Sero-Prevalence of Helicobacter Pylori Infection on Patients with Epigastric Pain Attending University of Maiduguri Clinic

1U. M. Askira, 2B. B. Daggash, 3U. M. Kadaura, 4I. M. Tom, 5M. M. Ibrahim, 6U. A. Bukar, 1J. Ishaya

1,4Department of Medical Laboratory Science, University of Maiduguri
2Department of Medical Microbiology, Federal University of Health Sciences, Azare
3Department of Microbiology, University of Maiduguri

ABSTRACT
Helicobacter pylori is a pathogen that plays a major role in the development of gastritis and it is also an important risk factor for peptic ulcers in the world. H. pylori was classified as a class I carcinogenic agent, which includes agents that can cause gastric carcinogenesis and primary gastric B-cell lymphoma. The prevalence of H. pylori differs significantly among various countries, with higher prevalence in developing countries compared to developed countries. This study sought to establish the sero-prevalence of Helicobacter pylori infection in patients with epigastric pain attending University of Maiduguri Clinic.

To achieve this, the study recruited 150 participants who attend the University Clinic, University of Maiduguri. Immunochromatographic techniques were used to detect H. pylori antigens in blood.

H. pylori infection was observed to be higher in female subjects than in males and this was statistically significant (p=0.021). The relationship between the different socio-demographic parameters and the positive results P-value <0.05 was considered statistically significant. There was no statistical significance in the result based on the subject category (students, civil servants or security) (p=0.828). There was also no statistical significance in the positive results based on the age groups of the patients (p=0.528).

This study revealed an 80% prevalence of H. pylori among study subjects. In conclusion, the seropravelence of helicobacter pylori infections in patients with epigastric pain attending university of Maiduguri clinic was 80%.

Keywords: Maiduguri, epigastric pain, seropravelence, Helicobacter pylori

INTRODUCTION
*Helicobacter pylori* is a helix-shaped, curved rod gram negative bacterium measuring a length of about three 3µm by 0.5µm in diameter. It colonizes the host stomach and it is the major cause of peptic ulcers, gastritis, and gastric cancer especially in adulthood (Shiotani et al., 2000). The infections caused by *H. pylori* have been proved to be of great public health importance in developing countries, especially in low socio-economic groups. Poor hygiene, and sanitation, and crowded conditions have been reported as the risk factors for *H. pylori* infection (Brown, 2000). *H. pylori*, initially, had not been recognized as an infectious agent until 1982, in the seminal work of Nobel Laureates, Warren and Marshall. *H. pylori* colonizes various regions of the upper digestive system, mainly the stomach and duodenum, causing stomach and duodenal ulcers and certain stomach cancers. The infection is today surprisingly common, and the bacteria are believed to colonize more than half of the world’s population (Aziz et al., 2015). Over 50% of the world’s inhabitants are infected with the bacteria, with the highest prevalence being found in the developing countries (Go, 2002; Suerbaum and Michetti, 2002). Colonization by the bacterium is frequently acquired during early days in life. It may as well be linked to duodenal ulceration, peptic ulcer, gastric adenocarcinoma, and mucosa-associated lymphoid tissue (MALT) lymphoma (Alazmi et al., 2010). At least half of the world’s inhabitants harbor the bacterium, making it the main prevalent illness in the world. Furthermore, the *H. pylori* infection rate varies from country to country with the developing countries of the world having a much elevated infection rates than the developed countries. In the developed countries, the infection rates are estimated to be 25% and below (Crowe, 2005). There are considerable differences in the occurrence of the infections globally and even in various parts of any specific country, which is closely linked to socio-economic status and overcrowding (Ford et al., 2007).

Worldwide the most common cause of chronic gastritis is infection with *H. pylori*. The organism is known to cause progressive damages to the gastric mucosa and it is now accepted as playing a causative role in a number of important diseases, including duodenal ulcer disease, gastric ulcer disease, gastric adenocarcinoma and gastric mucosa-associated lymphoid tissue (MALT) lymphoma (Sugano et al., 2015). The prevalence increases generally with age, but decreases have also been noted in narrow age ranges in childhood (Torres et al., 2000; Sugano et al., 2015). In developing countries, the occurrence is comparatively high in children and the occurrence of *H. pylori* ranges from less than 10% to more than 80%. The risk factors to *H. pylori* infection includes but not limited to lower socioeconomic status, overcrowding conditions, migration to high prevalence regions, and infection status of family members (Mitchel, 2001). Inflammation of the pyloric antrum (the opening of the stomach into the duodenum) is more prone to lead to duodenal ulcers, while inflammation of the corpus (body of the stomach) is more likely to lead to gastric ulcers and gastric carcinoma (Suerbaum and Michetti, 2002; Schubert 2017).

However, it may be possible that *H. pylori* takes part in a significant function just in the initial stage which leads to common chronic inflammation, but not in later stages that leads to carcinogenesis (Brown, 2000). A meta-analysis conducted in 2009, was in...
agreement that the complete elimination of \textit{H. pylori} minimizes the danger of gastric cancer in formerly infected persons, suggesting that the persistent existence of \textit{H. pylori} infection constitutes a relative

\textbf{MATERIALS AND METHODS}

\textbf{Study Area}

The selected area for this study is the University of Maiduguri clinic which is located in Maiduguri, the capital of Borno State, northeast Nigeria. Borno State is situated along the seasonal Ngadda River which disappears into the Firkin swamps in the areas around Lake Chad. It borders the Republic of Niger to the north, Lake Chad to the northeast and Cameroun to the east. On the south and west, it borders the Nigerian States of Adamawa, Gombe and Yobe (Hiribarren et al., 2017). The annual average temperature is 25.8°C and average annual rainfall is 613mm. The driest month is January, February. Rainy season starts May through October and there are two major season; wet and dry seasons. The population of the state is 4,171,104 (National Bureau of Statistics, 2007).

\textbf{Study Design}

The study adopted a cross-sectional hospital-based study that involve sample collection from patient attending University of Maiduguri Staff and student Clinic.

\textbf{Inclusion criteria}

Only screened patient who are willing to give informed consent were included in this study. Patient who are symptomatic showing signs and symptoms of \textit{Helicobacter pylori} were included. Patients who are not under evaluation for post-therapy follow-up diagnosis were included. Patients seeking for routine care for H. pylori diagnosis were also included in this study

\textbf{Exclusion criteria}

All those who do not meet the inclusion criteria were excluded from this study

\textbf{Sample size estimation}

The sample size of the study would be determined by using a standard formula for the calculation of minimum sample size Sample size \( n \) is given by the formula

\[
n = \frac{(Z_t - a)^2 (P)(1 - p)}{d^2}
\]

Where; \( n \) = minimum sample size,
\( P \) = the best estimate of the population prevalence from literature reviews. This was found to be 11\% = 0.11 (Olayinde et al., 2014).
\( D \) = the differences between the true population rate and the sample that can be tolerated i.e. the degree of freedom=5\% (0.05) \((Z - a) \) = the value of standard normal deviation which is 95\% confidence, the confidence coefficient from normal probability table found to be 1.96

Minimum sample size \( n \) = \([(1.96)^2*0.11*(1-0.11)] \/(0.05)\)

\[=\frac{3.84*0.11*0.89}{0.0025} \]
\[=0.375936 \]
\[=150.3 \approx 150\]

One hundred and fifty (150) samples was used for the study.

\textbf{Sampling Technique}

Purposive sampling technique was used to recruit participants. Those who presented with the symptoms and signs that were suggestive of ulcers or gastritis at the outpatient department. They were talked to about the study and those who were willing to participate gave their consent in writing or that of their parents/guardian until the required sample size was attained.

\textbf{Sample Collection}

Venous blood was collected and used for the analysis. The blood donor was asked to sit. With the aid of a tourniquet, pressure was applied few centimeters from site of puncture. The area to be punctured was swabbed using 70\% alcohol. A 5ml syringe was used to collect four milliliter of blood sample. Collected blood was aseptically transferred into a plain vacutainer bottle.

\textbf{Serological test analysis for \textit{H. pylori}}

The test was based on the principle of immunochromatography 	extit{in vitro} for qualitative determination of \textit{H. pylori} antigens in blood (Bio tracers TM). The test used \textit{H. pylori} specific monoclonal antibodies coated on the membrane of the test device

\textbf{Test Procedure}

The testing device (cassette) was taken out of the foil pouch and paced on a clean and flat surface, preferably on a bench. Then the dispenser cap of the sample tube was twisted off and by holding the tube vertically, five (5) drops of the mixture of the stool sample and buffer were dispensed into the sample well of the cassette test device. The results were read after 15 minutes.
Test outcome Information
The blood sample with no antigen (for negative test) did not react with the *H. pylori* antibody conjugate in the test device. The buffer and the antibody conjugate migrated chromatographically on the membrane of the cassette and no colored line was generated on the test window (T). The *H. pylori* antigen in the stool sample (for positive test) reacted with the *H. pylori* antibody conjugate in the test device. The antibody-antigen mixture then migrated chromatographically on the membrane of the cassette and generated a red colored line on the test window (T). An additional line in the control window (C) appeared irrespective of presence or absence of the specific *H. pylori* antigen in the stool sample. The test results were read and interpreted within 15 minutes. A red colour band on test (T) and control (C) window, showed positive results (antigen detected) was indicative of *H. pylori* antigen in a negative result, a band appeared on the control (C) zone only, (antigen not detected).

Ethical consideration and approval
The ethical clearance for the study was obtained from the research and ethical committee of the University of Maiduguri. See appendix for an attached copy

Statistical analysis
The result obtained from the study will be analyzed using the statistical package for social sciences (SPSS) version 20.0 for windows. The student t-test will be used for the difference between the means of the groups. The level of significance will be set at 95% (p<0.05) confidence interval.

RESULTS
One hundred and fifty (150) patients whose informed consent has been sought were recruited into the study and this included 83 (55.33%) females and 67 (44.47%) males. 12 patients (8%) were in the age group 15-19 years, 86 (57.33%) were in the age group 20-24 years, 31 (20.67%) were 25-29 years and 21 (14%) were 30 years and above. Figure 4 shows the prevalence of *H. pylori* among the study subjects. 30 subjects (20%) were negative while 120 (80%) subjects were positive. The study therefore reveals an 80% prevalence of *H. pylori* infection among the study subjects.

The relationship between the different socio-demographic parameters and the positive results is shown on Tables 4.2a and 4.2b. *P* value <0.05 was considered statistically significant at 95% confidence level. There was no statistical significance in the result based on the subject category (students, civil servants or security) (*p*=0.828).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject category</td>
<td></td>
</tr>
<tr>
<td>Civil servants</td>
<td>6 (4%)</td>
</tr>
<tr>
<td>Security</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Students</td>
<td>141 (94%)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>15-19 years</td>
<td>12 (8%)</td>
</tr>
<tr>
<td>20-24 years</td>
<td>86 (57.33%)</td>
</tr>
<tr>
<td>25-29 years</td>
<td>31 (20.67%)</td>
</tr>
<tr>
<td>≥30 years</td>
<td>21 (14%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>83 (55.33%)</td>
</tr>
<tr>
<td>Male</td>
<td>67 (44.67%)</td>
</tr>
<tr>
<td>Clinical symptom of peptic/gastric ulcer</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>90 (60%)</td>
</tr>
<tr>
<td>No</td>
<td>60 (40%)</td>
</tr>
<tr>
<td>Medication</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>80 (53.33%)</td>
</tr>
<tr>
<td>No</td>
<td>70 (46.67%)</td>
</tr>
</tbody>
</table>
Table 4.2a: Relationship between subject category, age and positive patients in the study

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Category</th>
<th>Result</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Negative</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>Subject category</td>
<td>Civil servant</td>
<td>1</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Security</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Student</td>
<td>28</td>
<td>113</td>
<td>141</td>
</tr>
<tr>
<td>Age (years)</td>
<td>15-19</td>
<td>1</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>20-24</td>
<td>16</td>
<td>70</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>25-29</td>
<td>7</td>
<td>24</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>≥30</td>
<td>6</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>30</td>
<td>120</td>
<td>150</td>
</tr>
</tbody>
</table>

*(p<0.05 is significant).

Table 4.2b: Relationship between sex, clinical symptom and medication status vs. positive patients in the study

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Category</th>
<th>Result</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Negative</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
<td>11</td>
<td>72</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>19</td>
<td>48</td>
<td>67</td>
</tr>
<tr>
<td>Clinical symptom</td>
<td>No</td>
<td>25</td>
<td>35</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>5</td>
<td>85</td>
<td>90</td>
</tr>
<tr>
<td>Medication status</td>
<td>No</td>
<td>26</td>
<td>44</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>4</td>
<td>76</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>30</td>
<td>120</td>
<td>150</td>
</tr>
</tbody>
</table>

*(p<0.05 is significant).
Fig 4.2: Distribution of *H. pylori* based on age groups in the study area

Fig 4.3: Distribution of *H. pylori* based on sex in the study area
Discussion

*H. pylori* is the most important cause of chronic or atrophic gastritis, peptic ulcer, gastric lymphoma, and gastric carcinoma and an understanding of its seroprevalence is important in controlling its spread (Iannone *et al.*, 2018). The study was carried out to establish the seroprevalence of *H. pylori* in subjects with epigastric pain. The study revealed a high prevalence of *H. pylori* among study subjects with 80%. This is in agreement with the previous findings of Smith *et al.*, (2022) who stated that in Nigeria, the prevalence of *H. pylori* is high with an estimated 87.7% prevalence rate. This study revealed that females were mostly infected with *H. pylori*. This is in agreement with the previous findings of DeMartel and Parsonnet, (2006) who stated that females are predominant of *H. pylori* infection.

There was no statistical significance in the positive results based on the age groups of the patients. However, there was a statistical significance in the positive results based on sex as infection was observed to be statistically higher in female subjects than in males. Based on patients clinical symptom, *H. pylori* infection was found to be statistically higher in patients manifesting with clinical symptoms than in those without symptoms. Based on medication status, *H. pylori* infection was found to be statistically higher in patients who were said to be taking medication for gastric/peptic ulcers than in patients who were not under any treatment for such symptoms than in those without symptoms. Based on medication status, *H. pylori* infection was found to be statistically higher in patients who were said to be taking medication for gastric/peptic ulcers than in patients who were not under any treatment for such symptoms.

Conclusion

In conclusion, the seroprevalence of *Helicobacter pylori* infections in patients with epigastric pain attending university of Maiduguri clinic was 80% and the infection was observed to be higher in female subjects than their male counterparts and also higher in patients taking medication. These findings were statistically significant.

Recommendations

Based on the findings from this study, it is recommended that:

1. Individuals infected with *H. pylori* should be monitored closely in terms of gastric conditions
2. Further studies should be conducted using different diagnostic methods to evaluate the accuracy of the various techniques

References


**APPENDIX**

Plate 1. The ethical approval for the research.

Plate 2. Shows, Positive and negative test result those showing two bands on both the control and test is positive while one with single band on the control line is negative.