Ascertainment of the Seroprevalence of *Helicobacter pylori* Infection among Adults in Some Urban Communities of Port Harcourt, South-South Nigeria

Abstract

Introduction:*Helicobacter pylori* is a highly evolved and adapted pathogen, notorious for infecting nearly half of all the people in the world. It is linked as a causative agent for numerous benign and malignant diseases of the digestive tract, such as peptic ulcer disease (PUD) and gastric cancer. This study was conceived to determine the seroprevalence of *Helicobacter pylori* in the urban communities of Diobu in Port Harcourt, Nigeria.

Materials and Methods:This retrospective cross-sectional study involved a review of laboratory records of persons resident in the study area between January 2022 and December 2023. The results of the laboratory tests of *Helicobacter Pylori* tests and relevant socio-demographic data about the ages, genders and areas of residence were extracted, coded and anonymously analyzed.

Results:The overall seroprevalence of *H. pylori*infection in the study area was found to be 34.6% The prevalences for specific urban communities were Mile I (23.9%), Mile II (43.3%), Mile III (37%) and adjoining urban communities (32.1%) The seroprevalence for males was 35.9% and 33.6% for females. Among the age groups, the highest seroprevalence was observed with the 30-39 age group (38.9%). 40-49 age group (37.8%), 60-69 age group (35.3%), 18-29 age group (32.8%) and 50-59 age group (25.6%).

Conclusion:The study has contributed to the body of knowledge on the seroprevalence *H Pylori* infections the urban communities. The findings will go a long way in assisting public health authorities in the policy design and implementation of prevention and control programs for malignant and benign digestive diseases associated with the bacteria.

Keywords: *Helicobacter pylori,* Diobu Port Harcourt, Seroprevalence, Peptic ulcer disease, Gastric cancer, *Digestive diseases*

Introduction

The discovery of *Helicobacter pylori* (*H. pylori)* in 1982 by Barry J. Marshall and Robin Warren marked a watershed in the scientific understanding and management of peptic ulcer disease (PUD) and other conditions associated with the bacteria. It also earned the two scientists a Nobel prize in Physiology or Medicine in 2005.[1] Before their landmark breakthrough, PUD was seen as a non-infectious disease caused by some types of diets, stress and related factors. *Helicobacter pylori,* is a ubiquitous, highly motile, microaerophilic, short helical, gram-negative bacterium, measuring 0.5–1 μm width, 2–4 μm in length; which may also appear as a rod, while coccoid shapes may be noticed after long-term in vitro culture or exposure to antimicrobial agents.[1,2]

H. pylori is notorious for infecting nearly half of the world population, with a global prevalence of 43.1% in 2022, down from an earlier 58.2% in 1990.[3] The African continent is known to bear the heaviest burden of *H.pylori* with a pooled prevalence of 70.1%.[3] The prevalence varies widely depending on sociodemographic factors such as age, health conditions, geography, race, socioeconomic status, and hygienic conditions.[3]*H. pylori* infection is highly prevalent in children and adolescents globally [4] Other predisposing factors include older age, poor hygiene conditions, crowded households, having infected close relations, drinking non-treated water, and low socioeconomic status.[5] Recent studies put the estimated number of persons infected globally with *H.pylori* at 4.4 billion; Nigeria, Portugal, Estonia, Kazakhstan, and Pakistan are the countries with highest population of infected persons.[2]

H. *pylori* infection is a highly evolved pathogen with the ability to colonize the gastric mucosa and tenaciously infect the stomach walls for long period, possibly the entire lifetime. The its efficient adaptability to the acidic and perilous gastric environment may have accounted a lot of immune responses leading to disparate pathological outcomes associated with the bacteria.[1] It has been linked with numerous benign and malignant diseases of the digestive tract, such as peptic ulcer disease (PUD) and gastric cancer.[6]

It is the major causative agent for peptic ulcer disease accounting for nearly 80% of. stomach ulcer and 90% of duodenal ulcer; it is also associated with chronic active gastroenteritis, stomach cancers and mucosa-associated lymphoid tissue lymphoma.[7] It is in the same class 1 biologic carcinogens category with viral infections such as hepatitis B and C viruses, human immunodeficiency virus, and human papillomavirus as classified by the International Agency for Research on Cancer, World Health Organization (IARC/WHO).[5] Complications of *H. pylori* infection extend beyond the digestive system and includes iron deficiency anaemia, vitamin B12 deficiency, cardiovascular diseases immune thrombocytopenic purpura, diabetes mellitus, and neurological disorders[4]

Diagnostic investigation of H. pylori infection falls into two categories, the invasive and non-invasive tests. The invasive procedure include endoscopy, histology, rapid urease test [RUT], bacterial culture from biopsy; while non-invasive tests includeserological, urea breath test (UBT) and the stool antigen test (SAT). There are also molecular techniques like PCR, real-time PCR, fluorescence in situ hybridization, and peptide mass fingerprinting[7,9]

This study was conceived to ascertain the seroprevalence of *Helicobacter pylori* infection in a high-density community within an urban city in the Niger delta region of Nigeria

Materials and Methods

Study Area

The study area, Diobu is a high-density collection of urban communities situated in the heart of Port Harcourt metropolis in the Niger Delta of Nigeria. The notable urban communities are Mile I, Mile II and Mile III urban communities. The coordinates of Diobu are: 4°47'24"N, 6°59'36"E (Latitude:4.772152; Longitude:6.994514). It is bordered on the north by New GRA, on the northeast by D-line, on the northwest Rivers State University, on the east by Old GRA, on the southeast by Kidney Island, and on the southwest by Eagle Island.

Diobu is a major hub of commercial and economic activities, hosting two of the major popular open-air markets in Port Harcourt, Theile I and mile II markets, as well as several specialized markets like the Mile III and Iloabuchi timber markets, the Ikoku motor spare parts markets, Mile III and Iloabuchibulding materials markets, Ojoto refrigerators markets, Anozie tires markets, Okija and Iloabuch electronic markets amongst others.

Many public and private healthcare facilities are located in Diobu, with the Kelsey Harrion Clinics and MgbuNdukwu Health centres as the notable public healthcare facilities. Private healthcare facilities include Meridian hospital Ikoku, New Mile One Hospital Emenike Street, Chijiman Hospital Ekwe street, Afini Clinic Afikpo street and several others. There are over 20 medical diagnostic laboratories, about ten

pharmacy outlets and numerous patent medicine shops and maternities catering for the health of the residents.

Diobu is populated with many low-income earners earning their living as artisans and petty traders, either on the roadsides, streets or in the open-air and specialized markets. Many of the big business owners live outside Diobu where they own well maintained houses, while most of the houses in Diobu were built in pre-independence and early independence times. There is however ongoing urban renewal with a number of older buildings giving way for newer ones.

Many households live in overcrowded rooms, with some rooms harboring more than four occupants. The residents depend on untreated borehole sources for water supply. There are toilet facilities in almost every home but there are cases of open defecation due to presence of vagrants and homeless persons found in every urban city in Nigeria. There are also large numbers of families occupying shanties across the Diobu watersides who defecate into the waters and on bare grounds.

Design of the study

This is a retrospective cross-sectional study conducted from 3rdJanuary 2022 to 3st December 2023involving 211 adult males and female residents of Diobu and closely adjoining urban communities of Port Harcourt metropolis; attending public and private healthcare facilities within the area. The inclusion criteria include persons who are 18 years and living withing mile I, mile II and mile III and closely adjoining neighborhoods such as Agip, Eagle Island, D-line etc., who within the study period, conducted serological laboratory investigations for IgG anti-H. pylori antibodies at Diagnostix and Scientifique Laboratories, Port Harcourt. Persons below the age of 18 years, those living far from Diobu or did not perform the two tests were excluded.

Data collection

Patients' data were obtained by going through their medical laboratory records. The outcomes of the laboratory tests of *Helicobacter Pylori* tests and relevant socio-demographic data about the ages, genders and areas of residence were extracted, coded and anonymously analyzed.

Statistical analysis

Data were analyzed with IBM SPSS Statistics version 25. Descriptive statistics were employed in presenting the data were in counts and percentages. Pearson chi-square test and Fishers exact test were employed to ascertain associations between the categorical variables.

Ethical Considerations

The study was reviewed and approved by ethical review committee of the Faculty of Medical Laboratory Science, Federal University Otuoke, Nigeria. Relevant approvals were sought and obtained from the management of Diagnostix and Scientific Laboratories.

Results

The study involved 211 blood specimens obtained from persons attending public and private healthcare facilities in Diobu, Port Harcourt, Rivers State Nigeria. The ages ranged from 18 to 69 years, the mean age was 38.26 (standard deviation 13.25), the median was 37, while the age with the highest frequency was 38 years. The number of males were 103 (48.8%), while the females were 108 (51.2%).

Seroprevalence of *Helicobacter pylori* in Diobu and Adjoining Urban Communities

The overall seroprevalence of *.H pylori* infection in Diobu and adjoining communities was found to be 34.6% in the sample areas. The seroprevalence for males was 35.9% and 33.6% for females. Among the age groups, the highest seroprevalence was observed with the 30-39 age group (38.9%). 40-49 age group 37.8%, 60-69 age group (35.3%), 18-29 age group (32.8%) and 50-59 age group 25.6% (Table 1.)

Table 1: Seroprevalence of *Helicobacter pylori* in Diobu and Adjoining Communities

Age Groups	Males			Females			Total		
	Positive	Negative	Total	Positive	Negative	Total	Positive	Negative	Total
18-29	12 (32.4)	16 (24.2)	28 (27.2)	9 (25)	27(26.2)	36(35.3)	21 (32.8)	43 (67.2)	64 (30.3)
30-39	11 (29.7)	16 (24.2)	27 (26.2)	10(27.8)	17 (23.6)	27 (25)	21 (38.9)	33 (61.1)	54 (25.6)
40-49	8 (21.6)	15 (22.7)	23 (22.3)	9 (25)	13 (18.1)	22 (20.4)	17 (37.8)	28 (62.2)	45 (21.3)
50-59	5 (13.5)	16 (24.2)	21 (20.4)	3 (8.3)	7 (9.7)	10 (9.3)	8 (25.6)	23 (74.2)	31 (14.7)
60-69	1 (2.7)	3 (4.6)	4 (3.9)	5 (13.9)	8 (11.1)	13 (12)	6 (35.3)	11 (64.7)	17 (8.1)
Total	37 (35.9)	66 (64.1)	103 (48.8)	36 (33.3)	72 (66.7)	108 (51.2)	73 (34.6)	138 (65.4)	211 (100)

Seroprevalence of *Helicobacter pylori* in Mile I Diobu, Port Harcourt

The seroprevalence of *Helicobacter pylori* in Mile I Diobu was 23.9%; the males had a prevalence of 21.1% and women had 29.2%. The 18-29 age group had a zero prevalence while the 30-39 had 28.6%; 40-49 (30); 5-59 (33.3%) and 60-69 (50) (Table 2)

Table 2: Seroprevalence of *Helicobacter pylori* in Mile I, Diobu, Port Harcourt

Age Groups	Males			Females			Total		
	Positive (%)	Negative (%)	Total (%)	Positive (%)	Negative (%)	Total (%)	Positive (%)	Negative (%)	Total (%)
18-29	0(0)	5(27.8)	5(26.3)	0(0)	5(29.4)	5(20.8)	0(0)	7(100)	7(17.1)
30-39	2(50)	4(22.2)	6(13)	2(28.6)	6(35.3)	8(33.3)	4(28.6)	10(71.4)	14(34.2)
40-49	1(25)	5(27.8)	6(13)	2(28.6)	2(11.8)	4(16.7)	3(30)	7(70)	10(24.4)
50-59	0(0)	3(16.7)	3 (6.5)	2(28.6)	1(5.9)	3(12.5)	2(33.3)	4(66.7)	6(14.6)
60-69	1(25)	1(5.6)	2(9.5)	1(14.3)	3I(17.7)	2(8.3)	2(50)	2(50)	4(9.8)
Total	4(21.1)	18(39.1)	19(41.3)	7(29.2)	17(37)	24(52.2)	11(23.9)	35(76.1)	41(100)

Seroprevalence of *Helicobacter pylori* in Mile II, Diobu, Port Harcourt

The group seroprevalence for Mile II Diobu was observed to be 43.3%; the seroprevalence for males was 46.7%, females 40%; the 60-69 age group had zero prevalence, while the prevalence for 18-29 was 35.7%, 30-39 (28.6%), 40-49 (14.3%) and 50-59 (21.1).

Table 3: Seroprevalence of *Helicobacter pylori* in Mile II, Diobu, Port Harcourt

Age Groups	Males			Females			Total		
	Positive (%)	Negative (%)	Total (%)	Positive (%)	Negative (%)	Total (%)	Positive (%)	Negative (%)	Total (%)
18-29	5 (35.7)	5 (31.3)	10 (33.3)	4 (40)	4 (26.7)	8 (39.6)	9 (37.5)	9 (29)	18 (32.7)
30-39	4 (28.6)	4 (25)	8 (26.7)	2 (20)	2 (13.3)	4 (18.5)	6 (25)	6 (19.4)	12 (21.8)
40-49	2 (14.3)	1 (7.1)	3 (10)	3 (30)	4 (26.7)	7 (25.9)	5 (20.8)	5 (16.1)	10 (18.2)
50-59	3 (21.4)	5 (31.3)	8 (26.7)	0 (0)	3 (20)	3 (11.1)	3 (12.5)	8 (25.8)	11 (20)
60-69	0 (0)	1 (7.1)	1 (3.3)	1 (10)	2 (13.3)	3 (14.8)	1 (4.2)	3 (9.7)	4 (7.3)
Total	14 (46.7)	16 (53.3)	30 (54.6)	10 (40)	15 (60)	25 (45.5)	24 (43.3)	31 (56.4)	55 (100)

Seroprevalence of *Helicobacter pylori* in Mile III, Diobu, Port Harcourt

The group seroprevalence for Mile III Diobu was observed to be 37%; the seroprevalence for males was 38.5%, females 35.7%; the 18-39 age group had a prevalence of 35%, the prevalence for 30-39 (57.1%), 40-49 (13%) and 50-59 (14.3%) and 60-69 (9.3%)

Table 4: Seroprevalence of *Helicobacter pylori* in Mile III, Diobu, Port Harcourt

Age Groups	Males			Females			Total		
	Positive (%)	Negative (%)	Total (%)	Positive (%)	Negative (%)	Total (%)	Positive (%)	Negative (%)	Total (%)
18-29	3 (30)	4 (25)	7 (26.9)	4 (40)	9 (50)	13(43.3)	7 (35)	13(65)	20 (37)
30-39	4 (40)	4 (25)	8 (30.8)	2 (20)	4 (22.2)	6 (20)	6 (42.9)	8 (57.1)	14 (25.9)
40-49	1 (10)	2 (12.5)	3 (11.5)	1 (10)	3 (16.7)	4 (13.3)	2 (28.6)	5 (71.4)	7 (13)
50-59	2 (20)	5 31.3()	7 (26.9)	0 (0)	1 (5.6)	1 (3.3)	2 (25)	6 (75)	8 (14.8)
60-69	0 (0)	1 (6.3)	1 (3.8)	3 (30)	1 (5.6)	4 (13.3)	3 (75)	2 (25)	5 (9.3)
Total	10 (38.5)	16 (61.5)	26 (48.2)	10 (35.7)	18 (64.3)	28 (55.6)	20 (37)	34 (63)	54 (100)

Seroprevalence of *Helicobacter pylori* in Adjoining Communities to Diobu, Port Harcourt

The group seroprevalence for the adjoining communities to Diobu was observed to be 32.1%; the seroprevalence for males was 36%, females 29%; the 18-39 age group had a prevalence of 31.3%, the 30-39 (35.7%), 40-49 (38.9%) and 50-59 (16.7%) and 60-69 (0)

Table 5: Seroprevalence of *Helicobacter pylori*in Adjoining Communities to Diobu, Port Harcourt

Age Groups	Males			Females			Total		
	Positive (%)	Negative (%)	Total (%)	Positive (%)	Negative (%)	Total (%)	Positive (%)	Negative (%)	Total (%)
18-29	4 (44.4)	2 (12.5)	6 (24)	1 (11.1)	9 (40.8)	10 (32.3)	5 (31.3)	11 (68.7)	16 (28.6)
30-39	1 (11.1)	4 (25)	5 (20)	4 (44.4)	5 (22.7)	9 (29)	5 (35.7)	9 (64.3)	14 (25)
40-49	4 (44.4)	7 (43.8)	11 (44)	3 (33.3)	4 (18.1)	7 (22.6)	7 (38.9)	11 (61.1)	18 (32.1)
50-59	0 (0)	3 (18.8)	3 (12)	1 (11.1)	2 (9)	3 (9.7)	1 (16.7)	5 (83.3)	6 (10.7)
60-69	0 (0)	0 (0)	0 (0)	0 (0)	2 (9)	2 (6.5)	0 (0)	2 (100)	2 (3.6)
Total	9 (36)	16 (64)	25 (44.6)	9 (29)	22 (71)	31 (55.4)	18 (32.1)	38 (67.9)	56 (100)

Discussion

This Study has been able to ascertain the seroprevalence of *Helicobacter pylori* in Diobu and some adjoining communities within Port Harcourt metropolis. The seroprevalence of 34.6% observed in this study was within the range of 28–51.4% reported as the prevalence in southern Nigeria.[10] It aligned closely with the 38.5% observed in Port Harcourt,[13] but much lower than the seroprevalence of 63% reported among patients attending a tertiary hospital in Port Harcourt.[12] This may be indicative of improved standards of hygiene in the study area and corelates with observations of declining trends in the prevalence of the bacterial infection globally.[3,4]

The seroprevalence was higher than the prevalence of 26.6% reported in Taiwan, which was also a decline from previous reports.[4]It was however lower than the 42.8% reported in adult patients attending public health facilities of Mizan Aman Town, Southwest Ethiopia;[11] and the 43.9% reported as the global pooled prevalence. A study in Ethiopia also reported a similar prevalence (34%) in dyspepsia patients attending a Comprehensive Specialized Hospital.[14] It appears that in Nigeria and across parts of Africa, efforts aimed at controlling H. pylori infections are yielding positive results as seen with lower prevalences that what was obtainable in the past

Age was observed to be a factor in the infection as over 80% of the infected persons were in the 18-49 age group which are the most active age group. This corroborates the findings of a study in United Arab Emirates that age is a factor in *H. pylori* infection.[15] While gender was observed as not being a factor as has been reported in a number of studies;[16] some studies have reported that the female gender as being more likely to be infected than the males.[5.17] More studies are required to unravel the reasons behind the discrepancies in the outcomes of the studies.

The seroprevalence of *Helicobacter pylori* in Mile I Diobu was the least of all the four communities in the study. This may be attributable to more improved hygienic standards, it may also be due to the low number of participants compared with the other communities. Poor hygienic standards have been a major factor associated with H. pylori infection.[18]

The highest prevalence of the four study areas was 43.3% recorded in the mile II area of Diobu, which a very close neighbourhood to mile I. A better understanding of the wide disparity may require further studies but a lot more efforts need to be channeled towards combating the situation. The factors may be attributable to the poor hygienic conditions and overcrowding associated with the slums or watersides of the area,[19]

The mile III and adjoining urban communities with seroprevalences of 37% and 32.1% respectively are more closely aligned to the overall prevalence. While the outcomes reported here are lower than previous reports and what is still found in some areas of Africa, efforts must be intensified to eradicate the scourge of *H pylori*.

The limitations of the study are largely as encountered in other retrospective studies, due to the fact of the samples having been analyzed and results obtained prior to the commencement of the study. Also, sociodemographic data used in the study are only those contained in the laboratory records, and there is no personal interaction with the participants. Some information that may enrich the study are therefore not captured. Prospective studies may be designed as follow-up to improve on the overcome the study.[20]

Conclusion

This study has been able to ascertain the seroprevalence of *H pylori* in some urban communities within Port Harcourt metropolis. This, to our knowledge is the first of such a study and has contributed in the body of knowledge required to for informed planning and decision making on the strategies for the

prevention and control of *H pylori* in the area. The prevalence of 34.6% in this study is a call for action on public health authorities to intensify efforts at creating public awareness and other interventions aimed to tame the scourge.

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