

## ***Helicobacter pylori* infection in asymptomatic rural Bangladeshi population**

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### **Abstract**

**Background and objectives:** The prevalence of *Helicobacter pylori* infection differs in urban and rural population. In our country, no previous study investigated the *H. pylori* infection in rural population. The aim of the present study was to find out the status of *H. pylori* infection among the Bangladeshi asymptomatic rural adult population.

**Material and Methods:** This cross-sectional study was carried out in a rural area located about 40 km north-east of capital Dhaka. Apparently healthy non-diabetic, pre-diabetic and diabetic adults (18 years and above) were enrolled in this study. A structured questionnaire was developed to record the socio-demographic and clinical information. *H. pylori* infection status was determined by the presence of anti- *H. pylori* IgG antibody in blood. Serum anti-*H.pylori* IgG antibodies were determined by immunochromatographic test (ICT) method.

**Results:** A total number of 180 apparently healthy adult individuals were enrolled of which 112, 40 and 28 were non-diabetic, pre-diabetic and diabetic respectively. Out of 180 individuals, anti- *H. pylori* IgG was present in 70 (38.9%, CI: 32.1, 46.2) cases. Infection rate was 50%, 27.5% and 43.5% in 19-30, 31-50 and >50 years age group respectively. Infection rate was significantly ( $p < 0.05$ ) low in 31-50 years age group compared to 19-30 and > 50 years age groups. *H. pylori* infection rates in male and female were 42.6% (CI: 29.2, 56.8) and 37.3% (CI: 28.9, 46.4) respectively ( $p=0.50$ ). There was no significant ( $p>0.05$ ) association of *H. pylori* infection with economic status, education level, occupation and tobacco consumption of the study population. The rate of *H. pylori* infection in non-diabetic, pre-diabetic and diabetic individuals were not significantly different from each other.

**Conclusion:** The study revealed a low prevalence of *H. pylori* infection in rural population of Bangladesh. There was no significant association of *H. pylori* infection with several sociodemographic status and diabetes.

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### **Introduction**

*H. pylori*, a gastroduodenal pathogen, causes chronic gastritis and peptic ulcer disease and is associated with gastric cancer [1]. The prevalence of *H. pylori* infection is more in developing countries. Poverty-related factors including overcrowding, poor sanitation, unclean water and

low education level are the main risk factors of acquiring *H. Pylori* [2]. The infection tends to become chronic unless it is treated with antimicrobials [3].

In developed countries, the prevalence ranges from 11-32% in adults [4,5] and 10-16.7% in children [6,7]. On the hand, in developing countries, it

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ranges from 49-87% in adults [8,9] and 9-78.6% in schoolchildren [10,11]. However, in some developing countries, the prevalence is decreasing. For example, in South Korea, a significant decrease in prevalence was observed from 1998 (66.9%) to 2005 (59.6%) [12]. Bangladesh is one of the developing countries having peptic ulcer disease as a common health problem. The seroprevalence was reported 92% in 1997 [13] and 71.1% in 2008 [14] among the asymptomatic adults. In children, the prevalence was reported as 58% (0-4 years) to 82% (8-9 years) in Bangladesh [15,16]. The prevalence differs in urban and rural settings. In Vietnam, significantly higher prevalence of *H. pylori* infection was observed in urban area than in rural area. In the rural population of Vietnam, the risk for acquiring infection was 40% less than in the urban people [17].

In our country, no previous study investigated the *H. pylori* infection in asymptomatic rural population. Therefore, the primary aim of the present study was to find out the current prevalence status of *H. pylori* infection among the Bangladeshi asymptomatic adult rural population.

## Materials and Methods

**Study place and population:** This cross-sectional study was carried out in a rural area named Sreepur under Gazipur district. The rural area is located about 40 km north-east of capital Dhaka. Apparently healthy non-diabetic, pre-diabetic and diabetic adults (18 years and above) were enrolled in this study. Diabetes mellitus (DM) and pre-

diabetes were defined according to the criteria of American Diabetes Association [18]. Informed written consent was obtained from all the participants after explaining the nature and purpose of the study. A structured questionnaire (close ended) was developed and used to record the socio-demographic information and clinical history. It was pretested and checked for applicability before it was finally launched at the field to interview for data collection from the respondents.

**Collection of blood and estimation of anti- *H. pylori* IgG antibody:** *H. pylori* infection status was determined by the presence of anti- *H. pylori* IgG antibody in blood. Blood samples (2.5 mL) were collected aseptically from each participant by peripheral venipuncture under aseptic conditions. After collection, the serum was separated, aliquoted, refrigerated at 4°C and then transported to the microbiology laboratory in a cold box. Serum anti- *H. pylori* IgG antibodies were determined by ICT (immunochromatographic test) method using AimStep™ *H. Pylori* Rapid Cassette test device (Germaine® Laboratories, Inc, USA). The test was performed and interpreted according to the manufacturer's instruction.

## Result

A total number of 180 apparently healthy adult individuals were enrolled of which 112, 40 and 28 were non-diabetic, pre-diabetic and diabetic respectively. Out of 180 individuals, IgG antibody for *H. pylori* was present in 70 (38.9%; CI: 32.1,

**Table-1:** *H. pylori* infection according to age and gender of the study population

| Category            | Total number | Anti- <i>H. pylori</i> IgG positive Number (%) | 95% CI     | p value  |
|---------------------|--------------|--|------------|----------|
| All                 | 180          | 70 (38.9)                                      | 32.1, 46.2 | -        |
| <b>Age (years)</b>  |              |  |            |          |
| 19-30 <sup>a</sup>  | 42           | 21 (50)  | 34.2, 65.8 | 0.017*   |
| 31-50 <sup>b</sup>  | 69           | 19 (27.5)                                      | 17.5, 39.6 | 0.05**   |
| >50 <sup>c</sup>    | 69           | 30 (43.5)                                      | 31.6, 55.2 | 0.504*** |
| <b>Sex</b>          |              |  |            |          |
| Male <sup>a</sup>   | 54           | 23 (42.6)                                      | 29.2, 56.8 | 0.505*   |
| Female <sup>b</sup> | 126          | 47 (37.3)                                      | 28.9, 46.4 |          |

Note: CI: confidence interval; p value determined by chi square test; \*a vs b; \*\*b vs c; \*\*\*c vs a.

**Table-2:** *H. pylori* infection according to socio-demographic characteristics of the study population

| Category                            | Total number | Anti- <i>H. pylori</i> IgG positive<br>Number (%) | 95% CI     | p value |
|-------------------------------------|--------------|---|------------|---------|
| <b>Economic status</b>              |              |   |            |         |
| Middle class <sup>a</sup>           | 90           | 39 (43.3)   | 32.9, 54.2 | 0.221*  |
| Poor <sup>b</sup>                   | 90           | 31 (34.4)   | 24.7, 45.2 |         |
| <b>Education</b>                    |              |   |            |         |
| Illiterate <sup>a</sup>             | 91           | 32 (35.2)   | 25.4, 45.9 | 0.3*    |
| SSC/HSC/more <sup>b</sup>           | 89           | 38 (42.7)   | 32.3, 53.6 |         |
| <b>Occupation</b>                   |              |   |            |         |
| Farmer <sup>a</sup>                 | 34           | 16 (47.1)   | 29.8, 64.9 | 0.139*  |
| Housewife <sup>b</sup>              | 106          | 35 (33)   | 24.2, 42.9 | 0.106** |
| Skilled worker <sup>c</sup>         | 40           | 19 (47.5)   | 31.5, 63.9 | 0.97*** |
| <b>Smoking/ Use of tobacco leaf</b> |              |   |            |         |
| Yes <sup>a</sup>                    | 119          | 47 (39.5%)  | 30.7, 48.9 | 0.816*  |
| No <sup>b</sup>                     | 61           | 23 (37.70)  | 25.6, 51   |         |

Note: CI: confidence interval; p value determined by chi square test; \*a vs b; \*\*b vs c; \*\*\*c vs a

**Table-3:** *H. pylori* infection according to diabetes status

| Category           | Total number | Anti- <i>H. pylori</i> IgG positive<br>Number (%) | 95% CI     | p value   |
|--------------------|--------------|---|------------|-----------|
| Non-diabetic (Gr1) | 112          | 44 (39.3%)  | 30.2, 48.2 | 0.722*    |
| Pre-diabetic (Gr2) | 40           | 17 (42.5%)  | 27, 59.1   | 0.387**   |
| Diabetic (Gr3)     | 28           | 9 (32.1%)   | 15.9, 52.4 | 0.486***  |
| Pre-diabetic+      | 68           | 26 (38.23)  | 27.6, 50.1 | 0.889**** |
| Diabetic (Gr4)     |              |   |            |           |

Note: CI: confidence interval; p value determined by chi square test; \*Gr1 vs 2; \*\*Gr2 vs 3; \*\*\*Gr1 vs 3; \*\*\*\*Gr1 vs Gr4.

46.2) cases. Table-1 shows the *H. pylori* infection status by age and gender. Infection rate was 50%, 27.5% and 43.5% in 19-30, 31-50 and >50 years age group respectively. Infection rate was significantly ( $p < 0.05$ ) low in 31-50 years age group compared to 19-30 and > 50 years age groups. There was no significant ( $p=0.5$ ) difference of infection in the 19-30 and >50 years age groups. The infection rates in male and female were 42.6% (CI: 29.2, 56.8) and 37.3% (CI: 28.9, 46.4) respectively. No significant association of *H. pylori* infection was observed with economic status, education level, occupation and tobacco consumption of the study population (Table-2). The rate of *H. pylori* infection in non-diabetic, pre-diabetic and diabetic individuals were 39.3%, 42.5% and 32.1% respectively. The rates

were not significantly different from each other (Table-3).

### Discussion

The present study, using ICT, found a low prevalence of *H. pylori* infection (38.9%) in asymptomatic adult Bangladeshi rural population. Previously in 1997 and 2008, the seroprevalence rate of >90% and >70% were reported respectively in asymptomatic urban people from Bangladesh [13,14]. Similar decreasing trend was observed in South Korea [12]. Similar observation was made previously in Nepal where the infection rate in urban was 67.2% compared to 41.5% in rural population [19]. An Ethiopian study found a two-

fold higher prevalence in an urban population than rural [20]. The explanation behind this difference might be increasing migration of people from rural to urban area causing higher urban density with crowded accommodation and poor living condition [21]. The low prevalence found in our study might be due to the improvement in socioeconomic standard of the local people and improved sanitation, hygiene or water supply in rural areas. Also, there could be some other unidentified factors that might inhibit *H. pylori* infection in our rural population. Though *H. pylori* has no known environmental reservoir, in Peru, the infection rate was lower in people using water from private wells than from municipal supply [22]. Also, exceptionally low (7.0%) prevalence of *H. pylori* infection was reported among Malay peptic ulcer patients in north-eastern peninsular Malaysia [23]. Also, studies found that use of local strain to detect antibodies to *H. pylori* yielded a significantly improved sensitivity and specificity [17,24,25].

In our study, the maximum infection rate was found in  $\leq 30$  years of age group. People mostly acquire *H. pylori* during young age of life through feco-oral, oro-oral or gastro-oral transmission. The rate of infection becomes lower during later age due to lower exposure risk and decrease in susceptible individuals [3]. No significant difference between male and female was demonstrated in this study. Many previous studies reported similar finding [26,27] whereas significantly higher prevalence of infection among men was also found in other studies [28,29].

The study did not find any significant association of economic status, education and occupation with *H. pylori* infection suggesting that other risk factors likely exist which were not assessed in the current study. Additionally, the present study was conducted on a small number of relatively homogenous populations. We did not find any significant difference in *H. pylori* infection among non-diabetic, pre-diabetic and diabetic population having no symptom of gastritis or peptic ulcer disease. Also, in our previous study we did not find any significant difference in *H. pylori* infection in peptic ulcer patients with and without diabetes mellitus [30]. Thus, it appeared that diabetes was not a predisposing factor for *H. pylori* infection.

In conclusion, our study has shown a low prevalence of *H. pylori* infection in adult rural population of Bangladesh. Further large scale studies covering additional possible risk factors and by using indigenous *H. pylori* strain derived antigen(s) are needed to determine the exact prevalence of *H. pylori* infection in urban and rural population of Bangladesh.

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