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Heterogeneity of helicobacter pylori in diabetic and nondiabetic patients

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Abstract---Recent years have seen the appearance of fresh pieces of data suggesting a connection between Helicobacter pylori infections and diabetes. A sample of this size would require a random selection of 340 participants, with 176 males and 164 females. They were separated into the two primary categories of diabetes patients and non-diabetic individuals. Among the samples, H. pylori was found in 171 (57 percent), while 169 (43 percent) of the samples tested negative for the presence of H. pylori. The levels of glucose in the blood of diabetic patients were much higher than those of non-diabetic patients whose bodies were infected with bacteria. Of the 171 patients who tested positive for H. pylori, 97 (or 57 percent) did not have diabetes, but 74 (or 43 percent) did have diabetes. The current research shown that the rates of infection differ between age groups, and that this variation is directly related to age. According to the findings of this study, H. pylori infection is more common in males

than in females, and it is more prevalent in the urban core than in the surrounding districts and territories (rural). According to the findings of the study, non-diabetic persons who had *H. pylori* bugs had much higher blood sugar concentrations, which made them more prone to developing diabetes in the future if they were not treated.

Keywords---*helicobacter pylori* infection, gastroenteritis, diabetes mellitus.

Introduction

Many diseases of the gastrointestinal tract, including gastritis, peptic ulcer disease, gastroesophageal reflux disease, atrophic gastritis, and gastric cancer, have been linked to infection with *Helicobacter pylori*, which is a spiral rod-shaped Gram-negative bacterium. *Helicobacter pylori* is recognized as a bacterium that can cause gastritis. It has been estimated that up to half of the world's population is infected with these bacteria, and the most common way that infection is acquired is through the focal-oral, sororal, or gastro-oral routes, primarily during childhood. Infection with *H. pylori* has been linked to a number of diseases that are not associated with the digestive tract, including diabetes mellitus (DM), ischemic heart disease, neurological disorder, hypertension, thyroiditis, dermatological disease, rheumatological disease, and cerebrovascular disease. Infection with *Helicobacter* affects approximately half of the world's population and is more common in less developed countries than in more developed nations. Previous studies have estimated that *H. pylori* infection is very common in diabetic patients. This is especially true for diabetic patients who have inadequate metabolic control, as these kinds of people are more likely to have colonized by an infection caused by *H. pylori* in the gastric antrum.

This is most likely the result of the presence of specific chemotactic factors in the gastric epithelium, such as interleukins (IL) – IL1, IL2, and IL8 – as well as tumour necrotic factor. The induction of several changes in the gastric epithelium that lead to inflammation and damage to the epithelium is the role that these cytokines play in the body. The result of those reactions is an increase in the risk of aberrant repair, which can give the appearance of epithelial cell metaplasia and gastric atrophy. Diabetes mellitus is a chronic disease that is characterized by chronic hyperglycaemia as well as disturbances in the metabolism of fat, protein, and carbohydrate, resulting from a deficiency in both insulin production and action. Diabetes mellitus is one of the most common chronic diseases that affects people today. Patients with diabetes are more likely to experience severe complications when their hyperglycemia is chronic.

Several organs, such as the nerves, kidneys, heart, eyes, and blood vessels, can sustain long-term damage and become dysfunctional or even fail as a consequence of these complications. It has been found that *H. pylori* is involved in a wide variety of intestinal and extraintestinal diseases, such as metabolic syndrome, insulin resistance, and cardiovascular conditions. Additionally, *H. pylori* may be potentially associated with elevations in particular inflammatory markers, such as Interlukin-6 (IL-6) and C-reactive protein. There have been a

number of studies that have reported the high prevalence of *H. pylori* among DM patients; however, the connection between an infection with *H. pylori* and diabetes is still not well understood. An increase in a diabetic patient's susceptibility to infection could be the result of a number of factors, such as a weakened immune system, a change in glucose metabolism, a decrease in gastrointestinal motility and acid secretion, or an increase in the patient's predisposition to become infected by pathogens. I Pepsinogen II antibodies and immunoglobulin G (IgG) antibodies are well-defined markers for gastric inflammation and *H. pylori* infection, respectively. These antibodies are produced in association with *H. pylori*. Therefore, the purpose of this study was to determine the prevalence of *H. pylori* infection in patients with diabetes mellitus type 2 (DMT2) and to determine whether there is a significant correlation between *H. pylori* infection and DMT2 through serum investigation of *H. pylori* infection in diabetes and not diabetes patients in relation to high levels of blood sugar.

Instruments and Techniques

The samples were collected through online forms filling between October 2021 and March 2022. A total of 340 people (176 men and 164 women) participated in the research. Table 1 summarizes the clinical characteristics of the various research teams. In general, they were classified into two groups: There were 173 diabetic patients in Group I and 167 nondiabetic individuals in Group II, both of whom had constant stomach pain and gastritis. From 15 to 75 years old, they were all in attendance.

Table 1
Clinical Features of Study Groups

Age groups n (%)	%
Diabetic patients	173 (50.89)
Nondiabetic patients	167 (49.11)
Total	340 (100)
Sex n (%)	%
Male	176 (51.76)
Female	164 (48.24)
Address n (%)	%
Urban	219 (64.41)
Rural	121(35.59)
Occupation	%
Employee n (%)	152 (44.70)
Non-employee n (%)	188 (55.30)

ELISA Kits, which are a quantitative and qualitative testing for IgG antibodies to *H. pylori* and are manufactured by Genesis Diagnostics, were used to screen healthy subjects for *H. pylori* infection. The glucose oxidase/peroxidase method was used to assess the random and fasting blood sugar levels of all the study samples. A spectrophotometer was used to determine the concentration of glucose in the blood (both random and fasting) of all the study groups. In addition to the clinical symptoms, the diagnosis of diabetes is made based on the concentration

of glucose in the blood (120 mg/dl of plasma and 160 mg/dl) for fasting and random blood sugar, respectively.

Analytical Methods

The impact of various factors on study parameters or percentages was examined using the Statistical Analysis System (2021). This study's mean comparisons were aided by independent t-tests and correlation tests.

Results

Table 2
Displays the findings obtained from the current investigation

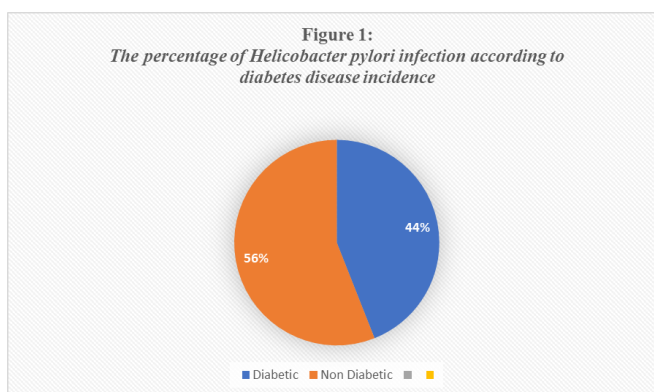
H. pylori positivity n (%)		%	
Positive		171 (50.3)	
Negative		169 (49.7)	
H. pylori and diabetes n		(%)	
Diabetic patients		81 (47.37)	
Nondiabetic patients		90 (52.63)	
Total		171 (100)	
H. pylori and age groups n		(%)	
H. pylori and age groups n (%)		Diabetic Patients	Non-Diabetic Patients
15–25		2 (6.250)	13 (33.33)
26–35		1 (3.125)	7 (17.94)
36–45		9 (28.125)	5 (12.82)
46–55		8 (25)	11 (28.20)
>56		12 (37.5)	3 (7.71)
H. pylori and patients' area n (%)		Diabetic patients	Nondiabetic patients
Urban (City Center)		25 (78.13)	37 (94.87)
Rural (Countryside and districts)		7 (21.87)	2 (5.13)

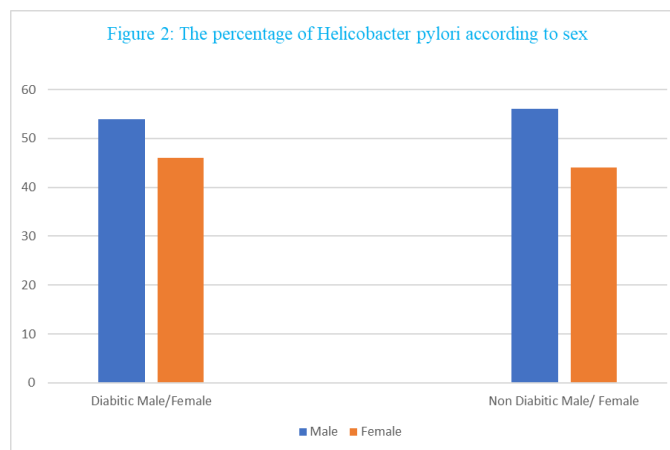
Among the samples, *H. pylori* was found in 171 (50.3 percent), while 169 (49.7 percent) of the samples tested negative for the presence of *H. pylori*. 90 of the 171 patients who tested positive for *H. pylori* were not diabetic, while 81 of the 171 patients who tested positive for *H. pylori* were diabetic [Figure 1]. This is since the glucose concentrations in the diabetic patients' blood increased significantly ($P = 0.035$), in contrast to the glucose concentrations in the bacteria-infected non-diabetic patients. The current investigation shown that the frequencies of infection differ according to age groups in both diabetes and non-diabetic individuals. This link was found to exist in relation to age. The incidence of *H. pylori* in diabetes patients was found to be highest in the age group (older than 56 years), and it was found to be lowest in the age group (15–25 years). On the other hand, the incidence of *H. pylori* in non-diabetic patients exhibited the opposite results. The present investigation discovered, in connection to the gender of the

patients, that the prevalence of *H. pylori* infection was higher in males than in females in both research groups [Figure 2]. According to the prevalence of *H. pylori* infection by living place, the results showed that the (urban) had the greatest rate in comparison to the other areas.

Discussion

There is an increasing body of information that can be referred to as a due to the correlation between multiple different types of pathogens and an increased likelihood of developing diabetes, patients who some viruses such as herpes simplex virus 1, cytomegalovirus, as well as the hepatitis A virus, in addition to a few other viruses' bacterial strains such as *Chlamydia pneumoniae*, *H. pylori*, and *H. influenzae*. *pylori* have a higher risk of developing diabetes in comparison to other the researchers have discovered some unfavourable results. These are the findings results of this investigation demonstrated that those who were infected with *H. pylori* 57% of the patients who participated in the trial across all groups, and Diabetes mellitus was seen in 43% of patients with *H. pylori*. A number a variety of studies, both globally and regionally, were carried out. and concluded that there were distinct outcomes and varied rates of infection. It came at the conclusion in 2020-21 that Diabetes was shown to be infected with 44.56 percent of *H. pylori* samples. The percentage of people who had diabetes was as follows: (62.89 percent, 79.01 percent, and (Respectively, 74.6 percent) in the countries of Iran, Egypt, and Thailand, & Oyeyemi et al. *H. pylori* antibodies were shown to exist, as demonstrated in were discovered in 18% of diabetics, whereas only 13% of normal subjects had them. It was demonstrated in that these bacteria infect. (64%) of diabetes patients, compared to (40%) of the control group.





These differences in infection rates could be due to could be because of the kind of study, the amount of people who participated, or both. addressed topics include diagnostic procedures as well as environmental and genetic aspects of the persons being investigated. The reason being as a possible explanation for the reduced prevalence of *H. pylori* among diabetes patients in this study could perhaps be a result of the diagnosis based on the fact that patients have IgG antibodies in addition to the importance of the examination itself, the research to be done on the community in addition to the environmental and genetic aspects of the people who are being investigated. The connection between them pylori infection and the progression of age showed a correlation that there is a correlation between age and the prevalence of infections groups of the infected individuals and patients without diabetes. It was shown that the most prevalent case of *H. pylori* was found in patients diagnosed with diabetes were among those in the age group (>56 years), while the incidence was at its lowest in the age group age range of 15–25 years old, while the highest incidence of *H. pylori* in nondiabetic patients (15–25 years) and the age group (More than 56 years) had the lowest incidence of infection in the same persons, whereas the rates of infection differ in the other age groups.

More than 56 years of age had the highest rate of infection observed the highest rate of infection in the age group (49–30 years) in NCR , and in another study found in Mumbai and others in 2021 that the highest incidence of diabetes patients was in the age group (45–54 years), while NCR was discovered that the highest rate of infection with this bacteria in people with diabetes and group control was in individuals of the age group (41–50 years). Both studies were conducted in most cases, *H. pylori* infection occurs in childhood; nonetheless, the prevalence of infection rises with age in both diabetic and healthy patients; it is uncertain how the infection is passed on from person to person within the same family.

Table 3

The correlation between *H. pylori* infection and diabetes disease

			H. pylori	Diabetes disease
H.	pylori	Pearson	1	0.144* Sig. (one-tailed)

correlation		
n	140	140
Diabetes disease		
Pearson correlation	0.144	1
Sig. (one-tailed)	0.045	
n	140	146

*Correlation is significant at the 0.05 level (1-tailed). H. pylori: Helicobacter pylori

This may be due to delayed diagnosis in children who have no symptoms, as well as a weak immune system in older people who are not infected with chronic diseases such as diabetes and may frequently lead to stomach cancer, particularly in developing countries and due to economically low levels of health and cultural awareness among community members. In addition, this may be due to a lack of awareness of the disease's signs and symptoms among community members. In both study's groups, the rate of H. pylori infection was higher in males than in females, according to the findings of the current investigation. It has been demonstrated in several research that the H. pylori bacteria impact diabetic females and males, as well as healthy ladies and males, at different rates. These differences may be significant in some investigations. According to the findings of NCR, the rate of infection in females was found to be higher than that of males in patients who had gastritis. However, other studies have found that the percentage of infection in men who have diabetes is higher than the percentage of infection in women who have diabetes. According to the social situation that is currently prevalent in Mumbai region, which makes males more vulnerable to sources of infection of different age groups, the findings of the current study may be due to the fact that males in the study society are more active than females. This could also be because males in the study society engage in more physical activity.

It was found, in correlation with patients, that the rate of H. pylori infection was highest in the middle of the NCR Region, which is an urban area, in comparison to the districts and areas, which are rural areas, for both research groups. In addition, the findings of this study suggest that the prevalence of H. pylori infection is higher among those who are not employed, as compared to people who are employed. Many researchers have discovered that the rate of infection is higher in urban areas when compared to rural or countryside areas. They have also explained that the most important risk factors for the infection H. pylori are the overcrowding of families as well as the overcrowding of the population in cities when compared to the countryside. Additionally, the main services play an important role in the transmission of the germ among the population. These factors sanitation for wastewater and healthy water supply, in addition to other factors, are discussed in the following: -

According to the findings of the study, 43 percent of people diagnosed with diabetes had a lesion containing these germs. The current investigation demonstrated that H. pylori infection produced a substantial rise in the concentration of sugar ($P = 0.035$) in the blood of non-diabetic individuals who had H. pylori infection. The increase in sugar concentration was measured by measuring the concentration of glucose in the blood. Diabetes was found to have a statistically significant association with H. pylori infection ($P = 0.045$), which

was found to relate to diabetes. The link between diabetes and *H. pylori* infections has been the subject of investigation in several research that have been carried out in different parts of the world. One of the many things that has been seen is that the prevalence of this infection is noticeably higher in diabetes individuals than it is in healthy people. In 2013, Chung et al. published their findings that they were able to significantly raise the concentration of the exact albumin in the urea. The results that Tanriverdi attained in 2016 were the same.

According to the findings of other studies, this illness caused an increase in the amount of glucose that was present in the blood and dramatically increased when compared to those who were healthy. Infections caused by *H. pylori* provoke a stimulation of the immune system in the patient, which results in the formation of an initial immunological response that leads to a depletion of energy and an accumulation of fat. Toll-like receptors are activated by the internal toxin (lipopolysaccharides) of this bacterium. This increase causes the phosphorylation of serine units in the insulin receptors on the cell surfaces, which prevents the interaction between insulin and its receptors. This interaction is what leads to insulin resistance, which in turn leads to high blood sugar. Receptor receptors, on the other hand, cause an increase in the level of inflammatory cytokines as a result of increased secretion by immune cells.

Conclusions

According to the findings of the study, the prevalence of *H. pylori* infection was significantly greater in healthy individuals than in diabetic patients. On the other hand, there was a significant increase in sugar concentration among patients who did not have diabetes but who tested positive for *H. pylori*. This may point to the risk of future diabetes development if the bacterial infection is not treated.

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