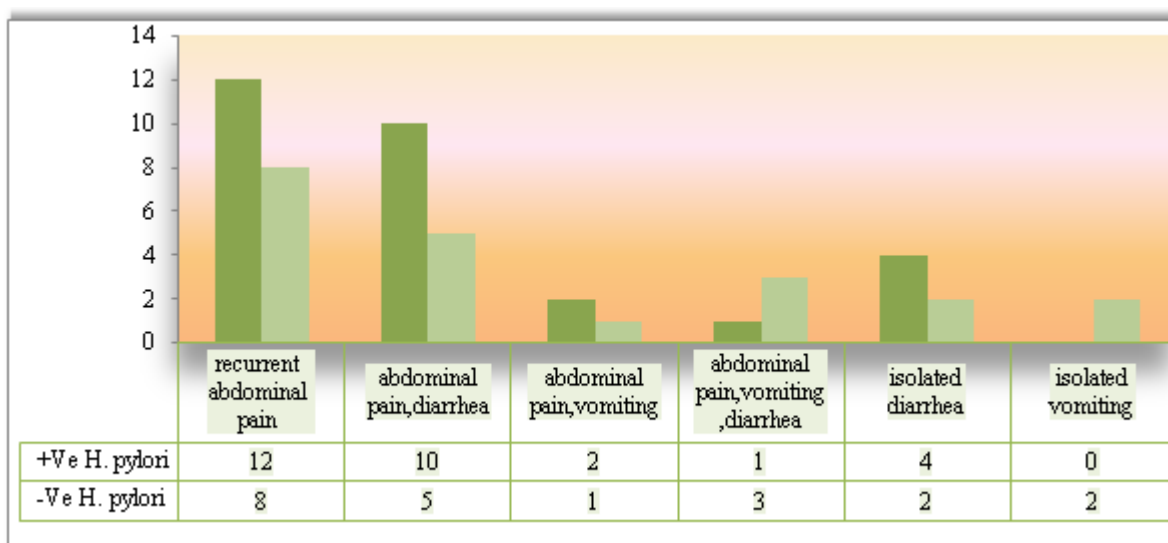


Figure 3: Association of H.pylori stool antigen and abdominal symptoms

Table 1: correlation between abdominal pain and the result of the stool

Abdominal symptoms	+Ve H. pylori stool antigen	-Ve H. pylori stool antigen	Total
Abdominal pain +/- vomiting +/- diarrhea	25	17	42
Isolated symptom (vomiting or diarrhea)	4	4	8
Total	29	21	50

P> 0.05

4. Discussion

The strength of this study is that it was conducted in one of under developed area in Africa where a higher incidence of H. pylori is expected in general population and particularly children, due to low socioeconomic status and poor sanitation, while the main limitation in our study is its sample size, which is a rather smaller one, but still consistent with various data from around the globe. H. pylori antigen is detected in the stools of more than half of the studied group 29(58%), which agreed with data from Africa, however

other studies showed lower figure reaching (23%) and others reported higher figure near to 80% as in Alexander et al in Russia (14), the controversy in results is most probably due to geographical and ethnic variation of the studied groups. Interestingly most of H. pylori stool positivity was detected in children whose age less than five years old, in consistent with both Gabor et al and Okuda et al studies (8, 9, 19, and 20).

Low socioeconomic status had strong association with the existence of the H. pylori antigen in the stool which goes with most if not all the other studies from different countries for example two studies carried by Ndip et al (21) and Rodrigues et al(22,23), probably this association is due to poor hygiene and contaminated sources of water in this group of people. On the other hand the most remarkable symptoms which had statistical correlation with H. Pylori positivity was abdominal pain whether a recurrent pain alone or in concomitant with diarrhea or vomiting or both of them, representing 25 out of the 29 positive cases, and this is consistent with data from Tunisia done by Siai K et al (26), and Oderda et al study (24), (14), but surprisingly this is completely against two studies one was a meta-analysis

study done by Poddar U et al (25), in India, and the other was Italian study done by Maria et al, in which they claimed only correlation between *H. pylori* infection and vomiting/diarrhea while no association with abdominal pain (13), this strange results were against the postulation that *H. pylori* is a protective mechanism against diarrhea, the above contrast can be explained by the lack of a biological marker or valid measurement for pain, and the variation in tolerance of pain in the human beings, However there is a good study in Turkey, concluded that children with abdominal pain and *H. pylori* appear to benefit from eradication therapy of *H. pylori*(15).

Finally, majority of the negative correlation results and the conflict of data may be because were derived from studies conducted in developed countries and by means of detection of antibodies against *H. pylori* in the serum not antigen detection method. In addition, these children were those whom referred to tertiary hospital clinics, but the majority of the children with abdominal pain are managed in the primary care setting.

5. Conclusion

The authors concluded that the most common GI symptom associated with the presence of fecal antigen for *H. pylori* was abdominal pain whether alone or in association with other symptom, while isolated diarrhea or vomiting has no significance association, moreover concluded that existence of *H. pylori* fecal antigen in children less than five is more than those upper than five years old, and there is strong association between the presence of stool antigen and the socioeconomic status of the family.

6. Further Scope

Randomized trial with larger sample size studies will be helpful for more elaboration of the associated clinical symptoms for *H. pylori* infection in children. Also setting of criteria for diagnosis of *H. pylori* infection in pediatric is recommended to determine when to treat this organism, particularly in under developed countries.

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