

## Original Research Article

# *Helicobacter pylori* risk in type 2 diabetes mellitus: a hospital based case-control study

Rajesh S., Reshma S.\*, Shruthi Kamal V.

Department of General Surgery, Saveetha Medical College and Hospital, Thandalam, Chennai, Tamil Nadu, India

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### \*Correspondence:

Dr. Reshma S.,

E-mail: [surgeonreshma@gmail.com](mailto:surgeonreshma@gmail.com)

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### ABSTRACT

**Background:** The aim of this study is to determine the frequency of *Helicobacter pylori* (*H. pylori*) infection in Type 2 diabetic and non-diabetic patients with dyspeptic symptoms and to compare the frequency of *H. pylori* infection in both groups.

**Methods:** This was a hospital-based case-control study was conducted on 196 subjects in the Department of General Surgery, Saveetha Medical College and Hospital (tertiary care hospital) from March 2016 to November 2016. Patients were divided into two groups i.e. type 2 diabetics with poor glycemic control with dyspeptic symptoms and non-diabetics with dyspeptic symptoms. Each group consisted of 98 patients. All type 2 diabetic patients of  $\geq 35$  years of age with poor glycemic control both gender and the known cases with history of dyspepsia, epigastric pain or bloating for more than a month were screened for *helicobacter pylori* infection. The collected data of both groups was evaluated and separated for analysis

**Results:** Majority of the patients were male with mean age $\pm$ SD, 50 $\pm$ 12. Among the type II diabetic group with dyspeptic symptoms, *H. pylori* was positive in 70/98 (71.4%), whereas in non-diabetic group with dyspeptic symptoms *H. pylori* was positive in 51/98 (52%) cases.

**Conclusion:** Type II diabetic patients with dyspeptic symptoms are more prone and at risk to acquire *H. pylori* infection. Therefore, proper monitoring of blood glucose level and screening for *H. pylori* infection are effective preventive measures for this chronic infection.

**Keywords:** Dyspeptic symptoms, Endoscopic biopsy, H pylori, Non-diabetics, Type II diabetes mellitus

### INTRODUCTION

Infection with *H. pylori* infection has been recognized as a public health problem worldwide, affecting approximately 50% of the world population and more prevalent in developing than the developed countries.<sup>1,2</sup> It is a common infection in diabetic patients who have inadequate metabolic control as such individuals are colonized by *H. pylori* infection in the gastric antrum, probably because of chemotactic factors such as TNF, Interleukins - IL1, IL2 and IL8 are present in gastric epithelium. These cytokines induce a number of changes in the gastric epithelium that promote inflammation and

epithelial damage thus leading to increased risk of aberrant repair giving the picture of gastric atrophy or epithelial cell metaplasia.

Diabetes mellitus is one of the important causes of dyspepsia. Disordered gastrointestinal motor function is now recognized as a major problem of diabetes mellitus. Besides diabetes mellitus, *H. pylori* is also a well-established cause of dyspepsia. Incidence of *H. pylori* is increased in diabetes mellitus. Delayed gastric emptying and dysmotility are important causes of dyspepsia in diabetes. The role of *H. pylori* infection in diabetic dyspepsia is mainly related to blood glucose

concentration. Hyperglycemia may induce the infection by *H. pylori* or the silent infection may get reactivated and produce symptoms of dyspepsia in diabetes. *H. pylori* is also considered as an important risk factor both for gastric cancer and lymphomas.<sup>3</sup>

The prevalence of *H. pylori* in diabetes mellitus is 61%.<sup>4</sup> Whereas the prevalence of *helicobacter pylori* is 49% in non-diabetics.<sup>5</sup> Diabetes is diagnosed according to the diagnostic criteria for the diabetes mellitus.<sup>6</sup>

Diagnostic tool for *H. pylori* infection are serology, endoscopic biopsy, histopathology, rapid urease test, urea breath test, PCR for DNA of *H. pylori*, *H. pylori* stool antigen (HPSA).

Endoscopic biopsy test is an invasive procedure with an overall specificity and sensitivity of 94%. Among various diagnostic methods, histology plays a pivotal role in detecting *H. pylori*.

Hyperglycemia is controlled by insulin or oral hypoglycemic drugs, while the drug used for eradication of *H. pylori* infection are proton pump inhibitors, bismuth compounds, metronidazole, clarithromycin, amoxicillin and tetracycline.<sup>7</sup>

Since there are only a few studies in our country on the association of *H. pylori* and diabetes mellitus with dyspeptic symptoms, we conducted this study at tertiary care teaching hospital.

The study focus is on the frequency of *H. pylori* infection in patients with type 2 diabetes mellitus with dyspeptic symptoms and non-diabetic with dyspeptic symptoms and help in providing data that is useful in the field of medicine as well as epidemiology.

## METHODS

This case-control study was carried out in the Department of General Surgery at Saveetha Medical College and Hospital (a tertiary care hospital) Chennai, Tamilnadu from March 2016 to November 2016.

### Inclusion criteria

- All patients above 35 years of age
- Both gender
- History of dyspepsia, bloating or epigastric discomfort for more than one month
- Known case of type 2 diabetes mellitus of  $\geq 5$  years duration and with poor glycemic control of HbA1C 7 or  $>7$
- History of dyspepsia
- Epigastric discomfort, or bloating for  $\geq 30$  days.

### Exclusion criteria

- Patients of type-I diabetes

- Non-cooperative patients who refuse to give consent or participate in the study
- Patients already on/had *H. pylori* eradication therapy.

The inclusion criteria of study were then investigated for diabetes (if not known) and *Helicobacter pylori* infection, and divided into two groups: A and B.

Group A (also labelled diabetic group) contains patients of type II diabetes mellitus with dyspeptic symptoms (newly diagnosed or known cases) with positive or negative *Helicobacter pylori* infection while group B (also labelled non-diabetic group) contains non-diabetic individuals with dyspeptic symptoms with positive or negative *Helicobacter pylori* infection. Each group (A and B) consists of 98 patients.

The known cases of diabetes mellitus in group A were also investigated for blood sugar (not for diagnostic purpose but to assess the blood sugar level that whether it is controlled or uncontrolled).

### Data collection procedure

- For the assessment of diabetes mellitus, we had taken venous blood sample and send to laboratory for fasting blood sugar (FBS) level, post-prandial blood sugar (PPBS) level and HbA1C.
- For detection of *Helicobacter pylori* infection, we advised the participants for endoscopic biopsy and sent to laboratory for detection of *Helicobacter pylori* organism.
- The collected data of both groups (A and B) were then evaluated, separated and saved for analysis.

### Data analysis:

The data were evaluated in statistical program SPSS version 17. Frequency and percentages were calculated. The data were expressed by mean $\pm$ SD of age and was computed among the numerical parameters. The chi-square test was applied among the categorical variables. The P value  $<0.01$  was considered as statistically significant.

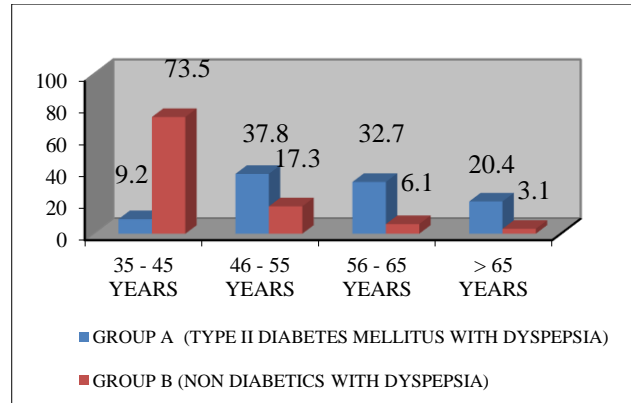
## RESULTS

Ninety-eight patients in each group were studied, of which 113 (57.7%) were males and 83 (42.3%) females, mean age $\pm$ SD, 50.04 $\pm$ 11.78. Majority of the patients were more than 46 years of age (Table 1). The frequency of patients in relation to age group is mentioned in Figure 1.

In the diabetic group with dyspeptic symptoms, *H. Pylori* was positive in 70/98 (71.4%) cases while in non-diabetics, *H. Pylori* was positive in 51/98 (52%) cases (Table 2). Majority of the *H. pylori* infected patients in both groups were more than 46 years of age (Table 3).

**Table 1: Demographic distribution of patients (n=196).**

| Characteristics                                      | N (%)      |
|--|------------|
| <b>Gender</b>  |            |
| Male   | 113 (57.7) |
| Female   | 83 (42.3)  |
| <b>Endoscopic biopsy results of <i>H. pylori</i></b> |            |
| Positive   | 121 (61.7) |
| Negative   | 75 (38.3)  |
| <b>Age group</b>                                     |            |
| 35 to 45   | 81 (41.3)  |
| 46 to 55   | 54 (27.6)  |
| 56 to 65   | 38 (19.4)  |
| >65 years  | 23 (11.7)  |

**Figure 1: Evaluation of cases within diabetic and non-diabetic group A (diabetic) and group B (non-diabetic group); (n=196).****Table 2: Frequency of endoscopic biopsy *Helicobacter pylori* positive cases in diabetic and non-diabetic group.**

| Parameter  | Endoscopic biopsy results of <i>H. pylori</i> (n=196) |                      | P Value |
|--|---|----------------------|---------|
|  | Diabetic (N=98%)                                      | Non-diabetic (N=98%) |         |
| <b>Endoscopic biopsy results of <i>H. pylori</i></b> |   |                      |         |
| Positive   | 70 (71.4%)  | 51 (52.0%)           | 0.005** |
| Negative   | 28 (28.6%)  | 47 (48.0%)           |         |

\*\*P<0.01, P Value is statistically highly significant.

**Table 3: Frequency of endoscopic biopsy *helicobacter pylori* positive cases in relation to age.**

| Parameter        | Endoscopic biopsy results of <i>Helicobacter pylori</i> positive cases (N=196) |                 | P Value    |
|------------------|--|-----------------|------------|
|                  | Positive (N= 121)  | Negative (N=75) |            |
| <b>Age group</b> |  |                 |            |
| 35 to 45         | 54 (44.6%)   | 27 (36.0%)      | 0.417 (NS) |
| 46 to 55         | 29 (24.0%)   | 25 (33.3%)      |            |
| 56 to 65         | 25 (20.7%)   | 13 (17.3%)      |            |
| >65 years        | 13 (10.7%)   | 10 (13.3%)      |            |

NS (Not Significant)

## DISCUSSION

Patient with diabetes mellitus are often affected by chronic infections. Many studies have evaluated the prevalence of *H. pylori* infection in diabetic patients and the possible role of this condition in their metabolic control. Some studies found a higher prevalence of the infection in diabetic patients while others did not support any correlation between metabolic control and *H. pylori* infection.<sup>8</sup> The present study determined the relationship between type 2 diabetes mellitus with dyspeptic symptoms and *Helicobacter pylori* infection and found that diabetic patients are most prone to acquire *H. pylori* infection ( $P = < 0.01$ ) (statistically significant); However, higher prevalence of *H. pylori* infection was also reported in diabetes mellitus than in non-diabetics in a study by marrollo.<sup>9</sup>

In the present study majority of the patients with *H. pylori* infection in both groups: diabetic and non-diabetic, were more than 46 years of age. Similarly, a study conducted at Abakaliki by Ugwu had shown that majority of *Helicobacter pylori* infected patients were more than 60 years of age.<sup>10</sup> However, a study by Sargyn et al, shows that mean age of diabetic patients with *H. pylori* infection is 56 years.<sup>11</sup>

Most of the *Helicobacter pylori* related diseases are associated with male gender, the role of gender as a risk factor for *H. pylori* infection is still debated. The present study shows that the *Helicobacter pylori* infections were common among males while another study conducted by Catherine confirms the male predominance of *H. pylori* infection in adults as a global and homogenous phenomenon.<sup>12</sup> On the other hand, in another study the

*Helicobacter pylori* infected females were predominant as compared to males, and that contradicts our statement.<sup>13</sup>

*H. pylori* infection and *H. pylori* related gastrointestinal/gastroduodenal disorder may be related to glycemic status.

Wu et al have hypothesized that lack of *H. pylori* infection, especially during childhood, might enhance the risk of development of morbid obesity (a known risk factor for diabetes mellitus) based on the finding of inverse relationship between morbid obesity and *H. pylori* infection.<sup>14</sup>

Regarding the diagnostic tool used in this study for the detection of *Helicobacter pylori* infection, we preferred and used endoscopic biopsy test because it has high sensitivity (94%) and high specificity (94%) and is potentially very helpful in diagnosing *H. pylori* infection. In the present study, the majority of patients with *Helicobacter pylori* infection were between 46-85 years of age.

The present study detects that hyperglycemia is a risk factor for *Helicobacter Pylori* infection. The Hisayama study by, Yamagata et al, shows that hyperglycemia is a possible cofactor increasing the risk posed by *H. pylori* infection.<sup>15</sup>

## CONCLUSION

Overall, the present study suggests that type 2 diabetic patients with dyspeptic symptoms are at more risk for *H. pylori* infection in comparison to non-diabetic population with dyspeptic symptoms, so every diabetic patient with acid peptic disorder must be screened for *H. pylori*. So, there is a need to provide proper counselling, education and awareness regarding diabetes mellitus and its association with *H. pylori* infection. Effective and appropriate measures should be taken against control of diabetes mellitus, eradication of *H. pylori* infection.

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