Prevalence of Peptic Ulcer Due to Helicobacter Pylori in Owerri, Imo State, Nigeria

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ABSTRACT

Background: Peptic ulcer disease (PUD) caused by *Helicobacter pylori* (H. pylori) infection is a significant health issue globally. This study aims to determine the prevalence of H. pylori-associated peptic ulcers among individuals in Owerri West Local Government Area (LGA), Imo State, Nigeria. Materials and Methods: A descriptive cross-sectional design was employed, targeting individuals aged 18 years and above in Owerri West LGA. A sample size of 268 respondents was determined using the Yammane formula and selected through a multi-stage sampling method. Data collection involved a combination of serological tests for H. pylori and structured questionnaires covering socio-demographic details. Results: The study revealed a high prevalence of H. pylori infection among individuals diagnosed with peptic ulcer disease, with 82.5% testing positive for H. pylori. The demographic analysis showed a diverse population with the largest age group being 31-40 years old and a slight majority of female respondents. The high prevalence of H. pylori infection among individuals with peptic ulcers in Owerri West LGA highlights the need for effective diagnostic and management strategies. The study underscores the importance of accessible and reliable diagnostic methods, as well as comprehensive management approaches, to address the burden of H. pylori-associated peptic ulcers in the region.

Keywords: Peptic ulcer, *Helicobacter pylori*, prevalence and Owerri

INTRODUCTION

Peptic ulcer disease (PUD) is a prevalent health issue globally, particularly in developing countries like Nigeria, where it is exacerbated by poor sanitation and limited healthcare access. The primary cause of PUD is *Helicobacter pylori* (H. pylori), a bacterium discovered in 1982, which has significantly altered the understanding and management of peptic ulcers (Sule, 2020).

In Nigeria, the prevalence of *H. pylori* infection among individuals with peptic ulcers varies significantly, with rates between 50% to 90% (Smith & Eke, 2019). Owerri West Local Government Area (LGA) in Imo State, Nigeria, exemplifies the semi-urban regions where the disease's prevalence is influenced by socioeconomic factors, lifestyle, and healthcare accessibility (Umeh, 2018).

Peptic ulcer disease (PUD) due to *Helicobacter pylori* (*H. pylori*) infection is a significant public health challenge in Nigeria. Despite advances in medical science, the prevalence of *H. pylori* infection and the associated burden of peptic ulcer disease remain high in this region (Smith & Eke, 2019). Factors such as poor sanitation, inadequate healthcare infrastructure, limited access to diagnostic and treatment facilities, and low public awareness contribute to the persistence of this problem (Umeh, 2018).

The high prevalence of *H. pylori* infection in Owerri West LGA exacerbates the morbidity and mortality associated with peptic ulcer disease. In this semi-urban area, the combination of urbanization and inadequate public health measures creates an environment conducive to the spread of H. pylori (Adiele & Chukwu, 2017).. This situation is further compounded by the lack of comprehensive data on the prevalence and management of peptic ulcer disease in the region, making it challenging to develop effective public health interventions.

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Moreover, the diagnosis and treatment of H. pylori-related peptic ulcer disease are hampered by limited resources and healthcare personnel. Many residents are unable to access or afford proper diagnostic tests and treatment regimens, leading to prolonged suffering and complications such as bleeding, perforation, and gastric cancer (Eze & Ugochukwu, 2016).. The absence of widespread public health education on the risk factors, symptoms, and preventive measures for peptic ulcer disease further aggravates the problem (Ndubuisi & Eze, 2020)..

Given these challenges, there is an urgent need to address the prevalence of peptic ulcer disease due to *H. pylori* infection in Owerri West LGA. This study aims to determine prevalence of peptic ulcer due to *Helicobacter pylori* in Owerri, Imo State, Nigeria, as it will help to inform the development of targeted interventions that could reduce the burden of peptic ulcer disease in this community and improve the overall health outcomes.

METHODOLOGY

Area of Study

This study was be carried out in Owerri-West Local Government Area (LGA), Imo State, Nigeria, is one of the 27 LGAs in the state. Owerri-West LGA has eight (8) districts known as Avu/Umuguma, Ihiagwa, Nekede, Obinze, Oforola, Okolochi/Eziobodo, Okuku (Obogwu) and Umunwoha. Geographically, Owerri West LGA is bounded by other local government areas such as Owerri Municipal LGA to the east, Owerri North LGA to the north, and Ngor Okpala LGA to the west. The LGA is also adjacent to the Orashi River and the Cross River Basin, providing natural resources and potential agricultural opportunities. Owerri West LGA serves as a significant hub for commercial and administrative activities in Imo State. It is home to various industries, markets, educational institutions, healthcare facilities, and government offices. The presence of these amenities contributes to the overall socio-economic development of the LGA. In terms of healthcare, Owerri West LGA is equipped with healthcare centers, hospitals, and clinics that provide primary, secondary, and tertiary healthcare services to the local population. These facilities offer medical consultations, diagnostic tests, treatments, and surgical interventions to address a wide range of health conditions, including peptic ulcers.

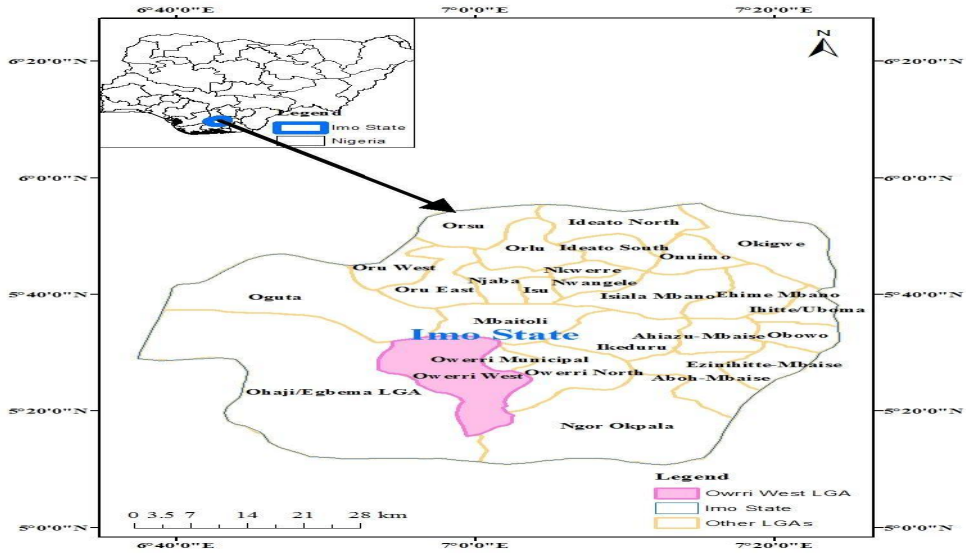

Figure 1: Map Of Imo State showing Owerri West LGA

Study Design

The study design was a community-hospital based descriptive cross-sectional design to determine the prevalence of peptic ulcers caused by *Helicobacter pylori* among the population. This design allows for the collection of data at a single point in time, providing a snapshot of the current prevalence of peptic ulcers in the population. By sampling individuals from Owerri West LGA, researchers can estimate the proportion of people affected by peptic ulcers and infected with *H. pylori*.

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Population of Study

Owerri-West Local Government Area (LGA) of Imo State, Nigeria, has a population of 140,100 according to 2016 population projection, (National Population Commission of Nigeria (web), National Bureau of Statistics (web), 2022). The study population consists of individuals aged 18 years and above residing in Owerri-West Local Government Area (LGA) in Imo State, Nigeria. The study population consists of patients encompass individuals receiving healthcare services, including civil servants, traders, farmers, students, and others.

Sample Size and Sampling Technique

Sample size

The sample size of 268 respondents was randomly selected from the study population. The sample size was determined at 95% confidence interval using the Yammane formula (1967) for sample size determination.

$$n = \frac{N}{1+Ne^2}$$

Where:

n is the desired sample size

N is the population size (140,100)

e is margin of error (0.05)

Therefore, n = 268

Sampling Techniques

A multi-stage sampling method was adopted for the study on the prevalence peptic ulcers due to *Helicobacter pylori* among the patients**.**

First stage**:** Selection of Districts (Communities)

Five (5) out of the eight (8) districts in Owerri West was selected by the researcher using simple random sampling via balloting to give every district an equal chance of selection. However, the basis for selecting five districts is to meet up with 30% of the total districts, providing a representative sample.

Second stage: Selection of villages

From each of the five (5) selected districts, three (3) villages were chosen through simple random sampling via balloting. This gave a total of 15 villages; this ensures that the selection is unbiased and representative of the district's population.

Third stage: Selection of households

Systematic random sampling was used to select households from the villages chosen in the second stage; the following steps were taken:

Household Listing: a comprehensive list of all households in each selected village was created by using existing records from the Owerri Capital Development Authority (OCDA).

The number of households to be included from each village was determined by dividing the sample size number by the number of villages selected, for example, 268/15 =18. This means that 18 households were surveyed per village.

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Consequently, numbers 1- 18 was written in a paper and each of the papers was folded and put in a small basket. The basket was shuffled and one of the papers was drawn by the trained research assistant. The 4th number was picked and used as the starting point. From the starting point of the 4th house and the interval of 10, the selected households were the 4th, 14th, 24th, and so on until we completed the sampling frame.

Fifth stage: Selection of Respondents

The researcher selected any adult aged 18 years and above in each household present at the time of study.

Data on sociodemographic characteristics and Risk factors of H. pylori

Instrument for Data Collection

The instrument for data collection involved serological assay test to ascertain information on the prevalence of peptic ulcer disease (PUD) among the population of Owerri West LGA. To also ascertain the diagnostic methods and techniques used for detecting *Helicobacter pylori* infection in patients with peptic ulcers.

The questionnaire consisted of the following sections: Sections 1: Personal Information of the respondent. Sections 2: Information on the socio-demographic details. Sections 3: Health Information, Sections 4: Information on the Lifestyle and Dietary Habits. Sections 5: Information on the access to healthcare. Sections 6: Information on the occupational exposure.

Data collection

Two sets of data were collected for this study. First, data on the presence and prevalence of *H. pylori* was collected. This was done by collecting blood samples from the consenting participants and subjecting them to serological test.

Second, data on personal information of the respondent, socio-demographic details, health information, information on the lifestyle and dietary habits, access to healthcare, occupational exposure, medication of peptic ulcers among participants were collected using a structured questionnaire. The questionnaire was personally administered by the researcher to respondents by hand and was collected thereafter. The questionnaire was distributed on face to face basis. All two hundred and sixty eight (268) copies of questionnaire was distributed, correctly filled and returned on the spot to achieve 100% return rate. Both the blood sample and the Meta data was collected at the same time while coding the questionnaire with the same code allocated to the blood sample in order to ensure proper identification.

Examination of samples for *H. pylori*

Sample collection for serological test

The consenting patients were asked to sit comfortably and relax to remain as calm as possible during the sample collection to minimize stress-induced changes in blood composition. The blood collection was from the vein in the inner elbow (antecubitalfossa). This area is easily accessible and provides an adequate amount of blood for testing. The chosen site was cleansed with an alcohol swab and allowed to air dry. This helps prevent infection. The blood collection equipment (sterile needle, a blood collection tube (often a vacutainer tube), and a vacuum system) was assembled. The needle was inserted into the cleaned vein using a quick and precise motion to minimize pain and discomfort. The blood collection tube was attached to the needle and the vacuum system allowed to draw blood into the tube. The required volume (3 ml) of blood was collected for the serological test. Once the blood sample has being collected, the needle was removed and gentle pressure applied over the puncture site with sterile gauze to stop any bleeding. The blood collection tube was properly labeled with the patient's name, date, and other necessary identifying information and transported to the laboratory for testing.

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Serological test for *H. pylori*

The *H. pylori* Rapid Test Device by Innovacon, Inc. 9975 Summers Ridge Road Manufacturer San Diego, CA 92121, US (Serum) was used. it is a rapid chromatographic immunoassay for the qualitative detection of antibodies to *H. pylori* in whole blood, serum, or plasma to aid in the diagnosis of *H. pylori* infection.

Principle

The *H. pylori* Rapid Test Device (Whole Blood/Serum/Plasma) is a qualitative membrane-based immunoassay for the detection of *H. pylori* antibodies in whole blood, serum, or plasma. In this test procedure, anti-human IgG is immobilized in the test line region of the test. After specimen is added to the specimen well of the device, it reacts with *H. pylori* antigen coated particles in the test. This mixture migrates chromatographically along the length of the test and interacts with the immobilized anti-human IgG. If the specimen contains *H. pylori* antibodies, a coloured line will appear in the test line region indicating a positive result. If the specimen does not contain *H. pylori* antibodies, a coloured line will not appear in this region indicating a negative result. To serve as a procedural control, a coloured line will always appear in the control line region, indicating that proper volume of specimen has been added and membrane wicking has occurred.

Test procedure for *H. pylori*

The test, specimen, buffer, and controls were allowed to reach room temperature (15-30°C) prior to testing. The pouch was brought to room temperature before opening it and the test device will be removed from the sealed pouch and used as soon as possible. The test device was placed on a clean and level surface. The dropper was held vertically and 2 drops of serum was transferred (approximately 50 µL) to the specimen well (S) of the test device, then 1 drop of buffer was added to the specimen well (S) and timed. The results was read at 10 minutes and was not interpreted until after 15 minutes.

Interpretation of Results

Positive: Two lines appear, one coloured line was in the control line region (C) and another apparent coloured line was in the test line region (T).

However, the intensity of the colour in the test line region (T) will vary depending on the concentration of *H. pylori* antibodies in the specimen. Therefore, any shade of colour in the test line region (T) will be considered positive.

Negative: One coloured line appears in the control line region (C). No line appears in the test line region (T).

Invalid: Control line fails to appear. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. The procedure will be reviewed and the test will be repeated with a new test.

METHOD OF DATA ANALYSIS

All data that was obtained via the questionnaire were coded and keyed into the Statistical Package for Social Sciences (SPSS version 21) for analysis. Descriptive results were expressed as frequencies and percentages. Multinomial logistic regression and Chi-square was used appropriately to test the significant differences or associations between independent and dependent variables with 95% confidence interval and P value of 0.5 and the important findings were presented in tables and figures.

Ethical Consideration/Informed consent

A letter of introduction and ethical clearance was obtained from the Department of Public Health Ethical clearance committee before the research was conducted. The purpose of the research was explained to each respondent and verbal informed consent obtained from them before inclusion into the study. Also, anonymity of the respondents were assured and ensured. The confidentiality of the information they gave was also be maintained.

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RESULTS

The results of the study on the prevalence of peptic ulcer disease due to *Helicobacter pylori* among individuals in Owerri West Local Government Area, Imo State, Nigeria showed that the demographic characteristics of the respondents in the study revealed a diverse population with varying backgrounds and professions. Among the respondents, the age distribution shows that the largest group is between 31-40 years old, constituting 27.6% of the population. The occupational distribution reveals that the largest group consists of civil servants, making up 34.0% of the patient population, while the least were the farmers (11.2%) (Table 1)

Table 1: Demographic Characteristics of the Respondents

Variable	Frequency (n=268)	Percentage (%)
Age		
18-30 years	60	22.4
31-40 years	74	27.6
41-50 years	54	20.2
51-60 years	43	16.1
>60 years	36	13.4
Gender		
Male	122	45.6
Female	146	54.5
Occupation		
Civil Servant	149	34.0
Trader	99	22.5
Farmer	49	11.2
Student	99	22.5
Other	42	9.6

Table 2 shows the prevalence of *Helicobacter pylori* infection among the individuals diagnosed with peptic ulcer. Out of the 268 patient, 82.5% individuals tested positive for *H. pylori*, while 17.5% tested negative for *H. pylori*.

Table 2: Prevalence of *Helicobacter pylori* infection among individuals with peptic ulcer disease

Diagnosis	Frequency (n=268)	Percentage (%)
Positive for *H. pylori*	221	82.5
Negative for *H. pylori*	47	17.5
Total	268	100

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Table 3 shows the distribution of *Helicobacter pylori* infection according to the demographic characteristics of the respondents. This revealed the age group of 31–40 years had the highest of 27.6% of the infection, and the lowest among those over 60 years (13.6%). Gender distribution showed that females constituted a slightly higher proportion of infected individuals (54.3%) compared to males (45.7%). In respect to occupation, civil servants had for the highest proportion of infected individuals (55.7%), followed by traders and students (37.1% each), while farmers had lower proportion of 18.6%.

Table 3: Distribution of *Helicobacter pylori* infection according to the demographic characteristics of the respondents

Variable	Total (n=268)	Positive for *H.pylori* (n=221)	% Positive	Negative for H. pylori (n=47)	% Negative
Age (years)					
18-30	60	49	22.2	11	23.4
31-40	74	61	27.6	13	27.7
41-50	54	45	20.4	9	19.1
51-60	43	36	16.3	7	14.9
>60	36	30	13.6	6	12.8
Gender					
Male	122	101	45.7	21	44.7
Female	146	120	54.3	26	55.3
Occupation					
Civil Servant	149	123	55.7	26	55.3
Trader	99	82	37.1	17	36.2
Farmer	49	41	18.6	8	17.0
Student	99	82	37.1	17	36.2
Other	42	34	15.4	8	17.0

% = percentage

DISCUSSION

The demographic characteristics of the respondents in this study reveal a diverse population with various backgrounds. The majority were female respondents which is onsistent with other studies where female patients often report higher healthcare-seeking behaviour compared to males (Graham et al., 2014).

The occupational distribution reveals that the civil servants making up 34.0% of the population. The remaining of 9.6%, fall into various other categories such as retirees and the unemployed. This occupational diversity suggests varied access to healthcare services and adherence to treatment protocols, consistent with other demographic studies (Klempereret al., 2016)..

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The prevalence and management behaviour of *Helicobacter pylori* (*H. pylori*) infection among individuals diagnosed with peptic ulcer disease was a critical focus of this study, aiming to understand the extent of this infection within the study population. The findings revealed 82.5% tested positive for *H. pylori*. This high prevalence indicates a significant presence of *H. pylori* infection among those with peptic ulcer disease in Owerri West Local Government Area, Imo State, Nigeria. A study conducted by (Hooi at al., 2017)., the global prevalence of *H. pylori* infection was reported to be around 44.3%. This study highlighted significant regional variations, with Africa having one of the highest prevalence rates at approximately 70.1%. The findings from this study indicate a higher prevalence rate than the global average and slightly higher than the continental average, suggesting a particularly high burden of *H. pylori* infection in this specific Nigerian community. A similar study in Northern Nigeria by (Jemilohuni at al., 2011) reported an *H. pylori* prevalence of 80% among patients with dyspepsia, which closely aligns with the findings of this study. This consistency underscores the widespread nature of *H. pylori* infection in Nigeria, likely influenced by socio-economic factors, sanitary conditions, and healthcare access (Eusebi at al., 2014).. Furthermore, a study in South Africa by Tanih at al. (2014) found an *H. pylori* prevalence of 68.9% among patients with gastrointestinal symptoms. While this prevalence is lower than what we observed in Owerri West, it still highlights a substantial infection rate. The variations could be attributed to differences in local healthcare practices, environmental factors, and population behaviours that affect transmission rates (Goh at al., 2011). Globally, the prevalence of *H. pylori* varies significantly by region and population. For example, in developed countries such as the United States, the prevalence is lower. A study by Zamani at al., (2018) indicated a prevalence of around 35%, reflecting better sanitation, healthcare infrastructure, and public health interventions aimed at reducing the transmission of *H. pylori*. In contrast, regions in Asia exhibit higher prevalence rates. A study in China by Zhang at al., (2014) reported a prevalence of 66.5%, which, while lower than the findings in this study, still signifies a high infection rate. This variation is often linked to differences in socio-economic conditions, dietary habits, and the effectiveness of public health measures (Graham et al., 2014). The findings in this study also align with those from a meta-analysis by (Malfertheiner at al., 2012)., which identified factors such as age, socio-economic status, and urbanization as significant determinants of *H. pylori* prevalence. In this study, the high prevalence could be partially attributed to the age distribution of the respondents, with the majority falling within the middle-aged groups, which are typically more exposed to *H. pylori* due to cumulative risk factors over time.

CONCLUSION

This study provides a detailed examination of the demographic characteristics and prevalence of *Helicobacter pylori* infection for peptic ulcer disease in Owerri West Local Government Area, Imo State, Nigeria. The study's findings align with global literature, indicating that socio-economic factors, sanitary conditions, and healthcare access significantly influence *H. pylori* prevalence. The study underscores the importance of localized health strategies to combat the high burden of *H. pylori* infection of peptic ulcer disease.

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