

## ORIGINAL ARTICLES

# ASSOCIATION BETWEEN RAPID UREASE TEST FOR H. PYLORI INCIDENCE AND NON-ULCER DYSPEPSIA IN BANGLADESHI PATIENTS

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### Abstract

**Introduction:** *Dyspepsia is a fairly common group of symptoms including epigastric pain, epigastric burning, postprandial fullness, early satiation, bloating in the upper abdomen, nausea, vomiting and belching. Interestingly the majority of them are found to have no ulcer, and they are termed as non-ulcer dyspepsia (NUD). However. Different studies worldwide have found there is an association between H. Pylori infection and NUD.*

**Objective:** *To evaluate the infection rates of H. pylori in patients, presenting with dyspepsia without any evidence of ulcer on endoscopy.*

**Materials and methods:** *This cross-sectional study was conducted from June, 2022 to December, 2022. The study included 100 patients (46 males and 54 females) with NUD and recruited by convenient sampling method.*

**Result:** *In the study, the prevalence of H. pylori infection in patients with NUD is 53% on the basis of (Rapid urease test) RUT. Gender-based prevalence was found to be 53.7% and 52.17% for women and men, respectively. The highest prevalence rate was found in the age group of 25-34 years. The prevalence of H. pylori infection was slightly higher for urban people.*

**Conclusion:** *H.Pylori infection can be easily identified by RUT. The study has found significant correlation of H. pylori infection with NUD by using RUT.*

**Keywords:** *Helicobacter pylori, Non-ulcer dyspepsia (NUD), upper GI endoscopy (EGD), Rapid urease test (RUT)*

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### Introduction:

Dyspepsia is a fairly common group of symptoms including epigastric pain, epigastric burning, postprandial fullness, early satiation, bloating in the upper abdomen, nausea, vomiting and belching which produces physical and psychological distresses in patients<sup>1-3</sup>. A

large number of these patients undergo upper GI endoscopy, also known as esophagogastroduodenoscopy (EGD) to rule out organic disease. However, no ulcer is found in the majority of them, and they are termed as non-ulcer dyspepsia (NUD)<sup>4</sup>. Helicobacter pylori (H. pylori) is a urease positive spiral-shaped, flagellated,

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microaerophilic gram-negative bacillus which colonizes the gastric mucosa and is strongly associated with peptic ulcer disease, chronic gastritis, and is involved in the development of gastric malignancy<sup>3</sup>. In developing countries, H. pylori infection usually takes place in early childhood and may persist for a lifetime, if not treated earlier, the H. pylori infection rate increases with age<sup>5-8</sup>. Helicobacter pylori infection is exceptionally common around the world though the prevalence rate varies globally. Nearly 40% to 50% of the population is infected with H. pylori in developed countries but for developing regions, the infection rate is as high as 80% to 90% of the population<sup>9,10</sup>. Same as other low-income countries, H. Pylori prevalence is very high in Bangladesh. Around 92% adult population are seropositive for H. pylori in Bangladesh<sup>11</sup>. In a previous study it has been found that, higher than 80% of children become infected with H. pylori by the age of 6-9 years<sup>12</sup>.

In the USA, large number of NUD cases found without any visible ulcer in endoscopy while 30-50 % of them have signs of H. pylori infection and histologic features of chronic gastritis<sup>13</sup>. Because there is not enough data available in Bangladesh, this study was done to assess the H. pylori infection rates in patients with NUD.

Endoscopic test for H. pylori has evolved over the past decade, and one of the areas of progress here, is the speed at which the rapid urease test (which is also known as CLO-test/ Campylobacter-like organism test) can be read. This gastric biopsy test is based on the activity of the H. pylori urease enzyme, which breaks down the urea test reagent to form ammonia. Ammonia raises the pH, detected by the phenol red indicator. Though some organisms incorporate in the pharynx to produce urease which get swallowed with saliva, but is rapidly denatured in the acidic lumen of the stomach (pH < 2.0) due to the weaker nature of this enzyme<sup>14</sup>. In theory, this urease activity could give false-positive results with very rapid urease tests. But, RUT has been found to be highly accurate, when read in 3 hours, by 100% specificity and high sensitivity (the different percentage was reported in several studies as 70% to 90%)<sup>15</sup>.

## Materials and methods

This cross-sectional study was conducted from June, 2022 to December, 2022 at the Green Life Hospital, Dhaka, Bangladesh. The objective of this study was to evaluate the infection rates of H. pylori in patients, presenting with dyspepsia without any evidence of ulcer on endoscopy. Inclusion criteria included patients who fulfilled Rome IV criteria for NUD<sup>16</sup> and patients with absence of any structural lesion (like ulcer, malignancy, obstruction) in upper GI endoscopy. Exclusion criteria included patients suffering from any disease related to pancreas, hepatobiliary system, gastrointestinal tract (GIT) obstruction, malignancy and patients with any structural lesion (like ulcer, malignancy, obstruction) in endoscopy. The study included 100 patients (46 males and 54 females) with NUD and recruited by convenient sampling method. Informed consent was taken from each participant before proceeding to procedure. Endoscopy was performed using a standard endoscope (Olympus scope). Before the procedure, lignocaine spray was used in the mucosa of the pharyngeal wall of all participants. The presence of any ulcer was excluded through endoscopy. Then two samples were taken with properly sterilized biopsy forceps, one from the antrum and another from the normal-appearing body of the stomach for a rapid urease test (RUT) to detect H. pylori infection. RUT was performed using a rapid diagnostic test kit. Changing of colour from yellow to red/pink was taken as positive and no colour change for 30 minutes was read as negative. Socio demographical data, clinical history of participants along with endoscopic test findings and RUT results were collected for analysis and interpretation to obtain the goal of the study. Descriptive statistics were used to describe the distribution of socio-demographic characteristics and other variables across the respondents. Categorical variables were tabulated as frequencies and percentages, and continuous variables as mean, and standard deviation (SD). The RUT has been done in all the participants and the frequency of H. pylori infection was calculated. A *p*-value of < .05 was considered significant. The data were analysed using SPSS software (SPSS Inc.

Version 23.0™; IBM Corporation, Chicago, USA).

**Ethical Consideration**

Prior to the commencement of this study, the aims and objectives of the study, along with its procedure, risks, and benefits, were explained to the participants in an easily understandable local language. All patients provided written informed consent. The result of this research is to be used only in scientific purposes and not in any other aims, and the confidentiality of respondents were completely protected.

**Results**

In the Bangladeshi population, this cross-sectional study was carried out to evaluate the infection rates of H. pylori in patients, presenting with dyspepsia, without any evidence of ulcer on endoscopy. Upper GI endoscopy was done in 100 participants presenting with dyspepsia after fulfilment of all inclusion and exclusion criteria.

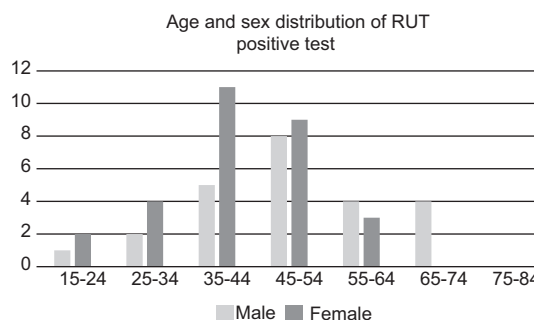
**Table-I**

*Study participants' Characteristics (n=100)*

Sex	Total	RUT positive	Percentage
Female	54	29	53.7%
Male	46	24	52.17%
Total	100	53	53%
Age (years)	Total	RUT Positive	Percentage
<24	12	3	25%
25-34	7	6	86%
35-44	30	16	53%
45-54	27	17	63%
55-64	12	7	58%
65-74	11	4	36%
>75	1	0	0
Total	100	53	

Among 100 participants with dyspepsia, approximately 54% are female, 46% are male, with age ranging from 18 years to above, with mean age of 44.38 years (Table 1). 53 participants were found to be positive with H. pylori infection based on RUT (positivity rate of 53%), in NUD. Out of 54 females, 29 were positive for H. pylori infection (positivity rate of 53.7%), whereas among 46 males, 24 were RUT positive (positivity rate of 52.17%) in NUD. No

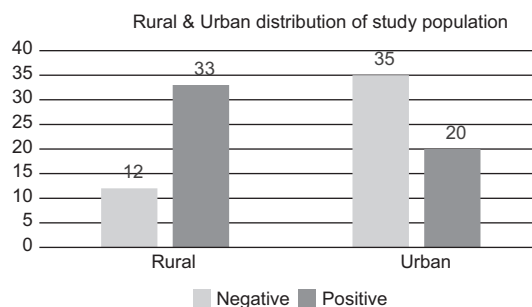
statistically significant difference was found in positive results between male and female groups ( $p$ -value = 0.878).



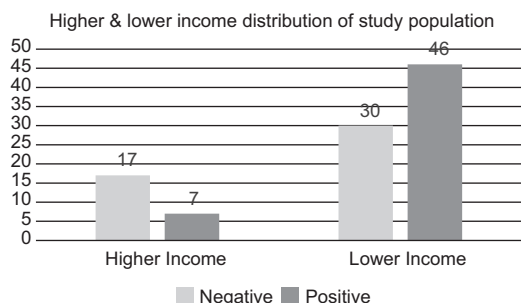
**Figure 1:** Distribution of RUT positive participants according to age and sex (n=100)

The frequency of H. pylori infection was calculated in different age groups (Table 1; Figure 1). The highest prevalence rate was found in the age group of 25-34 years. However, the difference was not statistically significant ( $p$ -value = 0.1).

People who were living in city corporations and municipality areas are considered to be residents of urban areas. In our study, 55% were from urban areas and 45% from rural areas. Among the rural people, 33 out of 45 were tested positive for RUT, which is 73.33%; whereas 20 out of 55 urban people were positive for RUT which is 36.36% (Figure 2). The finding is statistically significant for increased RUT positive results among rural people ( $p$ -value = .0002).



**Figure 2:** Distribution of study population according to living area and RUT test results (n=100)



**Figure 3:** Distribution of study population according to higher and lower socio-economic condition and RUT test results ( $n=100$ )

Patients were divided into high and low socio-economic groups based on their monthly household income. The cut-up value is considered 50,000 BDT (Bangladeshi Taka) per month of total household income. We have observed the result of RUT in different socio-economic groups (Figure 3). 24 people were found to be in the higher socio-economic group (>50,000 BDT per month) and the rest were considered in the lower socio-economic group. 7 persons out of 24 in the higher socio-economic group were positive for RUT; on the other hand, 46 persons out of 76 in the lower socio-economic group were positive for RUT ( $p$ -value is .007).

### Discussion

H. pylori infection varies in prevalence worldwide. The RUT has been established for more than two decades. The test has good performance value, with a sensitivity of 89.6%, a specificity of 100%, a PPV (positive predictive value) of 100%, and a NPV (negative predictive value) of 84.1%, and has been widely acclaimed<sup>9</sup>. According to our study result, the prevalence of H. pylori infection in patients with NUD is 53%. In 2022, Sharma et al. reported, a hospital-based RUT positivity rate of 40.85% in patients with NUD.<sup>4</sup> A study conducted by Greenberg et al. in 1990, found the prevalence of H. pylori in patients with NUD, to be 37%<sup>17</sup>. Louw et al. in 1993 has found the prevalence of H. pylori in NUD to be 63%<sup>18</sup>. Similarly, in 1997, a study conducted in Malaysia, the prevalence rate was found to be 31.2%<sup>19</sup>. In a study in Bangladesh by Islam, Md Din-ul et al. 2011, reported 73.26% positivity rate by rapid urease test (RUT)<sup>20</sup>, similarly, in another study

in Bangladesh Islam M, et al. 2011, found that 54.32% patients were positive by culture among the dyspeptic patients<sup>21</sup>.

In our study we have found, 29 females out of 54 (53.7%) as RUT positive and 24 out of 46 males (52.17%) as RUT positive. Sharma et al.2022, found the gender-based prevalence of H. pylori in patients with NUD as 41.93% for female and 40.14% of male on the basis of RUT positive test results<sup>4</sup>. Alemohammad, et al. 1993, reported, in a study in USA, that 53.3% of males and 46.7% of females were H. pylori infected<sup>22</sup>. Islam M, et al. 2011, found in their study that, male (51.85%) and female (48.15%) were positive with H. pylori<sup>21</sup>. Niknam et al. in 2014, reported 31% of all dyspeptic patients were positive for H. pylori infection where 26.1% males were positive and females were positive, 34.8%<sup>3</sup>.

In the analysis of age group, based on prevalence of H. pylori infection rate in NUD, the highest prevalence rate was found in the age group of 25-34 years, in our study. Whereas, Sharma et al.2022, found it most common in 30-39 years of age group<sup>4</sup>. Alemohammad, et al. 1993 reported highest Prevalence in 40-50 years age group in USA. Islam M, et al. 2011, observed highest infection rate in 21-30 years of age group in Bangladeshi population<sup>22</sup>.

We also found prevalence of H. pylori infection slightly higher for urban people. 55% of urban population and 45% of rural population were RUT positive which is statistically significant. 29.16% from higher socio-economic group were positive for RUT; on the other hand, 60.52% from lower socio-economic group were positive for RUT ( $p$ -value is .007), which is also statistically significant.

### Conclusion

We have found significant correlation of H. pylori infection with NUD and this can be easily identified by RUT. Eradication of H. pylori when identified by RUT may improve the symptoms and future complications. We recommend additional future research on this issue as needed in Bangladeshi population, before drawing any further conclusion regarding this matter.



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