



**SEROLOGICAL AND MOLECULAR DIAGNOSIS OF *HELICOBACTER PYLORI*
AMONG PATIENTS ATTENDING THE GASTROINTESTINAL CLINIC AT FEDERAL
MEDICAL CENTRE, YENAGOA, BAYELSA STATE**

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ABSTRACT

Background: *Helicobacter pylori* is a Gram-negative, microaerophilic bacterium that colonizes the gastric mucosa and is associated with chronic gastritis, peptic ulcer disease, mucosa-associated lymphoid tissue lymphoma, and gastric cancer. Accurate diagnosis is essential for effective treatment and prevention of complications. **Objective:** To determine the seroprevalence of *H. pylori* infection among patients attending the Gastrointestinal Clinic at the Federal Medical Centre, Yenagoa, and to explore the utility of Polymerase chain reaction (PCR) for molecular confirmation in a subset of seropositive individuals. **Methods:** A hospital-based cross-sectional study was conducted among 50 consecutive patients. Venous blood samples were screened for *H. pylori* IgG antibodies using a rapid diagnostic test. Stool samples were obtained from five seropositive participants and subjected to DNA extraction and PCR targeting the 23S rRNA gene. Data were analysed descriptively. **Results:** Of the 50 participants, 19 (38%) were males and 31 (62%) were females. Serology detected *H. pylori* antibodies in 28 participants (56%). Seropositivity was higher among females (21/31; 67.7%) than males (7/19; 36.8%). The highest seroprevalence was observed in the 11–15 and 51–55 year age groups. PCR confirmed *H. pylori* DNA in one of the five stool samples tested. **Conclusion:** A high seroprevalence of *H. pylori* was observed. However, molecular confirmation was limited, underscoring the inability of serology alone to distinguish active from past infection. Where resources permit, incorporation of PCR or other tests for active infection would improve diagnostic accuracy and patient management.

KEYWORDS: *Helicobacter pylori*; Polymerase Chain Reaction; Rapid Diagnostic Test; Serology; Molecular Diagnosis; Gastritis; Nigeria.

INTRODUCTION

Helicobacter pylori is a Gram-negative, spiral-shaped, microaerophilic bacterium that selectively colonizes the gastric mucosa of humans. Since its discovery by Barry Marshall and Robin Warren in 1982, *H. pylori* has been recognized as one of the most important human pathogens because of its close association with chronic gastritis, peptic ulcer disease, gastric adenocarcinoma, and mucosa-associated lymphoid tissue (MALT) lymphoma. The organism survives in the acidic gastric environment through urease production, which facilitates persistent colonization.^[1–4]

Infection with *H. pylori* affects more than half of the global population, with higher prevalence in developing countries where poor sanitation, overcrowding, and low socioeconomic status facilitate transmission. Persistent infection is a major risk factor for gastric cancer and other gastroduodenal diseases, making early diagnosis and eradication essential.^[5–12]

Accurate diagnosis remains fundamental to patient management. Available methods include invasive techniques (endoscopic biopsy, histology, culture, and rapid urease testing) and non-invasive approaches

(serology, stool antigen testing, urea breath testing, and molecular assays). Serological methods are inexpensive and widely used but cannot distinguish active from past infection because antibodies may persist long after eradication. Molecular techniques, particularly polymerase chain reaction (PCR), offer superior sensitivity and specificity through direct detection of bacterial DNA and can identify virulence and antimicrobial-resistance genes.^[13–27]

In Nigeria, *H. pylori* infection remains highly prevalent, yet comparative data on serological versus molecular diagnostic methods are limited, particularly in the Niger Delta region. This study therefore assessed the seroprevalence of *H. pylori* among patients attending the Gastrointestinal Clinic at the Federal Medical Centre, Yenagoa, and explored PCR-based detection in a small subset of seropositive individuals. The findings provide regional epidemiological data and highlight the practical limitations of relying on serology alone.

METHODS

Study Area and Design

This hospital-based cross-sectional study was conducted at the Federal Medical Centre (FMC), Yenagoa, Bayelsa State, Nigeria. Bayelsa State is located in the Niger Delta region of southern Nigeria (approximately latitude 4°15'–5°23' N and longitude 5°22'–6°45' E).

Ethical Considerations

Ethical clearance was obtained from the Research Ethics Committee of the Federal Medical Centre, Yenagoa. Informed consent was obtained from all participants (or their guardians where applicable). Confidentiality was maintained; each participant was assigned a unique study identification number, and unauthorized persons had no access to the data.

Sample Size and Participants

A convenience sample of 50 consecutive patients attending the Gastrointestinal Clinic who presented for *H. pylori* evaluation was recruited. Although an initial calculation using the Taro Yamane formula suggested a sample size of approximately 55 (margin of error 0.1), practical constraints limited enrolment to 50 participants. All participants provided written informed consent and a venous blood sample.

Inclusion and Exclusion Criteria

Inclusion criteria comprised patients presenting to the Gastrointestinal Clinic for *H. pylori* diagnosis who provided informed consent and a fresh blood sample. Exclusion criteria included refusal of consent, patients requiring emergency care, and those who had taken antibiotics within the two weeks preceding sample collection (to minimize interference with potential molecular detection).

Sample Collection

Approximately 2 ml of venous blood was collected aseptically from each of the 50 participants into EDTA tubes for serological analysis. Stool samples were requested from seropositive participants for molecular testing. Owing to logistical constraints during the study period, only five stool specimens that met the inclusion criteria were obtained and processed for DNA extraction and PCR.

Serological Testing (Rapid Diagnostic Test)

All 50 blood samples were screened for *H. pylori* IgG antibodies using a commercial one-step rapid diagnostic test kit (U-LIFESOURCE). The assay employs *H. pylori* antigen-coated particles and anti-human IgG to detect antibodies in serum within approximately 10 minutes. Three drops of serum were applied to the specimen well. Appearance of coloured lines at both the test (T) and control (C) positions indicated a positive result; a line only at the control position indicated a negative result. Tests lacking a control line were considered invalid and repeated.

Molecular Analysis

DNA was extracted from stool samples using the ZR Quick-DNA Fecal/Soil Microbe Microprep Kit (Zymo Research, supplied by Inqaba Biotec, South Africa) according to the manufacturer's instructions. Briefly, 150 mg of faecal material was processed with bead beating, followed by sequential filtration, washing, and elution steps. Extracted DNA was quantified using a NanoDrop 1000 spectrophotometer.

PCR amplification targeted a portion of the *H. pylori* 23S rRNA gene using the primers HP23S1835F (5'-GGTCTCAGCAAAGAGTCCCT-3') and HP23S2327R (5'-CCACCAAGCATTGTCCT-3'). Reactions were performed in a final volume of 40 µL containing 2× DreamTaq Master Mix (Inqaba Biotec), 0.5 µM of each primer, and template DNA on an ABI 9700 thermal cycler. Cycling conditions were: initial denaturation at 95 °C for 2 min; 30 cycles of denaturation at 94 °C for 20 s, annealing at 63 °C for 20 s, and extension at 72 °C for 20 s; followed by a final extension at 72 °C for 2 min. Products were resolved on a 1% agarose gel and visualized under blue-light transillumination. A band of approximately 350 bp was considered positive for *H. pylori* DNA.

Note: Although sequencing of the positive amplicon was planned, sequence data are not presented in this report.

Statistical Analysis

Data were entered into Microsoft Excel and summarised using descriptive statistics. Frequencies and percentages were calculated for demographic characteristics and laboratory findings. Results are presented in tables.

Study Limitations

Only five stool specimens were available for PCR analysis. This small number severely limits any direct comparison between serological and molecular methods and precludes robust statistical inference regarding discordance.

RESULTS

Participant Characteristics

A total of 50 patients were enrolled. Nineteen (38%) were male and 31 (62%) were female, indicating a female predominance (Table 1).

Table 1: Demographic distribution of study participants by age and sex (N = 50).

Age group (years)	Male n (%)	Female n (%)	Total n (%)
<10	2 (4)	2 (4)	4 (8)
11–15	2 (4)	5 (10)	7 (14)
16–20	3 (6)	4 (8)	7 (14)
21–25	3 (6)	2 (4)	5 (10)
26–30	0 (0)	3 (6)	3 (6)
31–35	0 (0)	0 (0)	0 (0)
36–40	3 (6)	3 (6)	6 (12)
41–45	3 (6)	2 (4)	5 (10)
46–50	0 (0)	1 (2)	1 (2)
51–55	1 (2)	4 (8)	5 (10)
56–60	0 (0)	1 (2)	1 (2)
61–65	1 (2)	1 (2)	2 (4)
66–70	1 (2)	2 (4)	3 (6)
71–75	0 (0)	1 (2)	1 (2)
Total	19 (38)	31 (62)	50 (100)

Seroprevalence of *Helicobacter pylori*

Rapid diagnostic testing detected *H. pylori* IgG antibodies in 28 of the 50 participants, giving an overall seroprevalence of 56%. Females accounted for the majority of positive results (21 of 28 positives; 42% of

the total study population), while males accounted for 7 positives (14% of the total population) (Table 2). Among females the positivity rate was 67.7% (21/31); among males it was 36.8% (7/19).

Table 2: Distribution of *Helicobacter pylori* antibodies by sex.

Sex	Number examined n (%)	Number positive n (%)	Positivity rate within sex
Male	19 (38)	7 (14)	36.8%
Female	31 (62)	21 (42)	67.7%
Total	50 (100)	28 (56)	56.0%

Age Distribution of Seropositivity

The largest proportions of participants belonged to the 11–15 and 16–20 year age groups (14% each). The highest absolute numbers of seropositive individuals

were observed in the 11–15 year (5 positives) and 51–55 year (5 positives) age groups (Table 3). All five participants aged 51–55 years were seropositive.

Table 3: Distribution of *Helicobacter pylori* antibodies by age group.

Age group (years)	Number examined n (%)	Number positive n (%)
<10	4 (8)	2 (4)
11–15	7 (14)	5 (10)
16–20	7 (14)	2 (4)
21–25	5 (10)	2 (4)
26–30	3 (6)	1 (2)
31–35	0 (0)	0 (0)
36–40	6 (12)	3 (6)
41–45	5 (10)	4 (8)
46–50	1 (2)	1 (2)
51–55	5 (10)	5 (10)
56–60	1 (2)	0 (0)
61–65	2 (4)	1 (2)
66–70	3 (6)	1 (2)
71–75	1 (2)	1 (2)
Total	50 (100)	28 (56)

Molecular Detection

Five stool samples obtained from seropositive participants were analysed by PCR targeting the 23S rRNA gene. Amplification confirmed the presence of *H. pylori* DNA in one sample; the remaining four samples were negative. These findings illustrate discordance between serological positivity and molecular evidence of current infection, consistent with the known persistence of IgG antibodies after bacterial clearance.

DISCUSSION

This study found a relatively high seroprevalence of *Helicobacter pylori* (56%) among patients attending the Gastrointestinal Clinic at the Federal Medical Centre, Yenagoa. Seropositivity was more frequent among females than males. PCR detected *H. pylori* DNA in only one of five stool samples from seropositive individuals. The disparity between serology and PCR highlights the well-recognised limitation of antibody-based tests: they cannot reliably distinguish active from previous infection.^[1-3]

The observed seroprevalence is consistent with reports from many developing countries where *H. pylori* remains highly endemic, driven by socioeconomic and environmental factors such as overcrowding, limited access to clean water, and early childhood exposure.^[1,5] Similar studies have sometimes reported higher prevalence among females, although sex-related differences are inconsistent across populations and may reflect healthcare-seeking behaviour rather than true biological differences.^[4]

The low rate of PCR confirmation is expected given the small number of stool specimens tested and is in keeping with literature showing that serology often overestimates active infection because antibodies can persist for months or years after eradication.^[2,3] Additional factors that may have contributed to PCR negativity include low bacterial load in stool, prior antimicrobial exposure not captured by the exclusion criteria, or degradation of DNA during sample handling and storage.

Reliance on serology alone risks overdiagnosis and unnecessary antibiotic treatment, which contributes to antimicrobial resistance. Where resources allow, incorporation of tests that detect active infection (stool antigen, urea breath test, or PCR) would improve diagnostic accuracy, guide appropriate therapy, and support surveillance of *H. pylori* and resistance patterns.^[3,5]

This study provides useful baseline seroprevalence data for Bayelsa State and illustrates the practical challenges of combining serological and molecular methods in a resource-limited setting. Strengths include the use of both antibody detection and PCR targeting a specific 23S rRNA fragment. Important limitations, however, must be emphasised: the study was conducted at a single centre with a modest sample size; molecular analysis was

restricted to only five stool samples, precluding meaningful statistical comparison of the two methods; and antimicrobial-resistance markers were not investigated.

Future multicentre studies with larger sample sizes should evaluate molecular detection alongside stool antigen testing, culture and antimicrobial-resistance profiling to strengthen the evidence base for *H. pylori* diagnosis and management in Nigeria.

CONCLUSION

A high seroprevalence of *H. pylori* (56%) was observed among patients attending the Gastrointestinal Clinic at FMC Yenagoa. PCR confirmed active infection in only one of five stool specimens examined from seropositive individuals. These findings underscore the greater specificity of molecular methods for detecting current infection and caution against reliance on serology alone for treatment decisions. Larger studies incorporating tests for active infection are warranted to guide clinical practice in the region.

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