Prevalence of *Helicobacter pylori* in Students with Stomach Ulcer Attending School of Health Technology Gwadabawa, Sokoto

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Authors' contributions

This work was carried out in collaboration between all authors. Authors MLJ, KKI and AG designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors AAN and CN managed the analyses of the study. Authors AIU and AI managed the literature searches. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

This present study was conducted with the aim of determining the prevalence of *Helicobacter pylori*, (*H. pylori*) among students of Sultan Abdurrahaman School of Health Technology Gwadabawa, Sokoto State. The study included 147 subjects, made up of 45(30.6%) males and 102 (69.4%) females. Randox G6PD quantitative in vitro test screening was used for screening for *H. pylori*

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infection. 116 (78.9%) patients were positive and 31 (21.1%) were screened negative and of the 45 male subjects studied, 38 (25.9%) were positive compared to females 80 (54.4%). The Prevalence of *H. pylori* among the subjects was 78.9%, and the frequency was higher in females than males and much higher in those that are married than singles. Symptoms of abdominal pains and ulcer were strongly associated to infection of *H. pylori*. There is a need for the routine screening of subjects on a much wider scale for *H. pylori* to allow for evidence-based management of subjects the infection and also educate them on the factors that will predispose them to infection, as well as good water sources and proper sanitation in our environment especially in the rural areas where personal and environmental hygiene is poor.

1. INTRODUCTION

H. pylori formerly known as Campylobacter pyloridis, then *Campylobacter pylori* [1] is one of the commonest bacterial infections worldwide [2]. Nearly 50% of the world's population is affected *H. pylori*, is unipolar, multi-flagellate, spiral shaped, micro-aerophilic, gram negative micro-organism that was discovered by Warren and Marshall in 1982, from gastroscopy biopsy specimens [2,3]. It is the only organism capable of colonizing the hostile acidic environment of the stomach. This is due to its ability to produce an enzyme called urease, which hydrolyzes urea to produces ammonia which in turn buffers external acid and creates a suitable pH environment [4]. *H. pylori* weaken the protective mucous coating of the stomach and duodenum, which allows acid to get through to the sensitive lining beneath. Both the acid and the bacteria irritate the lining and cause a sore, or ulcer [5]. Its helix shape is thought to have evolved to penetrate the mucoid lining of the stomach [6].

Majority of *H. pylori* infected persons has no symptoms. Approximately 10-15% of the infected persons develop associated illnesses, with 1 to 10% developing peptic ulcer disease, 0.1 to 3% developing gastric cancer and less than 0.01% developing gastric mucosa- associated lymphoid tissue (MALT) lymphoma [2].

There are several lines of evidence implicating *H. pylori* in the development of gastric and duodenal ulcers:

1. *H. pylori* is found in most patients who have peptic ulcers in absence of NSAID use.
2. Presence of *H. pylori* is a risk factor for the development of ulcer.
3. Eradication of *H. pylori* significantly reduces the recurrence of gastric and duodenal ulcers.

4. Treatment of *H. pylori* infection leads to more rapid and reliable ulcer healing than treatment with anti-secretory therapy alone.

Early studies have estimated the rate of *H. pylori* infection in patients with duodenal ulcer.to be as high as 90% and in gastric ulcer to be as high as 70 to 90% [2].

Chronic *H. pylori* infection, particularly when acquired early in childhood, can predispose a person to a significantly increased risk of development of gastric cancer. These studies are so compelling that the World Health Organization has recently classified *H. pylori* as a type I human carcinogen [7] because chronic inflammation and atrophy can further lead to malignant transformation [6]

Humans are the only known host of *H. pylori*, with the stomach been considered as the reservoir of this pathogen [8]. *H. pylori* is contagious, although the exact route of transmission is not known [6], the transmission seems to be direct from person-to-person via faecal-oral or oral-oral routes in developing countries. And gastro-oral routes in developed countries [8] Although, certain epidemiological studies have suggested the possibility of water-borne and food-borne transmissions [2].

H.*pylori* is present in 95% of patients with duodenal ulcers, and in 70% of those with gastric ulcers [9]. Its prevalence is highly variable in relation to geography, ethnicity, age, and socioeconomic factors. The prevalence of *H. pylori* infection in a community is related to three factors: 1. Rate of acquisition of infection, i.e. the incidence 2. The rate of loss of the infection 3. The prolonged prevalence of the bacterium in the gastro-duodenal mucosa between infection and eradication Prevalence is

directly related to incidence and duration of illness [2].

The prevalence of *H. pylori* infection is more common in developing countries than in developed countries, as well as concerning children, the prevalence ranges from as low as 10% to as high as 80% respectively [8]. Although, the prevalence of this infection appears to be decreasing in many parts of the world, *H. pylori* remains an important factor linked to the development of peptic ulcer disease, gastric malignancy and dyspeptic symptoms [2].

Colonization with *H. pylori* virtually always leads to infiltration of the gastric mucosa in both antrum and corpus with neutrophilic and mononuclear cells. This chronic active gastritis is the primary condition related to *H. pylori* colonization, and other *H. pylori* associated disoders in particular result from this chronic inflammatory process [10].

Peptic ulcers are pains felt on the stomach or duodenum lining, which is where small intestine begins. Peptic ulcers are more frequent, and one major reason for this is invasion by the bacteria *Helicobacter pylori*, although some ulcers occur as a result of long term use of non-steroidal anti-inflammatory agents (NSAIDs), like aspirin and ibuprofen. In some rare cases, cancerous tumors in the stomach or pancreas can cause ulcers. Peptic ulcers are not caused by stress or eating spicy food, but these can make ulcers worse [11].

1.1 Inclusion Criteria

Subjects with clinical history of stomach ulcer, and are on treatment were recruited for this study.

1.2 Exclusion Criteria

All subjects with no clinical history of stomach ulcer, or on medication for ulcer.

2. MATERIALS AND METHODS

2.1 Study Area

Gwadabawa local government is located in Sokoto state, north-western part of Nigeria. With a population of 231,569 in 2006 census, and a projected population of 269,050 in 2011, with a land mass of 991 km^2.

2.2 Study Population

A total of 200 students within the age range of 20 – 60 years of birth, with history of abdominal pain, ulcer and have been taking medication for stomach ulcer for the past1 – 6 years; attending the School of Health Technology Gwadabawa were recruited for this study. Informed consent was obtained from the study subjects and ethical approval obtained from the school authority before commencing the study.

2.3 Study Design

This research is a prevalence study. The patients were conveniently enrolled into the study. Quantitative data was elicited using interviewer administered questionnaire, while the qualitative data was obtained by screening the subjects for *Helicobacter pylori*. Information on marital status, history of upper abdominal complaints within the previous years, dyspeptic symptoms, substantial burning pain, decrease appetite and constipation were investigated. Frequency of consumption of raw vegetable, coffee, alcoholic beverages and meat were collected. Age was recorded in complete years.

2.4 Specimen Collection and Processing

3 mls of blood were collected in plain containers and allowed to clot, then centrifuged at 3000 rpm for 5 minutes. The serum obtained were transferred into serum containers and stored in a refrigerator until needed for the analysis. The screening for *H. pylori* was carried out using a rapid test kit.

2.5 Methodology

The method used in this study is a one-step rapid chromatographic immune assay for the qualitative detection of antibodies of *Helicobacter. pylori,* which is a simple visual qualitative test that detects antibodies of *Helicobacter. pylori* in whole blood serum or plasma.

Principle; the *H. pylori* antigen is immobilized in the test region of the test strip after a whole blood, serum or plasma sample is placed in the sample pad. The mixture migrates chromatographically along the length of the test strip and interacts with the immobilized *H. pylori* antigen. If the specimen contains the antibodies, a colored line appears in the test line region

indicating a positive result, if no line appears at the test region, then the test is negative.

2.5.1 Data analysis

The data generated were analyzed using SPSS for windows version 17.0 (SPSS Inc., Chicago, IL) and chi-square test at a confidence level of 95%.

3. RESULTS

This study was conducted with the aim of determining the prevalence of *Helicobacter pylori* deficiency among students of Sultan Abdurrahman School of Health Technology Gwadabawa, and its environs.

4. DISCUSSION

In this study, out of the 147 subjects tested, 116 (78.9%) were positive and 31 (21.1%) were negative. This is similar to a study carried out by Ratha-kornet al. [12] in a study in Bhutan Thailand that reported a prevalence of 73.4%

and Newton et al. [13] in Uganda that reported a positive prevalence of 87% among adults, even though the prevalence was a bit higher than ours, and that of Aguemon et al. [14], in Benin republic that reported prevalence of 72.3% - 74.4% in rural and urban settlements respectively, and Benberin et al. [15], that reported a percentage prevalence 0f 62.4% in Kazakstan, and Akin et al. [16], that reported a prevalence of 77.5% in a study in Turkey.

Comparing the frequencies based on sex, out of the total number of 147 subjects, 45 were males and 102 were females, out of which 38 (25.9%) males were positive and 9 (6.1%) negative, and 82 (54.4%) of the females were positive and 20 (13.6%) were negative. This shows that the prevalence is higher in females than males, which is contrary to reports by most studies that reported a higher prevalence in males while others reported no differences between sexes. This might be due to the higher number of females in the study or other factors not captured by the scope of this study.

Table 1. The prevalence of *H. pylori* among test subjects based on demography and history of ulcer

Demographic aspect	Rapid test (Positive)	Rapid test (Negative)	Chi-square (95%CI)	*p*
Sex				
Male (*n*=45)	38 (25.9%)	9 (6.1%)	7.587	0.023
Female (*n*=102)	80 (54.4%)	20 (13.6%)		
Age (years)				
20–30 (*n*=98)	71 (48.3%)	27 (18.4%)		
31–40 (*n*= 43)	39 (26.5%)	4 (2.7%)		
41–54 (*n*=6)	6 (4.1%)	0 (-)		
Above 55 (*n*=0)	0 (-)	0 (-)		
Marital status				
Single (*n*=62)	48 (32.6%)	14 (9.5%)	0.143	0.705
Married (*n*=85)	68 (46.3%)	17 (11.6%)		
Period of episodes				
0-6 months (*n*=51)	37 (25.2%)	14 (9.5%)	4.241	0.237
7-12 months (*n*=8)	6 (4.1%)	2 (1.4%)		
1-6 years (*n*=85)	68 (46.3%)	17 (11.6%)		
7-12 years (*n*=3)	3 (2.0%)	0 (-)		
History				
Abdominal pains				
Yes (*n*=139)	114 (77.5%)	25 (17.0%)		
No (*n*=8)	2 (1.4%)	6 (4.1%)		
Ulcer				
Yes (*n*=143)	115 (78.2%)	28 (19.1%)		
No (*n*=4)	1 (0.7%)	3 (2.0%)		

Values computed at significance level of 5%.

When compared based on age groups, 98 subjects are between the age of 20 – 30 years, out of which 71(48.3%) were positive and 27 (18.4%) were negative. 43 subjects were within the age range of 31 – 40 years, out of which 39 (26.5%) were positive and 4 (2.7%) were negative and finally 6 subjects were between 41 – 54 years, and all were positive, having a percentage of (4.0%). From this result it can be seen that the prevalence of the infection decreases with age. Which is similar to findings by Newton et al. [13] in Uganda, and Cataldo et al. [17] in Cote d Ivore that reported a decline in prevalence with age.

In the current study, when the frequencies are compared based on marital status, out of 62 subjects comprising of 26 males and 36 female, 48 (32.6%) were positive and 14 (9.5%) were negative, and of the 85 married subjects comprising of 19 males and 65 females, 68 (46.3%) were positive and 17 (11.6%) were negative. This shows that the prevalence of the disease is high in the married group than with those that are single. This is in partial conflict with reports by Tsongo et al. [18] in a study carried out in Uganda that reported a similar frequency of 32.7% and 38.8% for singles using Elisa and rapid test kit respectively, but has a frequency of 30.3% and 25.8% for the married group. These current findings might be due to other risk factors like socio-economic status, living in rural communities, crowded households exceeding 8 person/ home, poor sanitation, all of which are positively associated with the presence of *Helicobacter pylori* infection as reported by Leonardo et al. [19] Hasosah et al. [20] Langat et al. [21] The difference noticed in the married group might be as a result of living in a crowded household in rural areas, and the fact that the former practices polygamy more than the later, due to religious differences.

When compared based on duration of reported disease manifestation and clinical signs and manifestations of ulcer, out of the 51 subjects having signs between 1 – 6 months 37 (25.2%) were positive and 14 (9.5%) were negative, out of the 8 subjects experiencing signs between 7 – 11 months, 6 (4.1%) were positive and 2 (1.4%) were negative, 85 were having signs between 1 – 6 years, out of which 68 (46.3%) were positive and 17 (11.6%) negative, of the 3 subjects having signs between 7 – 12 years all were positive having (2.0%).

Out of the 147 subjects screened, 139 subjects answered yes to having abdominal pains, and 8 answered no. out of which 114 (77.5%) were positive and 25 (17.0%) negative and of the 8 that answered no 2 (1.4%) were positive and 6 (4.1%) are negative. Out of the 143 subjects that answered yes to having ulcer, 115 (78.2%) were positive and 28 (19.1%) are negative. 4 subjects answered no to having ulcer out of which 1 (0.7%) was positive and 3 (2.0%) were negative. This finding is in line with findings by a study in Uganda by Tsongo et al. [18] that reported a frequency of 79.2% positive, for those that answered yes to having abdominal pains and a 75% frequency for those that responded yes to ulcer, although the study could not establish a significant association of the infection to a symptom. However the current finding is in line with reports linking *Helicobacter pylori* infection to the development of peptic and duodenal ulcers. As reported by Ratha-korn et al. [12] in a study in Bhutan Thailand.

5. CONCLUSION AND RECOMMENDATION

The prevalence of *H. pylori* among the students with ulcers was established as 78.9%, there was a difference in the results between sexes, the highest frequency was observed among students that have the infection between 1 – 6 years. Abdominal pain and ulcer were strongly linked to *H. pylori* infections.

There is a need for the routine screening of subjects especially new patients complaining of ulcer before the commencement of treatment and those on treatment on a much wider scale for *H. pylori* to allow for evidence-based management of subjects with the infection, and save treatment cost, and also educate them on the factors that will predispose them to infection, as well as good water sources and proper sanitation in our environment especially in the rural areas where personal and environmental hygiene is poor. And a longitudinal study that will follow the progress of the patient right from infection to about 6 years should be carried out, to ascertain whether the frequency increases with duration of infection, decreases of fluctuate should be carried out.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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