

DISTRIBUTION OF ABO, RHESUS BLOOD GROUP AND *HELICOBACTER PYLORI* INFECTION AMONG SECONDARY SCHOOL STUDENTS IN CALABAR SOUTH LOCAL GOVERNMENT, CROSS RIVER STATE, NIGERIA

E. A Asemota¹, V.E Njar¹, I. T Aguanah¹, *Emmanuel Ifeanyi Obeagu²
<https://orcid.org/0000-0002-4538-0161>

- ¹ Department of Haematology and Blood transfusion Science, University of Calabar, Nigeria.
- ² Department of Medical Laboratory Science, Kampala International University, Western Campus, Ishaka, Uganda

ABSTRACT

Helicobacter pylori infection remains a public health issue and its pathogenesis is linked to ABO blood group and Rhesus blood system with diverse scientific reports. This study assessed the distribution of ABO, Rhesus Blood Group and *Helicobacter pylori* among Secondary School Students in Calabar South Local Government Area, Cross River State, Nigeria. Two hundred (200) subjects aged between 9 and 18 years were enrolled for this study. Informed consent was obtained from all parents of the participants and questionnaire administered. Blood group was done using standard tube method and *Helicobacter pylori* assayed using Rapid diagnostic kits(Micropoint Rapid diagnostic test(USA).Lot no.HP 1907).Statistical analysis was done using chi-square. One hundred and sixteen (116) respondents out of 200 were females representing 58% of the study population while eighty-four (42%) were males. Age group 13-15 made up 37% of the population with 74 children while age 10-12 were 58(29%), 15-18 were 48(24%) and the lowest age 9 with 20 respondents and 10%. Fifty-four (27%), 43 (21.5%), 31 (15.5%) and 72 (36%) students were of A, B, AB and O blood groups respectively. A total of 35 (46.5%), 23 (33.5%), 13(41.9%) and 40 (55.5%) students were seropositive for *Helicobacter pylori* infection of which belonged to groups A, B AB and O respectively. The age bracket of 13- 15 years 74(37%) had a higher *H. pylori* Infection rate of 56.3% across blood group O. Chi square analysis indicated that ABO blood group was significantly associated with *H. pylori* infection with respect to age ($X^2 = 43.612$, $P = 0.001$). From this study, blood group O was the most predominant and is more

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susceptible to *Helicobacter pylori* infection while group AB was the lowest. However blood groups A and B showed close proximity, Rhesus D positive blood group was more abundant with a higher occurrence of *Helicobacter pylori* infection. This study suggest that ABO and Rh (D) blood groups and age influence seropositivity for *Helicobacter pylori* infection.

Keywords: ABO blood group, *Helicobacter pylori*, seropositive, age

INTRODUCTION

Helicobacter pylori is a Gram-negative spiral-shaped pathogenic bacterium which inhabits the human gastric mucosa. The bacterium is present in approximately half of the world's population, but it causes symptomatic disease (peptic ulcer disease and gastric malignancy) in only 10–15% of those infected (Cooling, 2015).

In 1994, *H. pylori* was categorized as a class I carcinogen by the International Agency for Research on Cancer (IARC), a division of the World Health Organization (WHO) and considered to be the major risk factor of gastric cancer. Understanding who is likely to become infected and develop disease is extremely important, especially with increasingly common antibiotic resistant strains and the lack of an effective vaccine (Rossez, 2012).

Helicobacter pylori (*H. pylori*) infection is widespread among human populations. Previous seroepidemiologic studies indicated that about 50% of adults in developed countries and nearly 90% of adults in developing countries were positive for serum antibodies against *H. pylori* (Dogan, 2012). In developing countries, 70%–90% of the population harbor *H. pylori* which is mostly acquired during childhood, while in the developed countries, the prevalence is lower ranging from 30% to 40% (Saad and Chey, 2008). Studies from Nigeria by Bashir and Ali in Kano reported an *H. pylori* prevalence of 81%, Malu *et al.* in Jos, found a prevalence of 87%, while Aboderin *et al.* reported 73% in South-West (Etukudo, 2012).

The epidemiological view of the greater susceptibility of blood group O to infection by *H. pylori*, as well as support the conclusions of Alkout *et al* (2010) who demonstrated that the H antigen represents an important receptor expressed in the gastroduodenal mucosal cells to which *H. pylori* adheres.

The mechanisms by which *H. pylori* is usually acquired and its route of transmission remain unclear, however close human contact is required. Previous epidemiological studies showed that household hygiene practices and socioeconomic status (as defined by occupation, family

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income level, and living conditions) are important risk factors for *H. pylori* infection. These factors are thought to partially explain why rates of *H. pylori* infection vary between populations. Furthermore, a recent study showed a significant higher prevalence of *H. pylori* infection in sexual partners of *H. pylori*-infected subjects than in controls (Moher and Liberati, 2010). One genetically determined trait with known polymorphic expression between individuals and populations that has attracted interest as potential risk factors for *H. pylori* infection is ABO blood group. This premise was developed from previous studies showing a higher frequency of blood group O amongst patients with duodenal ulcer (Reid, 2011).

Helicobacter pylori remains a public health issue and its pathogenesis link to ABO blood group and Rhesus blood system with diverse scientific reports (Jaff, 2011). Presently in this location, there is scanty information on the distribution of ABO blood group among *Helicobacter pylori* infected secondary school students in Calabar South Local Government Area, Cross River state, Nigeria, hence the relevance of this study.

SUBJECTS, MATERIALS AND METHODS

Study Area

Calabar South is a Local Government Area of Cross River State Nigeria and it is located at latitude 4° 51'N and longitude 8° 20'E. It has an area of 264km and a population of 191,630 at the 2006 census. Postal code of the area is 540. Its headquarters are in the town of Anantigha.

Subjects

A total of 200 apparently healthy secondary school children aged 9 to 18 year in Calabar South Local Government Area were recruited for this study. Informed consent was obtained from the participants and their guardians/ parents. 4.0ML of venous blood was collected from participants via intravenous technique of blood collection and dispensed into EDTA-Ethylene diamine tetra acetic anticoagulant bottles. It was taken to the Medical Laboratory Science Village at University of Calabar Teaching Hospital (UCTH) for the determination of ABO and Rhesus blood group using tube method and *Helicobacter pylori* using Micropoint Rapid diagnostic test (USA). Lot no. HP 1907.

Method for Blood Group and Rhesus 'D' Grouping

ABO AND RHESUS 'D' CELL GROUPING

TUBE METHOD

MATERIALS: Khan tubes, tube racks, Pasteur pipette, tissue paper cotton wool.

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REAGENTS: Antisera (Anti-A, B, AB, and D)

SAMPLES: 5% washed cells suspension, ABO control samples (A, B, and O) and Rh control (Rh 'D' positive and Rh 'D' negative).

METHOD

Four (4) Khan tubes were set in a row on a rack and Anti A, B, AB and D were placed into khan tubes labeled accordingly. A Pasteur pipette was used to add a drop of 5% washed cell suspension across the tubes and mixed. The tubes were incubated at room temperature for one (1) hour. The content were examined for agglutination.

MICROPIONT RAPID DIAGNOSTIC TEST (USA).LOT NO.HP 1907

TEST PROCEDURE

The cassette was removed from its wrap pouch prior to performing the assay. It was labeled with patient's laboratory number. One drop of whole blood was added to the sample well of the cassette. One drop of buffer was added into the sample well. The results was read within 10-15 minutes.

Statistical Analysis

Data obtained from this research were analyzed using statistical package for social sciences (SPSS) (Chicagoo, IL). Chi- Square test was used to detect statistical significant differences among variables. P-values < 0.05 were considered significant.

RESULTS

Table 1 shows the demographic distribution of respondent by gender, 116 respondent representing 58% of the total population was female while 84 representing 42% were male. It showed that female showed more interest in the questionnaire than the male. The Demographic representation by age, the table showed that 20 respondents representing 10% were between the age below 9 years, 58 respondents representing 29% were between the age of 10-12, 74 respondents representing 37% were between age of 13-15. The distribution of respondents by their religion, 188 respondents representing 94% were Christians; 11 respondents representing 6% were Muslim. This implies that the majority of the respondents representing 188(94%) were Christians.

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Table 2 shows that majority of the respondents representing 72 (36%) had blood group O, 54 respondents representing 27% had had blood group A, 43 respondents representing 21% had blood group B and 31 respondents representing 15.5% had blood group AB. The result from the table 2 also revealed that *Helicobacter pylori* infection was dominant among blood group O which represented 40(55.5%). Out of 54(27%) of the respondents who have blood group A, 35(46.3) of the respondents had *Helicobacter pylori* infection. Respondents with blood group B, 23(33.5) of the respondents had *Helicobacter pylori* infection and respondents whom had blood group AB, 18 (58.1%) of the respondents had *Helicobacter pylori* infection. Majority of the respondents representing 197 were Rhesus D positive while 3 of the respondents were Rhesus D negative.

Table 3 shows gender of respondent with *Helicobacter pylori* infection. The male respondents were 10(45.5%), 8(52.3%), 5(4.7%) and 16(43.2%) for blood group A, B, AB and O respectively. The female respondents were 15(46.9%), 15(53.6%), 8(42.1%) and 16(43.2%) for blood group A, B, AB and O respectively. There was no statistical significant difference, ($P = 0.696$) among the variables.

Table 4 shows the age of respondents according to their blood group. The highest number of respondent were aged 13 – 15 (19(25.7%), 15(20.5%), 8(10.8%) and 32(43.2%) for blood group A, B, AB and O respectively. The lowest number of respondent we aged ≤ 9 years (5(25%), 4(20%), 2(10%) and 9(45%) for blood group A, B, AB and O respectively. There was no statistical system difference ($P = 0.940$) among the variables.

Table 5 shows the number of respondents with *Helicobacter pylori* infection based on their age. Blood group A respondent were 2(40%), 7(46.7%), 7(41.2%) and 6(46.1%) for ages 9, 10 – 12, 13 – 15, 16 – 18 and blood group A, B, AB and O respectively. Blood group O respondents were 3(33.3%), 11(40.7%), 18(56.3%) and 8(44.4%) for ages. 9, 10 – 12, 13 – 15, 16 – 18 and blood group A, B, AB and O respectively. There was statistical significant difference ($P = 0.001$) among the variables.

Table 1: Socio-Demographic Data of Secondary School Student in Calabar South, Cross River State.

Options	No of respondents n=200	Percentage(%)
Sex		
Female	116	58

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Male	84	42
Total	200	100
Age		
9 years	20	10
10-12	58	29
13-15	74	37
16-18	48	24
Total	200	100
Religion		
Christianity	188	94
Islam	12	6
Total	200	100

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Table 2: Distribution of respondents with *Helicobacter pylori* according to their blood groups

Variables Groups	Blood	No of subjects (n=200)	Helicobacter pylori +ve	Helicobacter pylori -ve
A		54(27)	35(46.5)	29(53.7)
B		43(21.5)	23(53.5)	20(46.5)
AB		31(15.5)	13(41.9)	18(58.1)
O		72(36)	40(55.5)	32(44.5)

Critical (P) value of X^2 at 0.05 level of significance = 3.841

Calculated $X^2 = 4.667$, $P = 0.198$

RHESUS

Positive	197	105(53.3)	69(46.7)
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Negative 3 3(100) None

$X^2= 61.438, P = 0.001$

Table 3: Gender of respondents with *Helicobacter pylori*

Blood group	Male	Female
A	10(45.5)	15(46.9)
B	8(52.3)	15(53.6)
AB	5(4.7)	8(42.1)
O	16(43.2)	16(43.2)

Critical (P) value of X^2 at 0.05 level of significance = 3.841

Calculated $X^2 = 1.441, P = 0.696$

Table 4 : Distribution of the age of respondents according to their blood groups

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Blood group	9	10-12	13-15	16-18	P-value
A	5(25)	16(27.6)	19(25.7)	13(27.1)	3.841
B	4(20)	10(17.2)	15(20.5)	10(20.8)	
AB	2(10)	5(8.6)	8(10.8)	7(14.6)	
O	9(45)	27(46.6)	32(43.2)	18(37.5)	

Critical (P) value of X^2 at 0.05 level of significance = 3.841

Calculated $X^2 = 3.524$, $P = 0.940$

Table 5 : No of respondents with *H. pylori* according to their age

Blood group	9	10-12	13-15	16-18
A	2(40)	7(46.7)	7(41.2)	6(46.1)
B	1(25)	4(40)	8(53.3)	4(40)

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AB	None	2(40)	3(37.5)	4(57.1)
O	3(33.3)	11(40.7)	18(56.3)	8(44.4)

Critical (P) value of X^2 at 0.05 level of significance = 3.841

Calculated $X^2 = 43.612$, $P = 0.001$

Discussion

In this study, two hundred (200) selected secondary school students were enrolled, comprising one hundred and sixteen (116) females and eighty four (84) males. It was confirmed that the most common blood group among the population was blood group O with 36% while blood group AB with 15.5% constituted the lowest blood group among the population in the study area. As respectively reported by Egsie *et al.* (2008) in a study carried out on undergraduate students of Niger Delta University, Bayelsa, Nigeria. The study showed that O Blood Group is highest occurrence among the subjects, followed by blood group A, B, and AB with percentage distribution of 53%, 20%, 19% and 8% respectively. This study also relates to the ABO blood group distribution reported by Jeremiah (2009) from a study carried out on students of African descent in Port Harcourt, Nigeria. He reported a prevalence of ABO phenotypes with O (49%) being the highest and AB (7%) being the least in occurrence, with ABO phenotype A and B having a prevalence of 22% and 20% respectively (Anyiam *et al.*, 2022; Mercy *et al.*, 2020; Obeagu, 2019; Okoroiwu *et al.*, 2015).

The findings from this study showed that females had the highest Incidence of blood group O with helicobacter pylori infection rate of 45.7% positive whereas male with blood group O had a 42.3% prevalence of helicobacter infection positive. The findings of the study is not in agreement with the study of Chizoba (2009) in a study of helicobacter pylori infection in Nwangela Local Government Area of Imo State reported that males had highest incidence of 0, 63(31.5%) out of 120 samples examined, followed by 57 (28%) for females. For blood group A, the study revealed that female had the highest prevalence of *H. pylori* infection of 63(31.5%). Generally, the female students constituted the highest population in the sampled population of the study which made female to have the highest prevalence rate of *Helicobacter pylori*. The

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findings of this study revealed that the age range between 13- 15 years 74(37%) had a higher *H. pylori* Infection rate of 56.3% across blood group O.

CONCLUSION

From this study, blood group O were the most predominant and are more susceptible to *Helicobacter pylori* infection while group AB were the lowest, however blood groups A & B showed close proximity, Rhesus D positive blood group were more abundant with a higher occurrence of *Helicobacter pylori* infection. This indicates that there is a relationship between the distribution of ABO and Rh (D) blood groups among Secondary School Students infected with *Helicobacter pylori* in Calabar South Local Government Area.

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