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THE PREVALENCE OF HELICOBACTER PYLORI AMONG APPARENTLY HEALTHY CHILDREN AGED 2-16 YEARS IN ABA ABIA STATE, NIGERIA

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ABSTRACT

Prevalence of H*elicobacter pylori* infection among apparently healthy school children aged 2-16 in Aba metropolis, Abia State, Nigeria, was studied. Three schools were randomly selected after which appropriate advocacy visits were made prior to the commencement of the survey. Informed Consent was also obtained from the parents or guardian of the children. Three hundred (300) school children were recruited into the study, one hundred (100) from each school comprising 50 males and 50 females respectively. Blood samples were appropriately collected from the subjects and screened for *H. pylori* using antibody (Ab) rapid test kit. Stool samples were subsequently collected from the subjects who tested positive at screening level and tested for H. pylori antigen as a confirmatory test using HpAg Stool Rapid Test cassette. The result showed overall prevalence of 57% in the study population. There was increase in prevalence with increasing age, 45.5% for those aged 2-6 years, 58.3% for those aged 7-11 years and 62.0% for those aged 12-16 years. This increase was found to be statistically significant (Ø<0.05). There was also difference in prevalence according to sex, 60.7% for males and 53.3% for females. This difference was also found to be statistically significant (Ø<0.05). The result of this study with regard to location also showed difference in prevalence, (Aba South 62%, Aba North 58 and Aba central 51%) which was statistically significant (Ø<0.05). The above result is alarming and looking at the tenderness of the children involved, it calls for serious concern to the health authorities at all levels. It is, therefore, recommended that; clean and decent environment should be encouraged; provision of potable water and vigorous awareness campaign against the spread of *H. pylori* infection should be embarked upon by government at all levels and the possibility of developing a good gaulity vaccine against *H. pylori* infection should be considered, and the possibility of including it as part of routine immunization for children should be explored.

KEYWORDS: prevalence, Helicobacter pylori, apparently healthy children, 2-16 years.

INTRODUCTION

Helicobacter pylorus (H. pylori) is a gram negative, microaerophilic bacterium that usually inhabits various segments of the stomach, particularly the antrum. The bacterium induces a chronic low level inflammation of the stomach lining and is strongly linked to the development of duodenal, gastric and stomach ulcers which can degenerate to cancer. Over 80% of individuals infected with the bacteria are asymptomatic. More than 50% of the world's population harbor *Helicobacter pylori* in their upper gastrointestinal tract and the infection is more prevalent in developing countries, while incidence is decreasing in Western world (Linz *et al.*, 2007).

Helicobacter pylori has infected humans for decades, yet it largely escaped notice until it was discovered and introduced to medical community by Dr Barry Marshall and Dr. Robin Warren of Perth, Western Australia in 1982. Prior to the time of this discovery, the conventional thinking was that no bacterium could live in the human stomach as the stomach produces extensive amount of acid of pH 2.0-4.0. Research on *H. pylori* changed paradigms regarding disease causation (Marshall and Warren, 1984).

Physicians previously attributed ulcers to stress or anxiety and did not believe that bacteria could cause cancer. (Marshall and Warren, 1984).

H. pylori was the first bacteria species proven to cause cancer and is classified as a group I carcinogen by the International Agency for Research on Cancer and that *H. pylori* also belongs to the same category of cancer causing agents as smoking, radiation and asbestos dust (Mbulaiteye *et al*., 2009).

H. pylori-associated gastric cancer comprises about 5.5% of all cancers globally and accounts for 25% of all infection-associated with cancer.

An effective *H. pylori* vaccine is not yet on the horizon, so eradication must be accomplished using antibiotics. As with many other organisms, *H. pylori* antibiotic resistance is increasing (Gao *et al.*, 2010).

Researchers continue to discover new associations between *H. pylori* and idiopathic diseases. The systemic effects of gastric colonization can lead to extra-gastric pathology; however new sites of *H. pylori* colonization have also been identified. More research is needed to clarify which extra-gastric diseases are caused by *H. pylori* and whether the bacteria must be present at the disease site (Traci and James, 2014).

The prevalence of *H. pylori* infection varies widely by geographic area, age, race, and socioeconomic status. At least half of the world's population is infected by the bacterium, making it the most widespread infection on earth today (Hooi *et al*., 2017).

Actual infection rates vary from nation to nation, the people in under developed countries have much higher infection rate than the developed countries like North America, Australia etc, where rates are estimated to be about 25%. Infections are usually acquired in early childhood in all countries. In a rural village of Linqu County, Shandong Province China, a study of 98 children found that 70% of those aged 5-6 years were infected with H. pylori (Ma *et al*., 1998), an indication that most infections take place very early in life. However, the infection rate of children in developing nations is higher than that in industrialized nations, probably due to poor sanitary conditions. In developed nations it is currently uncommon to find infected children, the percentage of infected people increases with age, about 50% for those over the age of 60 and about 10% for those between 18 and 30 years (Hooi *et al*., 2017).

The regions with the highest prevalence were Africa about 70%, South America about 69% and Western Asia about 67%. Regions with the lowest prevalence were Oceana about 24%, Western Europe about 34% and North America about 37%. Countries with the highest prevalence were Nigeria about 87.7%, Portugal about 86.4% and Estonia about 82.5%. Countries with the lowest prevalence were Switzerland about 18.9%, Denmark 22.1% and New Zealand 24.0%. The global prevalence of H. pylori is estimated to be 4.4 million people (David, 2017).

The lower rate of infection in the developed countries is largely attributed to higher hygiene standards and widespread use of potent antibiotics (Megraud, 1998).

Helicobacter pylori is contagious, person to person transmission by either the oral or fecal oral route is most likely. Transmission occurs mainly within families in developed nations yet it can also be acquired from the community in developing countries (Abraham and Bhatia, 1997).

JUSTIFICATION

Helicobacter pylori infection has been proved to be responsible for several life threatening gastric and extra-gastric diseases like ulcers, intestinal lymphoma, cancers, etc. It is assumed to be acquired early in life, spreads within members of a family including the new born and is highly resistant to common antibiotics. It therefore becomes very necessary that we know the best and earliest time to commence screening test to identify early infection for early intervention.

The major aim of this research is to find out the prevalence of *Helicobacter pylori* infection among apparently healthy school children aged 2-6 years in Aba, Abia state Nigeria.

MATERIALS AND METHODS

Study area

This study was carried out in three locations in Aba, Abia State Nigeria. Aba is a city in the Southeast of Nigeria and the commercial nerve center of Abia State. Aba lies along the west bank of the Aba River, and the geographical location is on the North and East hemisphere, latitude 5^0 06′23.69"N and longitude 7^0 22′0.01"E (Izugbara and Umoh, 2004).

The two major seasons include rainy and dry seasons that run between April and October each year. The city is a collecting point for agricultural produce because of the railway running from Port Harcourt to the Northern Nigeria; Aba is also a major urban settlement and commercial hub of Eastern Nigeria (Oriji, 2011). There are well known markets such as Ariaria International Market, Ahia Ohuru (New Market), Eziukwu Road Market (Cemetery Market), Shopping Centre (Ekeoha) that serve the entire region with quality wares, provisions, cosmetics, etc. The major occupation in Aba is trading and few civil servants. The city has an estimated population of 2,200,000 (Falola and Heaton, 2015).

Study Population

Three schools were randomly selected, one from each of the three zones and the sample size was determined using Araoye, 2004. One hundred (100) participants, 50 males and 50 females were randomly selected from each school and the participants were within the age range of 2-16 years.

Ethical Approval

Advocacy visits, mobilization and pre- survey contact were made and approval secured (appendices 1, 2, 3, 4, 5, 6 and 7).

Sample Size
Formula For Sample Size (Araoye, 2004).
Sample size **N =** z^2pq/d^2
N= Minimum Sample Size for Significant Survey
Z = Standard Normal Deviation Set Which is equivalent to 95% confidence interval and equal to 1.96
P = proportion in the target population in a previous study (Hooi et al., 2017).
q = 1-p
d = margin of acceptance error= 5% (0.05)
If Z= 1.96^2, P= 0.73, q=1-0.73, d=0.05^2
1.96^2 x 0.73(1-0.73)/0.05^2
N = 3.84 x 0.73 x 0.27/0.0025
N = 302.7
N=300 (Sample size).

Selection Criteria
A) Inclusion
Apparently healthy children, 2-16 years old whose parents gave consent.

B) Exclusion
Those, whose parents refused consent.

Sample collection
Two milliliters (2mls) of Venous blood sample was aseptically collected from each participant using sterile syringe and needle by venepuncture technique into dry plastic containers, properly labeled and taken to the laboratory. Samples were allowed to clot, centrifuged at 1000 rpm and sera separated using pasture pipette into plain screw caped containers and stored at -20℃ prior to use.

Laboratory procedures
All reagents were commercially purchased and the manufacturer's standard operational procedure (S.O.P) was strictly adhered to.

DETERMINATIONS
A) Screening Test: H.P.Ab Rapid Test Kit, manufactured by Zhejiang Orient Gene Biotech for Tell company catalog no: **F1709013** was used.

The results of the screening, either positive or negative are recorded as shown on the table 1.

B) Confirmatory Test: H.P.Ag Rapid Test Kit manufactured by Zhejiang Orient Gene Biotech for Healgen company Catalog No: **1509125** was used.

STATISTICAL ANALYSIS
Data was analyzed using Chi-square and result presented in tables.

STATISTICAL TEST OF HYPOTHESIS
The chi-square (χ^2) test statistic is as below

$$\sum \chi^2 = \frac{(O_f - E_f)^2}{E_f}$$

Where
O_f = Observed frequency
E_f = Expected frequency

$$E_f = \frac{\text{Row total X Column total}}{\text{Grand total}}$$

Finally, the decision to reject or accept the null hypothesis (H_O) was made; if the calculated χ^2 is greater than the tabulated χ^2, the null hypothesis is rejected, otherwise it is accepted.

RESULTS
The results of this study are as follows and are presented in tables.
Table 4.1 is the overall prevalence of *Helicobacter pylori* infection among school children in the study population.
Out of the 300 children examined, the number infected is 171 giving an overall prevalence of 57% (<0.05).
Table 4.2 is the prevalence of *H. pylori* infection among school children in the study population according to age.
Out of the 171 infected, 30(45.5%) were in the age bracket of 2-6years, 7-11 years had 63(58.3%) and 78(62.0%) were infected in the 12-16 years age bracket.
There is a significant association in the prevalence with respect to age (<0.05)
Table 4.3 is the prevalence of *H. pylori* infection in the study population in relation to sex.
Out of 171 children infected, 91(60.7%) males and 80(53.3%) females had the infection. There was significant association in the prevalence with respect to sex (<0.05).
Table 4.4 is the prevalence of *H. pylori* infection among school children in the study population according to location.
Out of the 171 children infected, 62(62%) from Aba South, 58(58%) from Aba North and 51(51%) from Aba Central had the infection.
There was significant association in the prevalence with respect to location (<0.05).

Table 1: Overall Prevalence of H. pylori infection in the study population.

Study Population	NO. Examined	NO. Positive	NO. Negative	Prevalence %
2-16Yrs (300)	300	171	129	57
Total	300	171	129	57

Table 2: Prevalence of *H. pylori* infection among school children in the study population, according to age.

Age(Yrs)	NO. Examined	NO. Positive	NO. Negative	Prevalence %
2-6	66	30	36	45.5
7-11	108	63	45	58.3
12-16	126	78	48	62.0
Total	300	171	129	57.0

Table 3: Prevalence of *H. pylori* infection in the study population in relation to sex.

Sex	NO. Examined	NO. Positive	NO. Negative	Prevalence %
Male	150	91	59	60.7
Female	150	80	70	53.3
Total	300	171	129	57.0

Table 4: Prevalence of *H. pylori* infection among school children in Aba according to location.

Location	NO. Examined	NO. Positive	NO. Negative	Prevalence %
Aba South	100	62	38	62
Aba North	100	58	42	58
Aba Central	100	51	49	51
Total	300	171	129	57

DISCUSSION

The overall prevalence of *H. pylori* infection in the study population was found to be 57% and could be attributed to the poor sanitary condition of Aba; indiscriminate discharge of sewage water, domestic waste and human feaces into the blocked drainage system encouraging fecal-oral route transmission of *H. pylori* infection. The children within the study population are from homes where the parents and siblings are infected with *H. pylori* encouraging person-to- person transmission as they share pre-masticated food. The environment of the schools involved in this study are typical breeding ground for *H. pylori* infection, the children often drink from a common water source with the same cup and usually share snacks among themselves also encouraging person-to-person transmission of the infection. However, the high prevalence is in agreement with Hooi *et al*., 2017 which indicated that more than 50% of the world population is affected by *Helicobacter pylori* and that it is usually acquired in early childhood mostly in under-developed world like ours.

The age specific rate were 45.5% in children of age (2-6) years, 58.3% in children of age (7-11) years and 62% in children of age (12-16) years showing a statistical significant rise in prevalence as age increases. This could be attributed to the fact that, as the children advance in age, they tend to live an independent life style and are exposed more to other modes of transmission of *H. pylori* infection. In Aba, cooked food popularly known as "Mamaput" is hawked openly on the streets and around the school environment and children from 10 years and above are the major customers as they lack knowledge of the implication of eating contaminated food.

From this study, there is a statistical significant increase in prevalence according to sex, male 60.7% as against female, 53.3%, this may be due to the fact that male children play more in the filthy environment and are more involved in extra curricula activities within and outside the school unlike females that are usually meticulous in their life style even from the early stage of life.

The prevalence of *H. pylori* infection according to location is statistically significant in this study with Aba South having the highest prevalence of 62% followed by Aba North, 58% and Aba central 51%. Aba South and North are thickly populated with low income earners, traders and artisans. The environmental decay of Aba South and North is very pronounced as a result of poor sanitary condition with total absence of potable water supply making it a favorable environment for the spread of *H. pylori* infection. This, however, is in support of the work of Lambert *et al*., 1995 where 75% prevalence was detected due to environmental decay and overcrowded population. Hegarty *et al*., 1999 and Fan *et al*., 1998 were not left out in the affirmation. They found out that, *H. pylori* infection can be acquired from untreated water supply and dirty environment through fecal-oral route. Aba central is not overcrowded and the occupants are mostly the elites. It has more of offices, banks and supermarkets as business centers with improved drainage system hence children from this location have lesser prevalence of *H. pylori* infection.

CONCLUSION

The result of this study seems high with overall prevalence of 57%. The reason is not farfetched, Aba is a city densely populated due to the high commercial activities going on in it. It has high level of environmental decay with virtually no good health supporting amenities which is one of the major risk factors in the spread of *H. pylori*. The impact of *Helicobacter pylori* colonization on children's health in Aba, Abia State needs to be given urgent attention considering the devastative nature of the diseases associated with *H. pylori* infection both in the gastric and non gastric sites.

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