Original Research Article

Prevalence of *Helicobacter pylori* and its associated Peptic Ulcer Infection among Adult Residents of Aba, Southeastern, Nigeria

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A B S T R A C T

Helicobacter pylori (*H. pylori*) formerly known as *Campylobacter pylori* is a spiral rod-shaped Gram-negative, microaerophilic bacterium found in the stomach of infected person(s) causing duodenal ulcer, gastric ulcer and gastric cancer. Faecal and blood samples were collected from adult residents of Aba, Southeastern Nigeria between the months of March and July, 2015 for analysis using Diaspot *H. pylori* test kit and Faecal occult blood test. Out of three hundred (300) sampled, consisting of 128(42.7%) males and 172 (57.3%) females, a total of 119(39.7%) were infected with *Helicobacter pylori* while 129(43.0%) had peptic ulcer. A slightly higher percentage with peptic ulcer suggests that some other causes may have contributed to the peptic ulcer infection. However, the association of *H. pylori* with peptic ulcer positivity was found to be statistically non-significant (*p-value* > 0.05). The highest prevalence for *H. pylori* infection and peptic ulcer occurred within the age group 38-47 years with 56.2% and 49.3% respectively, while ages 18-27 years had the least prevalence for both infections. The sex-related prevalence of *H. pylori* showed that more males were infected than females and *both* infections increased with age. However, prevalence of *H. pylori* infection and peptic ulcer are not significantly associated with sex and age of the patients (*p-value* > 0.05). This study confirms *Helicobacter pylori* as a contributor and causative agent of peptic ulcer and recommends maximum food hygiene practice and clean environment by food handlers.

Introduction

Helicobacter pylori (H. pylori) is a spiral-shaped Gram-negative microaerophilic bacterium that grows in human gastric epithelial tissues and mucus of the stomach (Brooks *et al*., 2004; Chey *et al*., 2007). *H. pylori* remains one of the most common worldwide human infections and is associated with a number of important chronic gastritis, peptic ulcer disease, and gastric malignancy (Shamsuddeen *et al*., 2009). The prevalence of *H. pylori* is closely associated with socioeconomic conditions and accordingly, this infection is more common in developing countries than in developed countries (Everhart, 2000). About 40% of persons over 60 years of age have *Helicobacter pylori* (Gastroenterological society of Australia, 2003 on Facts about

Helicobacter pylori). Most people are infected in childhood. *Helicobacter pylori* causes more than 90% of duodenal ulcers and up to 80% of gastric ulcers. Approximately two-thirds of the world's population is infected with *H. pylori*. In the United State, *H. pylori* is more prevalent among older adults, African American, Hispanics and lower socioeconomic groups. Although, the prevalence of *H. pylori* infection in developed countries seems to be decreasing, it is still high in developing world with as much as 90% (Konturek, 2008). In developing countries, 70-90% of the population carries *H. pylori*; almost all of these acquired the infection before the age of 10 years (Taylor and Parsonnet, 1995). In developed countries, the prevalence of infection is lower, ranging from 25-50%. The data from developed countries also suggests that most infections are acquired in childhood (Taylor and Parsonnet, 1995). These remarkable organisms survive the extreme acidity of the stomach because of its ability to split urease to release nitrogen which increases the pH of gastric acid and for protein synthesis; thus creating an alkaline microenvironment by hydrolyzing urea to ammonia. Other intestinal parasites like hookworms *Ascaris lumbricoides,* roundworms and non-steroid anti-inflammatory drugs (NSAIDS) such as Aspirin and Ibuprofen also contribute to the development of ulcer (Parkin *et al*., 1999). Symptoms include abdominal discomfort, weight loss, bloating, burping, nausea/vomiting and release of bloody or dark coloured stool, bloody vomit or coffee vomits and bleeding.

The treatment of *H. pylori* remains a challenging clinical problem despite extensive research over the last 25 years (Egan *et al*., 2007). Bacterial resistance and poor patient compliance are believed to be the primary factors in *H. pylori* treatment

failure (Megraud, 2004). The occurrence of side-effects has reduced the compliance of patients with treatment regimens and led to the development of bacterial resistance (de Bortoli *et al*., 2007). This has led to the development of alternative treatment options in *H. pylori.* Increasing antimicrobial resistance and falling eradication rates are the result of the widespread use of antibiotics (Egan *et al*., 2007). The prevalence of antimicrobial resistance in *H. pylori* shows regional variation both within and between countries. However, alternative antibiotics based on local resistance rates may improve eradication rates (Egan *et al*., 2007). This survey is aimed at determining the prevalence of *H. pylori* and its associated peptic ulcer infection in Aba, Southeastern Nigeria.

Materials and Methods

Study Area

Aba is a major settlement and commercial center in the southeastern part of Nigeria. The geographical co-ordinates for Aba are 5° 07 N latitude and 7° 22 E longitude and 205m (673ft) above sea level. Aba consists of two Local Government Areas: Aba North and Aba South LGAs. The city is thickly populated with small towns and villages. The people are predominantly traders, artisans, farmers and public/civil servants. Because of climatic nature of the studied area (Aba being in the rainforest zone), compounded with the socioeconomic nature of the people, infections associated with personal and environmental hygiene are common.

Research Ethics

Ethical review and clearance of the research protocol were obtained from the Ethical Review Committee of the Department of

Biology/Microbiology, Abia State Polytechnic, Aba. Permission was sought from each of the Local Government Chairmen. All subjects who gave their consent and are willingness to participate in this study signed the consent form and presented their identification data (name, age, sex, occupation etc).

Sample Collection

Blood and stool samples were randomly collected from 300 adult individuals between the ages of 18 years and above. About 2mL of venous blood was collected from each subject into an EDTA bottle (labeled with code numbers, age and sex) using 5mL syringe. Stool samples were also collected with the use of catching device (hat-shaped plastic lid). The catching device prevents contamination of the stool samples by water, urine or dirt. The stool samples were put in sterile screw-capped bottles and labeled with identification numbers. The collected samples were taken to the Microbiology Laboratory of Abia State Polytechnic, Aba for analysis.

Analysis of the Samples

The presence of *H. pylori* was determined by Blood Antibody Test and Stool Antigen Test.

Blood Antibody test was carried out using *H. pylori* Test device (Diaspot H. pylori), an invitro chromatographic immunoassay for the qualitative detection of *H. pylori* antibodies. Each of the 2mL of blood samples collected was centrifuged for 20 minutes. The blood formed two layers (the serum and the red blood cells). The Diaspot *H. pylori* test kits were placed on a clean table. A rubber dropper was used to transfer 3 drops of serum into each well of the test kit and timed for 20 minutes to observe for

the presence or absence of one or two coloured lines: one is the control region (C) while the other is the test region (T). The appearance of one coloured line on the control region indicates a negative result while the appearance of two coloured lines both on the test region and control region indicates positive result to *H. pylori* infection.

Faecal occult blood test was performed in the laboratory by thoroughly emulsifying 2g of each stool sample in 5mL of normal saline in a test tube (faecal occult blood test tube), using sterile rod, and each placed in a test tube rack. The emulsified stool samples were allowed to sediment, after which, a faecal occult test strip was dropped into the mixture and allowed to absorb it. Two red lines at the middle of the strip indicate a positive result, while negative result is an indication of one red line.

Statistical Analysis

Statistical analysis was done using statistical package for social sciences (SPSS) version 20.0. Statistical significance tests included the use of *p-value* to assess the role of chance and $\chi 2$ (Chisquare) test to account for the association between different variables. In this study, *p-value* < 0.05 was used to disapprove the null hypothesis.

Results and Discussion

Table 1 represents the sex-related prevalence of *H. pylori* and peptic ulcer. Out of 300 adult individuals examined, consisting of 128(42.7%) males and 172(57.3%) females, 119(39.7%) were infected with *H. pylori* compared to129 (43.0%) with peptic ulcer. The prevalence of *H. pylori* infection and peptic ulcer are not significantly associated with sex (P = 0.242, t = -2.500).

Table.1 Sex-related Prevalence of *H. pylori* infection and Peptic ulcer

Sex	Number Examined (%)	Number Positive for *H. pylori* (%)	Number Positive for peptic ulcer (%)
Male	128 (42.7)	51(39.8)	54(42.2)
Female	172(57.3)	68(39.5)	75(43.6)
Total	300	119(39.7)	129(43.0)

Table.2 Age-related Prevalence of *H. pylori* infection and Peptic ulcer

Age (years)	Number Examined (%)	Number positive for *H. pylori* (%)	Number Positive for peptic ulcer
18-27	135 (45.0)	45 (33.3)	50 (37.0)
28-37	92 (30.7)	33 (35.9)	43 (46.7)
38-47	73 (24.3)	41 (56.2)	36 (49.3)
Total	300	119 (39.7)	129 (43.0)

H. pylori and peptic ulcer infections are statistically not significant (P= 0.529, t = -0.756).

The age-related prevalence of *H. pylori* and peptic ulcer is shown in Table 2. The highest prevalence for both *H. pylori* and peptic ulcer occurred within the age group 38-47 years with 56.2% and 49.3% respectively, while ages 18-27 years had the least for both the bacterial infection and peptic ulcer. Age-distribution of *H. pylori* and peptic ulcer infection is not statistically significant (P=0.568, t= 0.386).

H. pylori are spiral-shaped bacteria that can cause peptic ulcer disease by damaging the mucous coating that protects the lining of the stomach and duodenum. This study investigated the prevalence of *H. pylori* infection and peptic ulcer in Aba, Southeastern Nigeria. The result showed that the *H. pylori* infection is endemic in the studied area. On the relationship between *H. pylori* and peptic ulcer, result showed non-significant difference in their prevalence. This therefore confirmed the link between *H. pylori* and the pathogenesis of peptic ulcer disease (Paptheodoridis *et al.*, 2006; Chey *et al.*, 2006). Although, *H. pylori* is known to cause peptic ulcer, others like non-steroidal anti-inflammatory drugs have also been implicated by other authors (Peterson, 1991; Parkin *et al.*, 1999). On sex-related prevalence of *H. pylori* and peptic ulcer, the result revealed that males and females are approximately infected although more males were infected than females. The statistical analysis showed there is no significant difference in prevalence between the males and the females and this agrees with the findings of other authors (Tarkhashvili *et al.*,

2009; Shokrzadeh *et al.*, 2012; Adlekha *et al.*, 2013). On age –related prevalence, the results also revealed that both *H. pylori* infection and peptic ulcer increased with age; however this is not significantly different. This result agrees with the findings of Tarkhashvili *et al* (2009) and Adlekha *et al* (2013) but contrasts with the results of Shokrzadeth *et al* (2012) and Kaore *et al* (2012) were *H. pylori* positivity increased with age of 20-40 years. There is a need therefore to create awareness on *H. pylori* infection and its associated peptic ulcer infection in Aba.

In conclusion, this study evaluated the prevalence of *Helicobacter pylori* (*H. pylori*), a Gram-negative bacterium that causes peptic ulcer. The close association between the two infections suggests that *H. pylori* could be a major cause of peptic ulcer; although other causes such as non-steroidal anti-inflammatory drugs and Aspirin (taken to prevent heart attack or stroke) have also been implicated. Personal hygiene and early detection and treatment of *H. pylori* will go a long way in eradicating the infection and its associated peptic ulcer infection.

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