

Original Research Article

Helicobacter pylori infection among type 2 diabetics: a case control study

Hafiz Qazi Muhammad Amir¹, Omaila Ikram², Muhammad Tayyab Zia²,
Fareha Kashan Theba³, Naila Ikram⁴, Anas Tariq^{5*}

¹Department of Medicine, Sharif Medical and Dental College, Lahore, Punjab Pakistan

²Department of Medicine, King Edward Medical University Lahore, Punjab Pakistan

³Department of Physiology, Dow University of Health Sciences, Karachi, Sindh Pakistan

⁴Department of Physiology, Al Aleem Medical College, Lahore, Punjab Pakistan

⁵Department of Medicine, Al-Tibri Medical College and Hospital, Karachi, Sindh, Pakistan

Received: 02 January 2020

Revised: 08 January 2020

Accepted: 21 January 2020

*Correspondence:

Dr. Anas Tariq,

E-mail: anastariq93@gmail.com

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ABSTRACT

Background: *Helicobacter pylori* infection has been associated with hyperglycemia among type 2 diabetics. The objective of this study was to compare the *H. pylori* infection frequency in diabetic and non-diabetic patients.

Methods: This case-control study was done at Al-Tibri Medical College and Hospital from May 2019 to August 2019. After written and informed consent, patients between 18-75 years with epigastric burning, dyspepsia, regurgitation were included and with history of eradication therapy, antibiotic or NSAID use in the last 6 months or surgery of upper GI tract months were excluded. Type 2 diabetics were placed in one group and non-diabetic individuals in another. Both groups were compared for presence of *H. pylori* infection. Data was analysed using SPSS. Demographic variables included age, gender and status of *H. pylori* infection. Quantitative data was expressed as frequency and percentages. Chi-square test was applied to test for significance keeping p-value of <0.05 statistically significant.

Results: From 480 patients, 355 patients showed positive *H. pylori*, among them 282 were diabetic and 73 non-diabetic (p-value <0.001). Amongst the 355 diabetics, 55% were male Among 73 non-diabetics, 64% were male. All the patients in the study had dyspeptic symptoms and complained of dyspepsia, epigastric burning and regurgitation.

Conclusions: A substantial relationship between *H. pylori* infection among type 2 diabetes mellitus patients was observed compared to non-diabetics. As a result, diabetic patients having active dyspeptic symptoms should undergo further confirmatory tests for diagnosing *H. pylori* infection.

Keywords: Diabetes mellitus, Dyspepsia, Epigastric burning, *Helicobacter pylori*, Regurgitation

INTRODUCTION

Helicobacter pylori infection is a worldwide problem, more commonly observed in developing countries, however reported to have an overall incidence of 50%

throughout the world.¹ It has been reported in most studies that infection with *H. pylori* is termed as most common chronic infections world over.² *H. pylori* is spiral shaped, gram negative and a flagellate bacillus that usually resides in the gastric epithelium, which might

lead to an inflammatory cellular infiltration in the gastric mucosa that produces cytokines, responsible for not only local effects but also have the potential to damage distant tissues of the body causing extra digestive diseases.³

Likewise, since type 2 diabetes mellitus is linked to increased insulin resistance, which together with obesity are an important risk factor for metabolic syndrome.⁴ Researchers report *H. pylori* effects glucose homeostasis along with insulin sensitivity in a negative manner. Through the eradication of *H. pylori*, symptoms and patient's quality of life might have improvement.⁵ The International Diabetes Federation (IDF) in 2015 published that there were 7 million people in Pakistan between the age group of 20 to 79 years who were suffering from diabetes and by the year 2040, this figure is predicted to cross over 14 million. Furthermore, around 84,364 deaths due to diabetes were reported in the same year.⁶

Infection with *H. pylori* is a common entity among diabetics especially among those without a metabolically active hyperglycemic control and they have *H. pylori* colonization in the gastric antrum.⁷ Inflammation has been indicated in diabetes as having increase susceptibility to *H. pylori* infection through insulin resistance. For instance, increased levels of inflammatory cytokines might cause phosphorylation of serine residues on insulin receptor substrate that prevents insulin's interaction with its receptors, causing an inhibition in insulin action.⁸ Lipopolysaccharides from infectious agents in the gastro-intestinal tract such as *H. pylori*, are associated with activation of toll-like receptors, leading to energy expenditure, accumulation of fat and stimulation of innate immune system and consequently, resistance to insulin.⁹

Only a few researches have been done in the last decade where infection with *H. pylori* is reported to play a part in diabetes mellitus pathogenesis.¹⁰ International and local data is scant regarding linkage of *H. pylori* to diabetes mellitus. Objective of the current study was to determine frequency of *H. pylori* among patients with and without diabetes mellitus and their association to each other.

METHODS

This case control study was done at the general medicine department of Al-Tibri Medical College and Hospital, Karachi for a period of 4 months from May 2019 to August 2019. After ethical approval of Institutional Review Board (IRB) of the hospital and taking written and informed consent, data collection was initiated.

Inclusion criteria

Consisted of patients presenting to the general medicine department during the study period between ages 18 to 75 years with complains of epigastric burning, dyspepsia, regurgitation.

Exclusion criteria

Patients who refused to give consent or did not have documentation of *H. pylori* infection whether it was positive or negative, having history of eradication therapy, antibiotic use in last 6 months, surgery of upper GI tract and history of non-steroidal anti-inflammatory drugs in last 6 months were excluded from the study.

Documented type 2 diabetes mellitus were placed in one group and normal healthy, non-diabetic individuals without any co-morbidity were placed in another group. Both groups were compared for the presence of *H. pylori*.

Data was entered and analysed using SPSS version 20. Demographic variables included age, gender, co-morbidity, type 2 diabetes mellitus and status of *H. pylori* infection. Quantitative data was expressed as frequency and percentages. Chi-square test was applied for testing of significance keeping a p-value of <0.05 as significant.

RESULTS

With the application of inclusion criteria, a total of 480 patients were included in the study. Amongst them, 311 patients were reported with positive results of diabetes mellitus while 169 patients were negative for diabetes mellitus. From the 480 total patients, 355 patients were positive for *Helicobacter pylori* infection on serology while 125 patients were negative. Among 355 diabetic patients, 282 (79.4%) of patients were found to have positive *Helicobacter pylori* infection on serology. 73 (20.6%) patients with positive *H. pylori* serology were reported to be non-diabetic. 29 (23.2%) out of the 125 *H. pylori* negative patients were observed to be diabetics while 96 (76.8%) of the patients reported to be non-diabetics. A substantial difference of <0.001 was reported between diabetic patients having *H. pylori* infection as compared with non-diabetics (Table 1).

Table 1: *H. pylori* infection positivity among diabetics and non-diabetics.

<i>H. pylori</i> serology (n = 480)	Diabetic group	Non-diabetic group	p-value
Positive (n = 355)	282 (79.4%)	73 (20.6%)	<0.001
Negative (n = 125)	29 (23.2%)	96 (76.8%)	

Chi-square test applied to test for significance

Amongst the 355 patients that were diabetic, 195 (55%) male diabetic patients out of total 242 males were found to have *H. pylori* positive serology. Among total 73 non-diabetic patients, 47 (64%) out of total 242 male patients were reported to have a positive serology for *H. pylori*. 160 (45%) female diabetic patients out of total 186 females were found to have *H. pylori* positive serology. Among total 73 non-diabetic patients, 26 (36%) out of

total 186 female patients were reported to have a positive serology for *H. pylori* (Table 2).

Table 2: *H. pylori* infection distribution among diabetics and non-diabetics according to gender.

Gender	Diabetic group (n = 355)	Non-diabetic group (n = 73)
Male	195 (55%)	47 (64%)
Female	160 (45%)	26 (36%)

All the patients in the study reported dyspeptic symptoms such as complain of dyspepsia, epigastric burning and regurgitation. All other co-morbid such as hypertension and smoking were negative amongst patients. Most of the patients belonged to a middle and lower middle class family. Overall the mean duration of diabetes in diabetic patients was between 5-10 years. All patients were reported to take regular anti-diabetic medication, either in injectable form or on oral hypoglycaemic drugs and had controlled levels of glucose through medication.

DISCUSSION

The association of *Helicobacter pylori* infection is made to a number of gastrointestinal and extra gastrointestinal diseases which has changed the approach for diagnosis among the various medical fields.¹¹ In most studies, *H. pylori* infection has been linked with type 2 diabetes mellitus.^{12,13} Few studies have reported no such association.^{14,15} According to this study, it was observed that *H. pylori* infection was commonly seen among type 2 diabetic group (79%) in comparison to non-diabetic group (21%). A significant association implied that there stands an association between *H. pylori* infection and diabetes. The results are in line with another study done in Pakistan where hyperglycemia due to diabetes was regarded as a predisposing factor *H. pylori* colonization and reported that 73 % of patients having *H. pylori* infection were diabetic and 51% were non-diabetic.¹⁶ Nevertheless, *H. pylori* antigen was detected in stool in this study.

In another study done in Africa reported that 88% diabetic and 67% non-diabetic patients were found to have a positive status for anti-*H. pylori* antibodies.¹⁷ Similar results were observed in a study by Jeon et al as well as Huang et al.^{18,19} On the other hand, some studies have found contradictory results. In diabetic group vs the non-diabetic group, *H. pylori* positive patients were 28.1% vs 29.6% in one study and 50.8% vs 56.4% in another study.²⁰ Deficient molecular and humoral responses pose a greater risk for chronic infection among diabetic patients. The fact that gastroparesis lead to delays in gastric emptying, hence can cause bacterial overgrowth with increases the chances for infection with *H. pylori*. White blood cells functional abnormality with hyperglycemia in diabetes predisposes patients to infection and facilitates secondary *H. pylori* colonization.²¹

According to the study results, in the diabetic group, male to female ratio was almost equal with slight male predominance (55%). Similarly more males were found to be *H. pylori* positive in the non-diabetic group (64%). Likewise in a study by Wali et al, male predominance was reported at 62.5% and 85%, in diabetic and non-diabetic group respectively.²¹ In accordance with the results, a study by Zafar et al reported *H. pylori* positivity among 75% diabetic patients and 42.8% among non-diabetic patients.²² In contrast, another study by Devrajani et al showed that more prevalence of *H. pylori* was seen in females as compared with males which states that gender distribution for *H. pylori* infection remains controversial.¹⁶

Multiple methods exists for detecting *H. pylori* infection, mainly is done through biopsy of the mucosa, rapid urease test, serum *H. pylori* antibodies and *H. pylori* stool antigen test. Different studies use either one or any two of the above mentioned techniques for identifying *H. pylori* infection. However, in this study, *H. pylori* was tested using immunochromatographic method due to low economic cost and its rapid turnaround time. Likewise, for stool antigen test detection, the patient ought to wait which might be less convenient for the patients in comparison to a blood test. Techniques such as biopsy and rapid biopsy urease test, both need endoscopic procedures, which are invasive, have more economic cost and need patients' compliance as well. This study was not immune from selection and observer bias. *H. pylori* infection was diagnosed only through blood test plus if *H. pylori* serology came back positive, treatment was started but after eradication therapy, presence of *H. pylori* was not determined in this study.

CONCLUSION

Conferring to results of the study, a substantial relationship between *H. pylori* infection among type 2 diabetes mellitus patients was observed as compared to non-diabetic patients. As a result, diabetic patients having active dyspeptic symptoms should undergo further confirmatory test in order to diagnose *H. pylori* infection.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Hafiz QMA, Ikram O, Zia MT, Theba FK, Ikram N, Tariq A. *Helicobacter pylori* infection among type 2 diabetics: a case control study. *Int J Res Med Sci* 2020;8:1047-50.