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## Immunological response to *Helicobacter pylori* among healthy volunteers in Agbor, Nigeria

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### ABSTRACT

**Objective:** To determine *Helicobacter pylori* (*H. pylori*) immunologically. **Method:** The seroprevalence of *H. pylori* infection was determined by ELISA technique in 380 individuals who gave informed consent, comprising 180 males (47.4%) and 200 females (52.6%) in Agbor, Nigeria. 124 (27.4%) of the subjects lived in the rural communities while 276 (72.6%) lived in the urban areas of Agbor. They were aged 1 to over 70 yr [mean age $\pm$ SD)=(39 $\pm$ 9.42) yr]. Five milliliter of clotted blood was obtained from each subject for specific HP-IgG antibodies. **Results:** Antibodies to *H. pylori* were detected in serum of 159 males (88.3%) and 182 females (91.0%). This was not statistically significant ( $P > 0.05$ ). A total of 341 (89.7 $\pm$ 21.4%) subjects presented anti-*H. pylori* antibodies. The prevalence of *H. pylori* increased with age from 14.8% in age group 1–9 yr to 100% in age group 30–39 yr and 60–69 yr. At above 70 yr, the seroprevalence decreased to 93.3%. **Conclusions:** The prevalence of *H. pylori* in Agbor is very high among adults while comparatively low among children. Since a lot of factors have been attributed to affect the rate of infection, increased standard of living and improved public health measures are encouraged and studies on the development and administration of an effective vaccine is recommended.

## 1. Introduction

*Helicobacter pylori* (*H. pylori*) was first isolated from the human gastric biopsy in 1983. It is a fastidious, microaerophilic, spiral gram-negative organism that is considered associated with active and chronic gastritis as well as with peptic and duodenal ulcer diseases[1–4]. It has been reported that about half of the world population is infected with *H. pylori*[5–7].

Many aspects of the epidemiology of this bacterium still remain unknown. The modes of transmission have been reported to include the oral–oral transmission, gastro–oral transmission and faecal–oral transmission[8] while its reservoir include the oral environment and domestic water[9]. Recently dental plaque (DP) and saliva have been implicated as possible sources of *H. pylori* infection[7,10].

However, most attempts to cultivate it have failed due to its microaerophilic nature. Polymerase chain reaction based assays and serological methods are now more often used to detect *H. pylori* in most countries including Nigeria because of their high sensitivity and specificity[11].

Incidence data for infection with *H. pylori* are not as abundant as information on prevalence. However, a few studies on the incidence of infection have been performed and the ones available suggest that rates of infection with the developing world are much higher than the 1%–2% yearly incidence reported in developed countries[11]. In many developing countries, the prevalence of infection with *H. pylori* exceeds 50% by 5 year of age and by adulthood, infection rates exceeding 90% are common[12]. In Nigeria, the infection involves up to 92% of all children older than 10 years and up to 39%–100% of adults, aged 50–59 years[13–16].

Currently, no data exist regarding the seroprevalence of *H. pylori* among asymptomatic individuals in Agbor, Nigeria. Therefore this study was conducted to determine the seroprevalence of *H. pylori* among children and adults

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living in Agbor, Nigeria.

## 2. Materials and methods

**Study population:** A total of 380 asymptomatic individuals (subjects) living in Agbor, South– South Nigeria made up of 180 males and 200 females, aged between 1 to over 70 yr [(mean age $\pm$ SD)=(39 $\pm$ 9. 42) yr] were recruited and evaluated for the presence of anti HP–IgG. Exclusion criteria included individuals who had taken antibiotics within 4 weeks preceding the study and those with past history of *H. pylori* eradication or gastrointestinal tract infection. A questionnaire including demographic characteristics and often related variables was administered to each person who gave informed consent.

**Sample collection analysis:** Five millilitre of clotted blood was obtained from each subject for specific HP–1gG antibodies by ELISA method with a sensitivity of 90%–95% and specificity of 95%–98%. The seropositive status was determined according to the manufacturers instruction (Biokit, Finland).

The *Chi*–Square test was used to determine significance and statistical analyses were performed using statistic package for social science (SPSS) version 10. The level of significance was set at  $P < 0.05$ .

## 3. Results

A total of 380 asymptomatic individuals comprising 180 males (47.4%) and 200 females (52.6%) attending the Central Hospital Agbor, Nigeria were examined for seropositivity of antibodies to *H. pylori*. They were aged 1 yr to over 70 yr [(mean age $\pm$ SD)=(39 $\pm$ 9.42) yr].

**Table 1**  
Seroprevalence of *H. pylori* infection in relation to gender and age.

Parameters		n=380 (%)	% seropositive
Sex	Males	180(47.4)	159(88.35)
	Females	200(52.6)	182(91.00)
Age(yr)	1–9	27(7.1)	4(14.80)
	10–19	58(15.3)	52(89.70)
	20–29	42(11.1)	40(95.20)
	30–39	68(17.9)	68(100.00)
	40–49	60(15.8)	58(96.70)
	50–59	54(14.2)	50(92.60)
	60–69	41(10.8)	41(100.00)
	>70	30(7.9)	28(93.30)
Place of birth	Rural	104(27.4)	80(76.90)
	Urban	276(72.6)	271(98.20)

The table shows that out of 380 subjects, 104 (27.4%) lived in rural communities around Agbor and 276 (72.6%) lived in the main city of Agbor. 80 (76.9%) of those that live in rural communities were seropositive while 271 (98.2%) of those in the main city of Agbor were seropositive. This was statistically significant ( $P < 0.05$ ). In all, 341 [(89.7 $\pm$ 21.4)%]

subjects were seropositive for anti–*H. pylori* antibodies. Males have a percentage seroprevalence of 88.3% compared to the 91.0% recorded in females. This was not statistically significant ( $P > 0.05$ ). There was a correlation between age and seroprevalence. The seroprevalence rose from 14.8% in age group 1–9 yr to 100% in age groups 30–39 yr and 60 yr. It however dropped to 93.3% in age group of over 70yr. The decrease from 100% to 93% seroprevalence was statistically significant ( $P < 0.05$ ).

## 4. Discussion

It has been reported that *H. pylori* infection is acquired by so many routes including oral–oral or faecal–oral transmission and from drinking contaminated water[5]. Several studies have reported high prevalence's of this organism in Africa[17,18]. It has also been reported that the onset of *H. pylori* infection from childhood, which once established, may prevail throughout life[4,19,20,21]. In this study, the seroprevalence rate rose from 14.8% in age group 1–9 yr to 100% in age groups 30–39 yr and 60–69 yr (adult groups). This is similar to the study in Tanzania where seropositivity rose with age from 76% in children aged 0–4 yr to 99% in adults[22] and in Cameroon where incidences of 52.27% and 92.2% *H. pylori* infection were recorded[18].

In Nigeria, the age bracket of 0–18 yr is recorded as the children group and above 18 years is the adult group. One of the major finding in this study is that the children had a seroprevalence rate of 14.8% in age group 1–9 yr and 89.90% in 10–19 yr. The 14.8% recorded here is low compared to the 76% in children in Tanzania and also the 57%–82% in children in Nigeria between 5–9 yr[14].

The variation in seropositivity among children in the different studies may be due to standard of living and sanitary practices especially in developed countries and in low socio–economic groups[5,9]. These factors may also be responsible in developing countries. In the studied area, use of contaminated water for domestic activities and lack of portable water may have a high impact in transmission of *H. pylori* among individuals. Although *H. pylori* survival is short in water, it has been detected in water, swimming pools, rivers and streams[23].

The high seroprevalence rates of 100% in the age groups of 30–39 yr and 60–69 yr may be attributed to the socio–economic activities of these adults. The age group of 30–39 yr is the very high sexually active group where most individuals/partners are engaged in sexual activities such as kissing and sex. *H. pylori* has been reported to be present in the oral cavity and as a normal flora of the human vaginal niche[24].

Another important finding in this study is the higher prevalence of *H. pylori* in females (91.0%) than in males (88.3%). This is in contrast to previous reports[25]. Factor such as gastroesophageal reflux may be one reason for the high seroprevalence. Also, females in Agbor, Nigeria are increasingly involved in sexual activities in the urban areas

perhaps due to their socio-economic demands while the majority of them in the rural areas may have contact with *H. pylori* due to occupational exposure to the bacterium since kissing, water supplies and food are sources of *H. pylori* infection.

Despite extensive epidemiological research, the precise mode of transmission of *H. pylori* infection has not yet been firmly established. The high seroprevalence in adults in this study is of public health significance. We therefore recommended that community education about effective oral hygiene and adoption of good hygiene practices be encouraged. The low seroprevalence rate in children must not also be undermined as *H. pylori* infection once establish in children tends to build up and increase in adults.

### Conflict of interest statement

We declare that we have no conflict of interest.

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