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## **Comparative study of endoscopic rapid urease test with serology of helicobacter pylori infection in acid peptic disease**

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**Abstract**---Acid Peptic Disease (APD) is worldwide health issue for the surgeons, mainly due to risk and associated complications like Gastric Ulcer (GU), Duodenal Ulcer (DU), Gastro intestinal tract (GIT) perforation. This aims at early detection of disease which is caused by Helicobacter Pylori (HP) and intervention prevents the further complications. This study is Cohort study was conducted in the endoscopic unit of Department of General Surgery Tertiary care teaching Hospital over a period of 1 year with a sample size of 121. All the patients suitable for the study in regards to the inclusion and exclusion criteria are subjected to both the study until the sample size is achieved, with the prior agreement of the institutional ethical committee. All the participants are tested with RUT and ELISA and 87.60% had RUT positive and 86.78% had ELISA positive infection. RUT had sensitivity of 87.62% in predicting ELISA, specificity was 12.50%, with a total diagnostic accuracy of 77.69%. We treated 51.24% with the CMO kit and 48.76% with HP kit. On three-month follow up, 37.2% had recurrence of the disease with 33.87% in patients who are treated with CMO kit, and 40.68% among those treated with HP kit (p value 0.439). Based on Chi square test /Fisher's Exact test our study concluded that RUT to have good accuracy for

predicting HP infections and after three month follow up CMO kit treatment was found to have less recurrence rate.

**Keywords**---*helicobacter pylori*, acid peptic disease, rapid urease test, ELISA.

## Introduction

*Helicobacter Pylori* (HP) is highly prevalent in human population. It colonizes in the gastric epithelium in atleast  $\frac{1}{2}$  the world population.<sup>1</sup>In the developed countries, prevalence progressively ascends with age though the infection is acquired in the childhood.<sup>2</sup> Upto 93% and 87% of the duodenal ulcer and gastric ulcer are infected by HP respectively.<sup>3</sup> HP is a spiral, micro- aerophilic bacterium which on gram staining appears red/violet. It which was first discovered by Robin Warren and Barry Marshall in 1982 as the cause of gastritis and GU, a remarkable discovery in the olden days that revolutionized gastroenterology.<sup>4</sup> Warren and Marshall, won Nobel prize for the great demonstration of HP infection. Prior to this discovery the stomach was assumed to be a sterile surface. "HP, formerly known as *Campylobacter-pyloridis* then *Campylo-bacter-pylori*".<sup>5</sup> Its exact mode of transmission is uncertain. HP was isolated from the human stomach and thus the mechanism by which it colonizes the stomach gastric epithelium demonstrated by few theories. HP is known to cause of APD, which forms as DU and GU. Also HP is regnised as class 1 carcinogen, as it leads to development of gastric adenocarcinoma, one of the world's morbid and mortality associated cancers.<sup>6</sup> Earlier HP was assumed to be caused due to psychological stress, irregular food habits, life style but now it is well established fact that acid peptic disease is caused due to HP. Above mentioned factors acts as aggravating factors.<sup>7</sup> APD is a cluster of gastrointestinal symptoms including pain abdomen, retrosternal discomfort, vomiting, nausea etc. APD is multifactorial, long standing acid hyper section is no longer considered as sole contributor. Most of the GU are due to defective mucosal protection or any factors that impair the integrity of the gastric mucosa.<sup>8</sup> HP; along with the risk factors smoking, alcohol consumption, prolonged non-steroidal anti-inflammatory drugs/ steroid consumption, unhealthy dietary habbits, drug abuse also contributes to APD.<sup>9</sup> Though the incidence of APD is in the reducing trend but the acute complications (perforation, obstruction, bleeding) are still high. Calculation wise, HP incidence differs from one geographical location to another and may differ between different quality of life, ethnicity, social of country.<sup>10</sup> There are several methods to detect the HP infection, both invasive and non-invasive, culture, histological staining, urease test, serological analysis. Early detection and eradication of HP leads to reduce in the incidence of complications of APD.<sup>11</sup>

## Aim

To compare Endoscopic Rapid urease test with serology of *Helicobacter Pylori* Infection and Acid Peptic Disease. To compare the outcome to above test to determine the sensitivity and specificity.

## **Materials and Methods**

This study is Cohort study was conducted in the endoscopic unit of Department of General Surgery Tertiary care teaching Hospital over a period of 1 year with a sample size of 121.

### **Inclusion criteria**

Patients above 18 year undergoing upper GI endoscopy

### **Exclusion criteria**

Patients who have undergone partial or total gastrectomy. Patients who have received treatment for helicobacter pylori infection in past 6 months. Patients who are immunocompromised.

### **Methodology**

All the study subjects with symptoms of acid peptic disease were subjected to upper GI Endoscopy and biopsies were obtained from antral mucosa of 121 study subjects. Rapid urease test (RUT) and Serology tests for H. pylori (ELISA) were conducted accordingly. A detailed history, thorough clinical examinations, before the endoscopy were done. All the cases were undergone rapid urease test and ELISA IgG antibody detection. All the cases results were compared based on sensitivity and specificity to detect helicobacter infection. All the cases are followed up for 3 months for the symptomatic relief after the treatment.

### **Statistical analysis**

Descriptive statistics were used to analyze data in evidence with the study's objectives. Data were expressed as the mean, 95% confidence interval (CI; lower and upper bounds), median, minimum and maximum, and percentage, where appropriate. Categorical outcomes were compared between study groups using Chi square test /Fisher's Exact test (If the overall sample size was < 20 or if the expected number in any one of the cells is < 5, Fisher's exact test was used.). The sensitivity, specificity, predictive values and diagnostic accuracy of the screening test along with their 95% Class Interval were presented. P value < 0.05 was considered statistically significant. Data was analyzed by using SPSS software, V.22.

### **Result**

A total of 121 subjects were included in the final analysis.

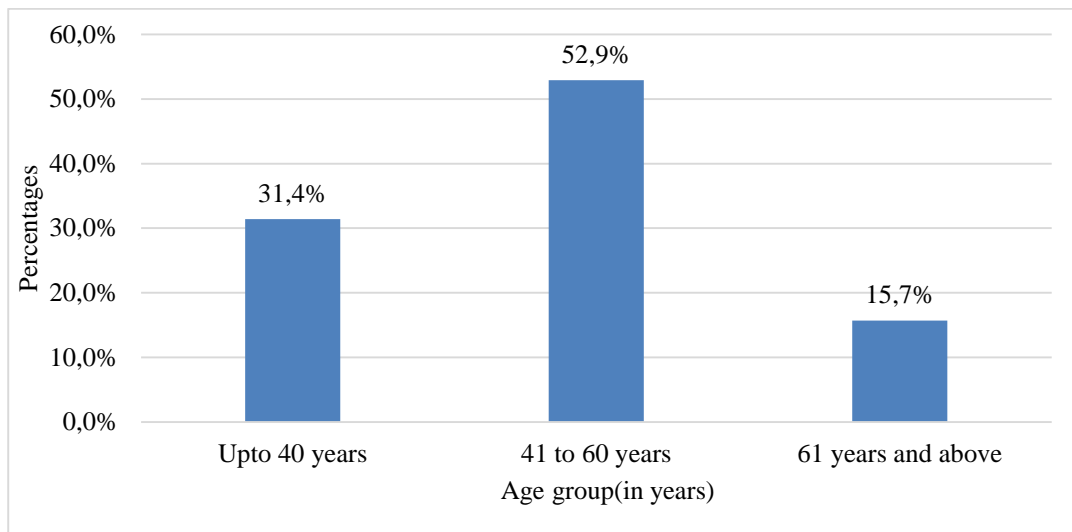


Figure 1. Descriptive analysis of age group (in years) in the study population (N=121)

Among the study population, 38(31.40%) were aged upto 40 years, 64(52.89%) were aged between 41 years to 60 years and 19(15.70%) were aged 61 years and above. (Figure 1)

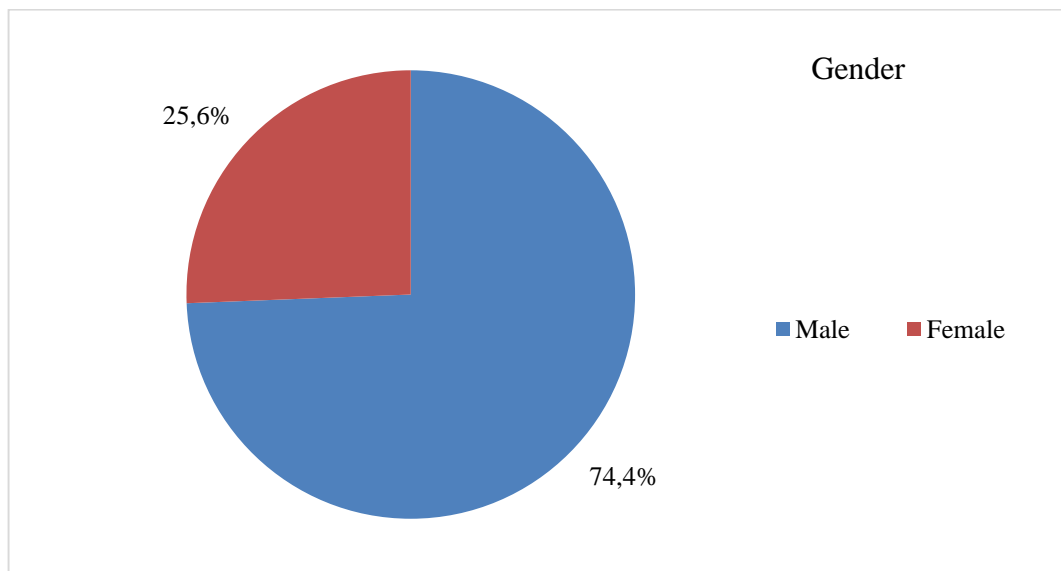


Figure 2. Descriptive analysis of gender in the study population (N=121)

Among the study population, 90 (74.38%) were male participants, 31 (25.62%) were female participants. (Figure 2)

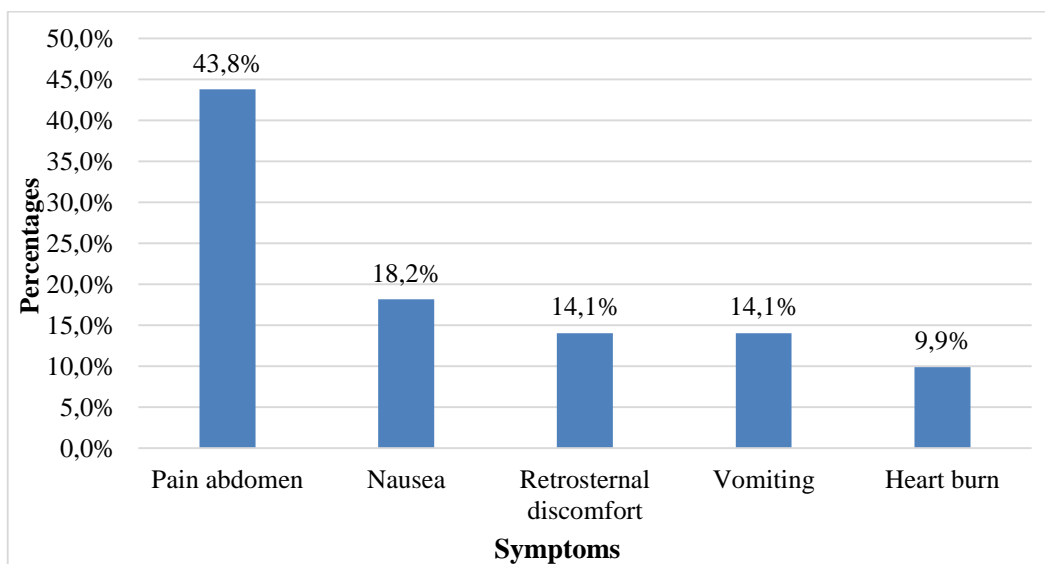


Figure 3. Descriptive analysis of symptoms in the study population (N=121)

As symptoms, 53 (43.80%) had pain abdomen, 22 (18.18%) had nausea, 17 (14.05%) had retrosternal discomfort and vomiting for each and 12 (9.92%) had 9.92%. (Figure 3)

Table 1

Descriptive analysis of endoscopic finding in the study population (N=121)

Endoscopic Finding	Frequency	Percentages
Antral Gastritis	31	25.62%
Gastritis	19	15.70%
Biliary Gastritis	18	14.88%
Normal Study	18	14.88%
Pyloric Hyperaemia	16	13.22%
Diffuse Gastritis	14	11.57%
Diffuse Mucosal Erythema	4	3.31%
Mucosal Hyperaemia	1	0.83%

As per endoscopic findings, 31 (25.62%) had antral gastritis, 19 (15.70%) had gastritis, 18 (14.88%) had biliary gastritis and normal study for each, 16 (13.22%) had pyloric hyperaemia, 14 (11.57%) had diffuse gastritis, 4 (3.31%) had diffuse mucosal erythema and 1 (0.83%) had mucosal hyperaemia. (Table 1)

Table 2  
Descriptive analysis of rapid urease test in the study population (N=121)

Rapid urease test	Frequency	Percentages
Positive	106	87.60%
Negative	15	12.40%

Out of 121 participants, 106(87.60%) rapid urease test result was positive. (Table 2)

Table 3  
Descriptive analysis of enzyme linked immunosorbent assay in the study population (N=121)

Enzyme linked immunosorbent assay	Frequency	Percentages
Positive	105	86.78%
Negative	16	13.22%

Out of 121 participants, 105(86.78%) had positive results in enzyme linked immunosorbent assay. (Table 3)

Table 4  
Descriptive analysis of treatment in the study population (N=121)

Treatment	Frequency	Percentages
CMO KIT	62	51.24%
HP KIT	59	48.76%

Among the study population, 62(51.24%) were taken CMO kit and 59(48.76%) were taken HP kit. (Table 4)

Table 5  
Predictive validity of rapid urease test in predicting ELISA (N=121)

Parameter	Value	95% CI	
		Lower	Upper
Sensitivity	87.62%	79.76%	93.24%
Specificity	12.50%	1.55%	38.35%
False positive rate	87.50%	61.65%	98.45%
False negative rate	12.38%	6.76%	20.24%
Positive predictive value	86.79%	78.83%	92.59%
Negative predictive value	13.33%	1.66%	40.46%
Diagnostic accuracy	77.69%	69.22%	84.75%

The rapid urease test had sensitivity of 87.62% (95% CI 79.76%to 93.24%) in predicting ELISA. Specificity was 12.50% (95% CI 1.55%to 38.35%), false +ve rate was 87.50% (95% CI 61.65%to 98.45%), false -ve rate was 12.38% (95% CI 6.76%to 20.24%), +ve predictive value was 86.79% (95% CI 78.83%to 92.59%), -ve predictive value was 13.33% (95% CI 1.66%to 40.46%), and the total diagnostic accuracy was 77.69% (95% CI 69.22%to 84.75%). (Table 5)

## Discussion

In our study the mean age of the study population is  $46.88 \pm 14.83$  years with majority at 52.89% in the 41-60 years' age group. Our study group has a preponderance of male subjects with 74.38% males and 25.62% females. Most of them have day time working hours with only 19.01% working during the night. A study by Reddy. also had male predominance in their study group with 82 males and 28 females with maximum number of patients aged 26 years to 50 years.<sup>12</sup> In contrast Jalalypour study had more females patients in their study group with 43 males and 62 females with a mean age of 43 years.<sup>13</sup> Whereas, Pourakbari, studied both children and adults with mean ages  $9.9 \pm 2.6$  and  $44.7 \pm 18.7$  respectively.<sup>14</sup> On analysis of the age distribution, highest number of patients were seen belonging to the age group 31-40; with 57.14% patients from this age group in Maimbilly.'s study.<sup>15</sup>

Majority of patients with 43.80% complained of abdominal pain, followed by nausea in 18.18%, 14.05% had retrosternal discomfort, 14.05% had vomiting and 9.92% complained of heart burn. The mean duration of symptoms was  $1.04 \pm 1.67$  days. On endoscopy, antral gastritis is found in 25.62%, 15.70% had gastritis, 14.88% had biliary gastritis, 13.22% had pyloric hyperaemia, 11.57% had diffuse gastritis, 3.31% had diffuse mucosal erythema and 0.83% had mucosal hyperaemia. 14.88% had a normal endoscopic evaluation with no abnormal findings. Majority of the cases were presented with chronic superficial gastritis (42%) followed by duodenal ulcer (37.33%) and Non ulcer dyspepsia was seen in 67% patients of dyspepsia in Rastogi.'s study.<sup>16</sup>

All the participants are tested with RUT and ELISA and 87.60% had RUT positive and 86.78% had ELISA positive infection. A study by Jalalypour used RUT, PCR and ELISA tests and patients with minimum 2/3 +ve tests (gold standard)

considered as infected.<sup>13</sup> According to this definition, 48.57% were positive for *H. pylori*, and 51.42% were diagnosed as uninfected.<sup>17</sup> Another similar study by Reddy, did RUT, Grams staining, culture & serology IgG detection to all the cases and they observed that HP were detected more in antral gastritis case followed by DU.<sup>12</sup> They found 58.1% positive with RUT, 51% positive with Grams staining, culture and 56.3% were positive on ELISA.<sup>18</sup> In Maimbilly's study, RUT was positive in 82.35% and ELISA was positive in 80%. The patients between 31-40 years of age were found to be highly positive for RUT as well as serum IgG in their study.<sup>15</sup>

The most important antibiotics in *H. pylori* treatment are clarithromycin, metronidazole, and amoxicillin. We treated 51.24% with the CMO kit (clarithromycin 250mg BD, metronidazole 400mg TID, Omeprazole 20mg BD) and 48.76% with HP kit (amoxicillin 750mg BD, Tinidazole 500mg BD, Omeprazole 20mg BD). On three-month follow up, 37.2% had recurrence of the disease with 33.87% in patients who are treated with CMO kit, and 40.68% among those treated with HP kit (p value 0.439). At the end of 3 months follow up, 46.77% had pain abdomen in the CMO kit group and 40.68% in the HP kit group; 16.13% had nausea in CMO group and 20.34% in the HP kit group, with no statistically significant difference in the symptom recurrence between the two types of treatment (p 0.905).

In a study in Karnataka, Shetty, noted increased resistance to metronidazole and levofloxacin, and a modest resistance to clarithromycin resistance. They found that metronidazole-, levofloxacin- and clarithromycin-based triple therapies can not be opted as 1<sup>st</sup>-line treatment in Karnataka.<sup>19</sup> In a randomized trial comparing Omeprazole + Amoxicillin + Clarithromycin (OAC group) versus Metronidazole (OAM group), clarithromycin was more effective than metronidazole in HP eradication.<sup>20</sup>

## Conclusions

The endoscopy findings found most with antral gastritis followed by gastritis, biliary gastritis, pyloric hyperaemia, diffuse gastritis, diffuse mucosal erythema and mucosal hyperaemia. Both RUT and ELISA was positive in majority of the subjects. Our study found RUT to have good accuracy for predicting HP infections. After a 3 month of follow up 37.2% had recurrence of the disease where 33.87% of patients with CMO kit, and 40.68% among those treated with HP kit. RUT was found to be effective method for detection of *H. pylori* infections.

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