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ASSOCIATION BETWEEN DIABETES MELLITUS TYPE II AND HELICOBACTER PYLORI INFECTION

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ABSTRACT

Objective: *To determine the frequency of H. pylori infection in patients with type II diabetes mellitus.*

Study Design: *Cross-sectional study*

Place And Duration: *Medicine Department of Liaquat University of Medical and Health Sciences, Jamshoro, for a duration of 6 months i.e. from Sep/2024 till Feb/2025.*

Patients And Methods: *Based on the inclusion and exclusion criteria, 289 patients of type II diabetes mellitus were enrolled into the study. The data was recorded onto a self-structured questionnaire containing inquiries regarding basic biodata, sociodemographic details and inference obtained from a detailed clinical history of the patient, the laboratory investigation values (such as fasting blood glucose, HbAlc) was done. The Helicobacter pylori (HP) infection was diagnosed via serology and HpSA and findings were noted down and were subjected to statistical analysis.*

Results: *The median (IQR) age of the patients was 49 (23) years. The median (IQR) duration of disease was 10 (7) years and the median (IQR) HbA1c levels were 9.7 (2.9%). There were 198 (68.5%) males and 91 (31.5%) females in the study. In terms of severity of diabetes, 44 (15.2%) patients had good diabetic control, 163 (56.4%) patients had intermediate control and 82 (28.4%) patients had poor control. HP infection was present in 124 (42.9%) patients.*

Conclusion: *In patients with type II diabetes, H.pylori infection was present in 42.9%.*

INTRODUCTION:

Globally, the prevalence of diabetes is rising quickly, making it a serious public health concern. The International Diabetes Federation (IDF) estimates that 463 million people globally have diabetes in 2019 (Aschner P et al, 2021). According to a national survey conducted in 2019, 17.1% of Pakistani adults have type II diabetes mellitus (Azeem S et al, 2022). The IDF estimates that 26.7% of Pakistani adults will have the disease in 2022, with an estimated 33,000,000 cases overall (International Diabetes Federation Pak, 2023). Finding distinct risk factors for diabetes in Pakistan will be very important in this situation.

An estimated half of the world's population is thought to be infected with Helicobacter pylori (HP), which has been recognized as a global public health concern (Elbehiry A et al, 2023). According to socioeconomic position, its frequency varies significantly, and it is typically more severe in underdeveloped nations (Li Y et al, 2023). The Helicobacter pylori prevalence in Pakistan is 45.66 (Zaman R, 2006) while the Helicobacter pylori prevalence in diabetes mellitus in Lahore, Pakistan, is 75% (Wali NA et al, 2018).

Common gastrointestinal issues caused by HP include mucosa-associated lymphoid tissue lymphoma, gastric adenocarcinoma, peptic ulcers, and chronic gastritis (Zhou J et al, 2022). Notably, a large number of studies have demonstrated a strong correlation between H.pylori infection and extra-gastrointestinal problems, including metabolic disorders, neurological disorders, autoimmune diseases, cardiovascular disease, and pregnancy-related hyperemesis gravidarum (Sahoo OS et al, 2023). In particular, diabetes, a topic of great interest in recent years, is thought to be linked to H. pylori infection (Sun M et al, 2024).

However, the results of previous research on the connection between diabetes and H. pylori infection were inconsistent. Eliminating the H. pylori infection may be crucial for the prevention and management of diabetes if it is a factor in the occurrence of the disease. Therefore, this study aimed to determine the burden of H. pylori infection in patients with type II diabetes mellitus in Pakistan. Understanding the prevalence of H. pylori infection in individuals with Type II diabetes could provide crucial data to establish whether an epidemiological connection exists. This knowledge has the potential to guide targeted healthcare interventions, offering a foundation for improved management strategies and public health policies tailored to addressing the interplay between diabetes and infections in the Pakistani population.

PATIENTS AND METHODS:

The study had a cross-sectional design. The study was conducted for six months, from Sep/2024 to Feb/2024, at the Medicine Department of the Liaquat University Hospital, Hyderabad/Jamshoro. The study enrolled 289 patients who had Type II diabetes. The sample size of 289 diabetic patients was calculated by using WHO Openepi sample size calculator keeping 5% margin of error, 95% confidence interval, and taking prevalence of H. pylori in diabetes mellitus as 75% (Wali NA et al, 2018). Non-probability consecutive sampling technique was used.

Inclusion criteria: The study included consenting patients, diagnosed with diabetes mellitus type II for at least last 6 months (aged 18 to 75 years), of both genders.

Exclusion criteria: Patients having functional dyspepsia, GERD and on Steroids or NSAIDS were excluded from the study.

Based on the American Diabetes Association's standards, diabetes mellitus was classified as fulfilling any of these criteria: HbA1c=6.5%, a self-reported diabetes diagnosis from a doctor, or the usage of an antidiabetic drug. The Helicobacter pylori infection was diagnosed via serology i,e. IgM & lgG. Helicobacter pylori stool antigen (HpSA) was also used for confirmation.

Based on the inclusion and exclusion criteria, patients of Diabetes Mellitus were enrolled into the study. The information was entered into a self-structured questionnaire that asked questions about the patient's basic bioinformation, sociodemographics, and conclusions drawn from a thorough clinical history. The researcher also paid for the laboratory testing of H. pylori and FBG and HbAlc. 3cc of blood was drawn by a phlebotomist at the time of being analyzed. Using the hexokinase method (Clobas 8000 modular analyzer, Roche Diagnostics), fasting blood glucose (FBG) was measured. The ion-exchange high-performance liquid chromatography method (G8 HPLC Analyzer, Tosoh) was used to measure HbAlc. The Helicobacter pylori infection was diagnosed via serology and HpSA. Inquiries were also made about gastrointestinal bleeding, gastric burning and nausea. By using codes rather than names and password-protecting the data, the patients' privacy and confidentiality were preserved. After the project was finished, the data was deleted after a predetermined amount of time.

The data was analyzed through Statistical Package for social sciences (SPSS) version 25.0. Frequency or percentages were calculated for qualitative variables

like gender, family history of diabetes, HP infection, hypertension and BMI status. The Shapiro-Wilk test was used for assessing the normality of data and as the data was non-normal in distribution so median with interquartile range was calculated for quantitative variables (e.g. age, duration of diabetes, HbAlc levels). Effect modifiers like age, gender, duration of disease and severity were controlled through stratification. The post stratification chi-square test / Fisher Exact test was applied by taking p value less than and equal to 0.05 as significant.

RESULTS:

A total of 289 patients were enrolled. The median (IQR) age of the patients was 49 (23) years. The median (IQR) duration of disease was 10 (7) years and the median (IQR) HbA1c levels were 9.7 (2.9%) (Table-I).

There were 25 (8.7%) patients of age group 18 to 30 years, 71 (24.5%) patients of age group 31 to 45 years, 104 (36%) patients of age group 46 to 60 years and 89 (30.8%) patients of age group 61 to 75 years. There were 198 (68.5%) males and 91 (31.5%) females in the study. Family history of diabetes was present in 110 (38.1%) patients. Duration of disease was ≤5 years in 36 (12.5%) patients, was >5 to 10 years in 114 (39.4%) patients and was >10 years in 139 (48.1%) patients. With respect to body mass index, 126 (43.6%) patients had normal BMI, 126 (43.6%) were overweight and 37 (12.8%) patients were obese. In terms of severity of diabetes, 44 (15.2%) patients had good diabetic control, 163 (56.4%) patients had intermediate control and 82 (28.4%) patients had poor control. Hypertension was present in 93 (32.2%) patients. HP infection was present in 124 (42.9%) patients (Table-II).

Stratification of HP was done with respect to age, gender, severity of disease and disease duration and it was found that none of these effect modifiers had any significant association with HP presence (Table-III).

Table-I: Median (IQR) of Quantitative Variables (n=289)

Variables	Median (IQR)
Age (in years)	49 (23)
Duration of disease (in years)	10 (7)
HbA1c (%)	9.7 (2.9)

Table-II: Frequency of qualitative variables (n=289)

Variables	Frequency (percentage)
Age group: 18 to 35 years 36 to 50 years 51 to 60 years 61 to 75 years	 25 (8.7%) 71 (24.5%) 104 (36%) 89 (30.8%)
Gender: Male Female	 198 (68.5%) 91 (31.5%)

Family history of diabetes: Yes No	 110 (38.1%) 179 (61.9%)
Duration of disease: ≤5 years >5 to 10 years >10 years	 36 (12.5%) 114 (39.4%) 139 (48.1%)
Body mass index (BMI): Normal Overweight Obese	 126 (43.6%) 126 (43.6%) 37 (12.8%)
Severity of diabetes: Good control Intermediate control Poor control	 44 (15.2%) 163 (56.4%) 82 (28.4%)
Hypertension: Yes No	 93 (32.2%) 196 (67.8%)
Presence of HP infection: Yes No	 124 (42.9%) 165 (57.1%)

Table-III: Stratification of HP infection with respect to age, gender, disease duration and severity of disease (n=298)

Variables	HP infection		P-value
	Yes	No	
Age group: 18 to 35 years 36 to 50 years 51 to 60 years 61 to 75 years	 12 (4.2%) 28 (9.7%) 40 (13.8%) 44 (15.2%)	 13 (4.5%) 43 (14.9%) 64 (22.1%) 45 (15.6%)	0.391
Gender: Male Female	 91 (31.5%) 33 (11.4%)	 107 (37%) 58 (20.1%)	0.122
Severity of diabetes: Good control Intermediate control Poor control	 23 (8%) 66 (22.8%) 35 (12.1%)	 21 (7.3%) 97 (33.6%) 47 (16.3%)	0.374

Duration of disease: ≤5 years >5 to 10 years >10 years	 11 (3.8%) 49 (17%) 64 (22.1%)	 25 (8.7%) 65 (22.5%) 75 (26%)	0.247

DISCUSSION:

The current study findings revealed that in type II diabetic patients, HP infection was present in 42.9% of patients. Majority of the patients in our study were males, were of age group 51 to 60 years, had >10 years duration of disease, were of either normal BMI or were overweight and had intermediate control of diabetes. The rate of HP infection was unaffected by the effect modifiers.

HP infection has been identified as a global public health concern, impacting roughly 50% of the global population and being more common in underdeveloped nations than in industrialized ones (Maev IV et al, 2022). HP infections in the gastric antrum are common in diabetes individuals with poor metabolic control due to chemotactic factors such as tumor necrotic factor and the presence of interleukins 1, 2 and 8 in the gastric epithelium (Kim WS et al, 2022). These cytokines cause the gastric epithelium to undergo a variety of alterations that enhance inflammation and injury to the epithelium (Sekaya G et al, 2024). This increases the likelihood of aberrant repair, which can result in gastric atrophy or epithelial cell metaplasia (Ma H et al, 2021). One of the major causes of dyspepsia is diabetes mellitus (Addissouky TA et al, 2023). People with diabetes are more vulnerable to infection, especially if they have poor glycaemic control. However, there is debate over the connection between HP infection and diabetes (Shi ZG et al, 2021). While some researchers found no significant relationship, others discovered a favorable association. Furthermore, one study found that people with diabetes had a much lower incidence of HP infection than subjects without the disease (Malecki M et al, 1996). Given the early data pointing to a potential link between HP infection and the onset of cardiovascular disease, it is especially important to look at HP infection prevalence in relation to diabetes, which is a significant cardiovascular risk factor in and of itself. There is a dearth of pertinent information, particularly in the Pakistani population. Keeping this in view, the current study was carried out to assess the frequency of HP infection in Type II diabetic patients in our population.

Our study results showed that HP infection was present in 42.9% type II diabetics. A study conducted previously in Hyderabad revealed that HP infection was present in 73% of the type II diabetics (Devrajani BR et al, 2010). Lo et al. revealed that HP infection was found in 44.1% patients with diabetes (Lo MK et al, 2004). A study conducted in China found that HP infection was detected in 50.8% diabetic patients (Ko GT, 2001). Bener et al revealed that 50.7% diabetic patients had HP infection (2021). These findings support our study findings that HP infection is frequently encountered in type II diabetics. In contrast, a study conducted by Malecki M et al, 1996 revealed that the rate of HP infection was only 22% in type II diabetics. This finding by Malecki et al. is different from our study because the higher rates in our study can be attributed to increased frequency of diabetes in the current era as well as to the geographical variations.

Patients with diabetes are more likely to get an H. Pylori infection. Therefore, screening for H. pylori infection and maintaining appropriate blood glucose monitoring are important preventive treatments against this potentially fatal infection.

CONCLUSIONS:

The current study concluded that HP infection was present in 42.9% patients with type II diabetes. The current study findings propose that all diabetic patients should have their H. Pylori levels checked. It is imperative that people receive the proper guidance, instruction, and understanding regarding diabetes mellitus and its connection to H. pylori infection. Appropriate and efficient steps should be made to eradicate the H. pylori infection and regulate diabetes mellitus. To validate the results of the current study, larger samples must be used in future research.

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LIMITATIONS:
The study was subject to significant limitations. Because this study was conducted at a single center and had a small sample size, its findings cannot be broadly applied. Secondly, only type II diabetics were enrolled and thus the frequency of HP and its association with type I diabetics cannot be commented on.

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AUTHOR'S CONTRIBUTION:

Collection and acquisition of data & grammatical corrections	*Dr. Hira Sajjad*
Concept & design of study & proof read	*Dr. Poona Bai*
Drafting the article and finalizing the manuscript	*Dr. Gulzar Fatima*
Revising critically and make it suitable for final format	*Dr. Muhammad Aslam Rind*
Grammatical and topographical review	*Dr. Sidra Ghori*
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