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SEROPREVALENCE OF *HELICOBACTER PYLORI* INFECTION AMONG DYSPEPTIC PATIENTS OF DIFFERENT BLOOD GROUPS SEEN AT AMINU KANO TEACHING HOSPITAL KANO, NIGERIA

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ABSTRACT

Helicobacter pylori remain one of the most common bacteria associated with some gastrointestinal diseases and the ABO antigens are increasingly gaining biological significance as they may be associated with predisposition to or protection from many diseases. The study aimed to determine the seroprevalence of *H. pylori* among dyspeptic patients of different blood groups with various gastrointestinal symptoms. Blood samples were collected from one hundred and fifty dyspeptic individuals and subjected to a one-step immune-chromatographic rapid test for the detection of antibodies (IgG) against *H. pylori*. The blood group of the samples was determined using the conventional haemagglutination technique and the result revealed that 114 (76%) of the blood samples were seropositive against *H. pylori* and females had a higher seroprevalence rate of 76.34% than males (75.44%). Generally, patients aged 31-45 years had the highest seroprevalence rate of 80.5%. The result also revealed that patients with blood group O⁺ had the highest seroprevalence (45.6%) of IgG antibodies against *H. pylori*. The study identified that a significant number of dyspeptic patients in the study area had *H. pylori* infection and that majority were of the blood group O. The study concludes that blood group O may be a predisposing factor in the establishment of *H. pylori* infection.

Keywords: *Helicobacter pylori*, Prevalence, Blood group, Dyspeptic, Kano

INTRODUCTION

Helicobacter pylori initially called *Campylobacter pyloridis* has been recognized as one of the important agents in

gastrointestinal (GI) diseases (1-3). It is a helical Gram-negative, microaerophilic bacterium that causes chronic low-level inflammation of the stomach lining and is

linked to the development of duodenal, and gastric ulcers and cancer (4). It plays a crucial role in the pathogenesis of upper GI disease including gastritis, peptic ulcer disease (PUD), and gastric cancer (5-6). *Helicobacter pylori* infection usually occurs in early childhood, persisting throughout life in most of the infected and affecting up to 50% of the world population (7). The transmission routes are oral-oral (by saliva), which prevails in the developed world, fecal-oral (person-to-person or by contaminated water, or maybe food), mainly in the developing countries, or gastro-oral (by vomiting and regurgitation) (8).

The acute phase of *H. pylori* infection is associated with transient, non-specific symptoms of dyspepsia (a condition that refers to a collection of gastrointestinal symptoms) that commonly resolve unnoticed (9). However, in about 10-20% and 1-2% of the infected persons respectively, there is a risk of developing peptic ulcer disease and gastric carcinoma (10). Dyspepsia is clinically associated with complex abdominal symptoms that include; upper-centered discomfort of pain, feeling of abdominal fullness, early satiety, abdominal distention and bloating, belching, and nausea (9). Up to half of *H. pylori*, strains produce cytotoxins, which along with other

secretions like proteases and phospholipases, can attack and damage mucosal cell membranes and cause local lacerations, leading to active gastritis and peptic ulceration (11).

The ABO antigens are permanently fixed on red blood cells and serve as lifelong biological markers for any individual as fingerprints (12). The ABO blood group system has its clinical importance not only in blood transfusion and transplantation but also exhibits biological significance and may be associated with predisposition to, or protection from many diseases (13).

Studies have shown that an association exists between *Helicobacter pylori* and group O antigens and others relate it closely to socioeconomic conditions (14-15). However, despite such reports, there is a paucity of data on the seroprevalence of *H. pylori* and its association with the blood group types in the study area. The study aimed to detect the presence of *H. pylori* among patients of different blood groups with various gastrointestinal symptoms.

MATERIALS AND METHODS

Sample Collection and Processing

Blood samples were collected from 150 purposely selected patients with dyspepsia that reported to the General Out-patient Department of Aminu Kano Teaching

Hospital Kano. Ethical clearance and permission to conduct the study were obtained from the ethical committee of the Hospital and samples were collected from patients that consented to participate in the study.

Five (5) milliliters of blood samples were collected between 8.00 am to 12.00 pm from the patients and placed into EDTA bottles as described by Cheesbrough (16). The blood samples were transported to the Microbiology Laboratory at Aminu Kano Teaching Hospital Kano State, for detection of IgG antibodies against *H. pylori* and the determination of the ABO Blood Group.

Detection of IgG Antibodies against *H. pylori*

The blood samples were screened for the presence of IgG antibodies against *H. pylori* using one step ANTI-HP rapid screen test. The kit is a lateral flow immunochromatographic test that utilizes an anti-human antibody and Rabbit anti-HP antibody (polyclonal antibody) on the nitrocellulose membrane with colloidal gold marked HP antigen as a mark tracer. Upon application to a blood sample, it produces a visible pink rose colour band whose intensity depends on the concentration of the anti-HP present in the sample. The test was carried out as described by the

manufacturer. Briefly, the collected blood samples were centrifuged to obtain the serum. The pouch containing the cassette was opened, labelled, and placed on a clean surface. Then thirty (30) microliter of the serum was transferred into the sample well using a pipette and a drop of buffer (Sodium Chloride) was then added to the wells. The results were read visually after 15 minutes.

Determination of ABO Blood Group

The ABO blood group for each patient was determined using the conventional hemagglutination test according to the methods described by Cheesebrough (13). The method employed the principle of agglutination or clumping as the antigens in the patient's blood reacted with anti-A, anti-B, or anti-D sera. Briefly, a drop of each of the anti-A, anti-B, and anti-D sera was placed on a white-labeled tile, then a drop of the patient's blood was added to each drop of the sera and mixed with a separate applicator stick, rocked gently, and observed for evidence of agglutination. The reactions were then observed and the results were recorded. Results were interpreted as follows:

1. anti-A⁺ and anti-B⁻ = Blood group A
2. anti-A⁻ and anti-B⁺ = Blood group B
3. anti-A⁺ and anti-B⁺ = Blood group AB

4. anti-A⁻ and anti-B⁻ = Blood group O

Data Analysis

Generated data were presented using percentages and Chi-square (χ^2) was used to compare seroprevalence rates of infection in various categories. A value of $p \leq 0.05$ was considered significant.

RESULTS

The results of the study revealed that out of 150 patients with dyspepsia, *H. pylori* was detected in 114 (76%) (Table 1). The seroprevalence was higher in females (76.34%) compared to males (75.44%) ($\chi^2=0.0171$, $df=1$, $P=0.157$) (Table 1).

The result of the study revealed that although there was no statistically significant difference in the seroprevalence of *H. pylori* among the studied patients based on age ($\chi^2=11.075$, $df=4$, $P=0.299$), patients over 60 years old had the highest seroprevalence rate of 100%, while those aged 1-15 years old had the lowest seroprevalence rate of 58.3% (Table 2).

Results shown in Table 3 revealed that patients with blood group O⁺ had the highest seroprevalence rate of IgG antibody against *H. pylori* of 45.6% ($\chi^2=7.7716$, $df=6$, $P=0.243$). The lowest seroprevalence rate of 0.9% was recorded against those with blood groups A⁻ and B⁻.

Table 1: Seroprevalence of *Helicobacter pylori* among the studied subjects based on gender

Sex	Total	Number positive (%)	P-value
Male	57	43(75.44)	0.157
Female	93	71(76.34)	
Total	150	114(76.00)	

Table 2: Distribution of *Helicobacter pylori* among the studied subjects based on age

Age group (years)	Total	Positive (%)	P-value
1-15	12	7(58.3)	0.299
16-30	29	15(51.7)	
31-45	82	66(80.5)	
46-60	17	10(58.8)	
>60	2	2(100)	
Total	150	114(76)	

Table 3: Distribution of *Helicobacter pylori* among the studied subjects based on blood group

Blood group	Total	Positive (%)	P-value
A ⁻	1	1(0.9)	0.243
A ⁺	28	24(21.1)	
B ⁻	1	1(0.9)	
B ⁺	35	27(23.7)	
AB	7	4(3.5)	
O ⁻	5	5(4.4)	
O ⁺	73	52(45.6)	
Total	150	114(76.0)	

DISCUSSION

The findings of this study showed a high seroprevalence rate (76.0%) of IgG antibodies against *H. pylori* among dyspeptic patients in the study area. This implies that the majority of the dyspeptic

patient in the study area are infected with *H. pylori*. Jemilohun *et al.* (14) expounded that high seroprevalence rates of *H. pylori* are not unexpected in a hyper-endemic area like Nigeria since serological tests cannot discriminate between previous and current infections especially considering that the seroprevalence assay's IgG antibody lasts for up to 3 years or more in the serum even after the organism has been eradicated. Recent studies by Bello *et al.* (15) among patients with gastroduodenal diseases in Kano reported a higher *H. pylori* prevalence of 81.7%. Compared to the findings of this study, Olokoba *et al.* (17) also reported a high prevalence rate of 93.6% for *H. pylori* by serology and 80.0% by histology in Maiduguri. In a related, study Chukwuma *et al.* (8) and Ayodele *et al.* (11) reported a lower seroprevalence of *H. pylori* of 51.4% and 39.8% among peptic ulcerative individuals in Nnewi, Nigeria, and among suspected peptic ulcer patients in Port Harcourt, Nigeria respectively. Compared with the present study, the variation in the prevalence rates could be attributed to the fact that the study participants in the present study comprised of patients that presented with various complaints of gastrointestinal symptoms, unlike the other reported study

whose participants were categorically patients diagnosed with peptic ulcer.

The findings of the study indicated that both sexes had similar *H. pylori* prevalence rates, although the seroprevalence was slightly higher in females (76.34%) compared to males (75.44%). A study by Bello *et al.* (14) indicated that there is an increased prevalence of *H. pylori* in males when compared with females ($P < 0.0041$).

The findings of this study revealed that the seroprevalence of *H. pylori* among the patients studied was insignificantly associated with age ($P = 0.299$), this supports earlier documented studies that *H. pylori* infection usually occurs in childhood and persists throughout adulthood (7). This is evidenced by the fact that patients within age groups 1-15 years and 46-50 years had almost the same seroprevalence rate. The high seroprevalence rates observed in those aged 31-45 years old support earlier observations by David and Hope (4) that individuals in these age groups are engaged in high interpersonal social activities that enhance the transmission of the bacteria. Additionally, Ayodele *et al.* (11) reiterated that the high seroprevalence of *H. pylori* infection observed in their study participants aged 31-50 years may not be unconnected with the fact that these groups constitute the

largest active labour force. They shoulder the highest family responsibility in any society as such may find it convenient to eat out in restaurants and fast food joints, which may not meet satisfactory food hygiene standards, thus increasing their exposure to foodborne infections.

The findings of this study indicated that patients with blood group O⁺ had the highest seroprevalence rate of IgG antibody against *H. pylori* infection, followed by those with blood group B⁺ and A⁺, and the least was observed in those with blood group A⁻ and B⁻ (P=0.243). In an earlier report, Alkout *et al.* (18) and Corcoran *et al.* (19) expounded that people of blood group O are at increased risk of peptic ulcers due to the enhanced binding of *Helicobacter pylori* to epithelial cells of persons of blood group O and due to low levels of the circulating plasma protein von Willebrand factor (vWf). They demonstrated that there was the release of interleukin (IL)-6, IL-10, and tumor necrosis factor (TNF) that bound in significantly higher numbers to group O leukocytes. This binding increases the density of colonization of epithelial cells and higher inflammatory responses to *H. pylori* of persons of blood group O. They concluded that blood group O might

contribute to increased susceptibility to peptic ulceration.

Consistent with the observations of the present study, a more recent study by Teshome *et al.* (20) also revealed a higher prevalence of PUD among patients with blood group O than other group types. Similarly, studies by Gasim *et al.* (21) revealed that Sudanese women with blood group O were at higher risk for *H. pylori* IgG seropositivity.

CONCLUSION

The study identified that a significant number of dyspeptic patients (76.0%) in the study area had *H. pylori* infection and that seroprevalence were higher among blood group O⁺ patients. The study concludes that blood group O may be a predisposing factor in the establishment of *H. pylori* infection.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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