

Association of Helicobacter Pylori Infection in patients suffering from Type 2 Diabetes Mellitus

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ABSTRACT

Background: *Helicobacter pylori* (*H. pylori*) infection has been associated with hyperglycemia and raised levels of inflammatory cytokines triggered in patients suffering from type 2 diabetes mellitus.

Aim: To compare the frequency of *H. pylori* infection in diabetic and non-diabetic patients.

Study Design: Case control.

Place and Duration: Department of Pathology/Microbiology and Medicine outdoor department, Life Hospital, Lahore from June 2017 to March 2018.

Methods: This hospital-based case control study was conducted on 180 subjects and were divided into two groups i.e. type 2 diabetics and non-diabetics. All diabetic patients of ≥ 18 years of age, both gender and the known cases with history of indigestion, heart burn, pain or discomfort in the stomach or abdominal fullness for more than a month were screened for *H. pylori* infection. The collected data of both groups was evaluated and separated for analysis.

Results: *H. pylori* infection was positive in 75% of diabetic patients and only 25% in non-diabetic group with a highly significant p-value (0.000). In *H. pylori* infection positive diabetic group, majority of the patients were reported to be males with maximum age range of 41-50 years in both diabetic (30) and non-diabetic (10) patients.

Conclusion: This study overall concludes that diabetic patients are at greater risk of *H. Pylori* infection. Hence, infection by this pathogen must be suspected in patients suffering from type 2 diabetes mellitus.

Keywords: Diabetes mellitus, Helicobacter pylori, Helicobacter pylori serology

INTRODUCTION

Helicobacter pylori (*H. pylori*) infection is gaining strong foothold in the developing countries. It is also a public health problem worldwide¹. The rate of active *H. pylori* infection in one of a study conducted in Pakistan is 49.5%². It is notorious for causing gastritis, peptic and duodenal ulcers³. This Gram negative rod has a unique virulence factor called cag A protein which modifies the signal transduction and gene expression in host epithelial cells. The production of ammonia by its urease enzyme along with inflammatory response further leads to mucosal damage⁴.

H. pylori is also responsible for certain extragastric disorders including cardiovascular diseases and metabolic syndrome. The activating point of infection has been low grade systemic inflammation in all of these extragastric disorders. Similarly, it has been suggested in certain studies that inflammation has a key role in the pathogenesis of type 2 diabetes mellitus⁵. The insulin action is blocked by various inflammatory markers such as C-reactive protein and Interleukin-6 by phosphorylation of serine residues on insulin receptor substrate. The growing evidence suggests that *H. pylori* is responsible for the regulation of two hormones leptin and ghrelin, involved in energy homeostasis. The action of these two hormones affects obesity, insulin sensitivity, and glucose homeostasis⁶.

Diabetes mellitus is one of the important causes of dyspepsia. There is an increase occurrence of *H. pylori* infection in diabetes mellitus patients. Two significant

causes of dyspepsia in diabetics include delayed gastric emptying and antral dysmotility. The blood glucose concentration has been mainly thought to be related with *H. pylori* infection. Hyperglycemia may trigger *H. pylori* infection or there may be reactivation of previous dormant infection producing symptoms related to dyspepsia in diabetes.⁷ The prevalence of *H. pylori* in diabetes mellitus is 61% in Pakistan⁸. There are various studies which show positive relevance between *H. pylori* infection and type 2 diabetes mellitus^{9,10,11}.

Only few studies from Pakistan reported association of *H. pylori* infection and type 2 diabetes mellitus. The present study was focused on observing the frequency of *H. pylori* infection in patients with type 2 diabetes mellitus. The aim of the study was to help the clinicians to properly identify the cause of dyspeptic symptoms in type 2 diabetic patients.

PATIENTS AND METHODS

This case control study was conducted at Medicine outdoor department and Pathology/Microbiology department of Life care hospital, Lahore, A project of Life Care Foundation TRUST from June 2017 to March 2018. All ethical considerations and obligations were duly addressed and the study was conducted after approval from ethical committee. Informed consent was also taken from the patients.

Non-probability convenient sampling was done. Patients aged ≥ 18 years who were known diabetics & with active symptoms of dyspepsia, epigastric discomfort or bloating for one month or more were included in the study. Patients with type 1 diabetes, on steroids or immunosuppressants, recently taking antibiotics, proton pump inhibitors, H2 receptor blockers, or on antacids in last

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4 weeks and with past and present evidence of active gastrointestinal bleeding, jaundice or after gastric surgery were excluded from the study both for diabetic patients and non-diabetic patients group.

Cost effective *H. pylori* antibody commercial kit (Bio Check, USA) for antibodies detection in blood was performed on all these samples sent to laboratory. The antibodies detected are either IgG, IgM or IgA to *H. pylori* if present in this specimen will bind to the *H. pylori* conjugates. This immunochromatographic (ICT) test was interpreted according to instructions of the manufacturer. When both control and test lines were visible, the ICT test was regarded positive. When only control line was visible, the test was regarded negative. When control line was absent, the test was regarded to be invalid. The test was interpreted within 15 minutes. *H. pylori* positive patients were divided into two groups - A and B. Group A was allocated to known diabetic patients and group B to non-diabetic patients (control group). The collected data of both groups (A and B) were then evaluated, separated and saved for analysis.

The data were evaluated in statistical program SPSS version 21. Frequency and percentages were calculated wherever applicable. The Chi-Square test was applied among the categorical variables. P-value < 0.05 was considered as statistically significant.

RESULTS

Out of total 180 patients, there were 107 patients positive for *H. pylori* infection. Out of 107 patients, 80 patients were found to be diabetic and 27 patients were found to be non-diabetic as shown in table 1. Overall, p-value is 0.000 which is highly significant statistically.

From eighty patients studied, 62.5% of diabetic males were found to be *H. pylori* positive as compared to diabetic females (37.5%) given in table 2.

Figure 1 depicts the *H. pylori* infection in diabetics and non-diabetics in relation to various age groups. *H. pylori* infection was found highest in both diabetics (37.5%) and non-diabetics (37%) with age group of 41-50 years. The mean age in diabetic group is 49±11 years.

Table 1: Frequency of *H. pylori* infection in diabetic and non-diabetic patients (n=180)

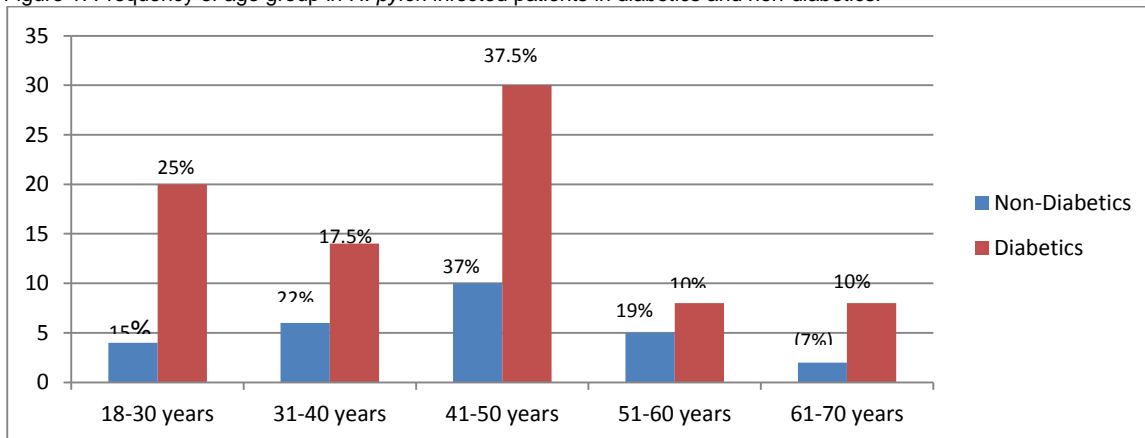
<i>H. pylori</i> serology status	Group A	Group B
Positive (n=107)	80 (75%)	27 (25%)
Negative (n=73)	25 (34%)	48 (66%)

P value=0.000

Table 2: Gender distribution in *H. pylori* positive infected diabetic and non-diabetic patients (n=107)

<i>H. pylori</i> positive gender	Group A (n=80)	Group B (n=27)
Males	50 (62.5%)	23 (85%)
Females	30 (37.5%)	04 (15%)

Figure 1: Frequency of age group in *H. pylori* infected patients in diabetics and non-diabetics.



DISCUSSION

Helicobacter pylori associated with a number of gastrointestinal & extra gastrointestinal diseases that has dramatically altered the diagnostic approach in various fields of medicine¹². In the literature, most of the studies show link between *H. pylori* infection with type 2 diabetes^{9,11}. Whereas, few other studies failed to reveal any association^{13,14}.

In our study, we found that *H. pylori* infection was more common in diabetic patients (75%) as compared to non-diabetic patients group (25%). Highly significant p-value implies that there is an association of *H. pylori* infection with diabetic group. These results corresponds to a study conducted in Pakistan at Liaquat University Hospital,

Jamshoro in 2010, where *H. pylori* infected 73% patients were diabetic and 51.4% were non-diabetics. However, in this study *H. pylori* antigen was detected in stool⁷. Another study conducted in Africa revealed 88.2% diabetics and 67.7% non-diabetics with anti-*H. pylori* antibodies positive status¹⁵. Analogous results were also found in studies conducted by Kimiaki et al and Marollo et al^{16,17}. On the contrary, few authors reported contradictory results. Diabetic versus non diabetic *H. pylori* positive patients 28.1% vs. 29.25%¹⁸, 50.8% vs. 56.4%¹⁹. Deficiency of cellular and humoral responses pose risk for chronic infections in diabetic patients. Gastroparesis causes delayed gastric emptying, hence bacterial overgrowth can increase the chance for *H. pylori* infection. Leukocyte

functional abnormality and hyperglycemia are also predisposing factors for infections and facilitate secondary *H. pylori* colonization²⁰.

In the present study, most of male diabetic patients were found to be *H. pylori* infection positive. This may be due to more males visiting to our hospital as compared to females. Alike results were reported by a study conducted in India with male predominance of 75% in diabetics and 42.8% in non-diabetic patients suffering from *H. pylori* infection.²¹ On the other hand, another study showed more prevalence of *H. pylori* in females which states that gender distribution for this infection is still controversial⁷.

In our study, both diabetic and non-diabetic patients infected with *H. pylori* reported in age group between 41-50 years. A study published by Zafar et al reported maximum patients in the same age group as that of our study but only for *H. pylori* infected diabetic patients²¹. The mean age in our study was 49±11 years. However, a study by Sargın et al showed that the mean age of diabetic patients with *H. pylori* infection was 56 years²².

There are different methods for detection of *H. pylori* infection, namely biopsy of the mucosa, the rapid urease test, serum *H. pylori* antibodies and *H. pylori* stool antigen test. Different studies have used either one or any two of these methods for studying *H. pylori* infection. However, in the present study, *H. pylori* infection was investigated by immunochromatographic method because of low economic cost and rapid turnaround time. Similarly, for stool antigen detection, patient might have to wait which may be less convenient for the patient as compared to blood test. Biopsy and rapid biopsy urease test both requires endoscopic procedure which is not available in our hospital.

CONCLUSION

This study indicates there is a significant relationship of *H. pylori* infection in patients who are suffering from type 2 diabetes mellitus when compared to non-diabetic population. Therefore, type 2 diabetic patients suffering from active dyspeptic symptoms should undergo further confirmatory tests for diagnosis of *H. pylori* infection.

Conflict of interest: No conflict of interest.

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