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Assessment of helicobacter pylori colonization in patients with duodenogastric reflux: A retrospective study

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ABSTRACT

Introduction: This study investigates the relationship between duodenogastric reflux (DGR), Helicobacter pylori (HP) colonization, and their impact on gastric health. Given the established risks of both DGR and HP for gastric mucosal damage and the development of pre-cancerous lesions, we aimed to explore their interrelation and the effect of bile reflux on HP colonization in an acidic environment.

Materials and Methods: A retrospective analysis was conducted on patients who underwent gastroscopy at our hospital between December 2022 and December 2023. DGR diagnosis was based on the endoscopic observation of bile-stained fluid or reflux, while HP presence was confirmed via giemsa staining of biopsy samples. Statistical analysis utilized SPSS software, with significance set at p<.05.

Results: Out of 4.316 gastroscopies performed, 743 patients were identified with DGR, and HP positivity was found in 34.9% of the cohort. Comparison of HP infection rates between patients with and without DGR revealed no significant difference, indicating the independent nature of these conditions regarding gastric colonization.

Conclusion: HP and DGR synergistically inflict damage on the gastric mucosa. However, consistent with the existing literature, our study also demonstrates that, although both DGR and HP infection are significant risk factors for gastric mucosal injury independently, there is no observed association between HP colonization and DGR. Given the complexity of the gastric mucosal structure and its acidic environment, we believe further research is needed to understand the underlying mechanisms of these relationships.

Keywords: Bile reflux, Duodenogastric reflux, Gastric mucosal damage, Helicobacter pylori, Pre-cancerous lesions

Introduction

Helicobacter pylori (HP) is a gram-negative bacterium that colonizes the human stomach and is associated with various diseases, including stomach-related cancers.[1] The prevalence of HP varies globally and is influenced by numerous factors such as age, ethnicity, and socioeconomic status.[2]

Duodenogastric reflux (DGR) can be described as the retrograde flow of alkaline duodenal contents into the stomach, ultimately causing inflammation of the gastric mucosa. DGR is commonly observed following gastric surgery, cholecystectomy, and pyloroplasty, but can also occur due to antroduodenal motility disorders (Primary DGR).

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To date, there is no established gold standard for the diagnosis of DGR.[3] Studies have observed a prevalence of 16.7% in groups without any biliary intervention and 61.8% in others.[4] In the pediatric population, among 804 cases undergoing endoscopic examination due to abdominal pain, bile reflux was observed at a rate of 23.9%.[5]

Bile acids possess antibacterial effects and bile itself is a potent alkaline and chemical irritant. It causes a change in the pH of the stomach, where the usual environment is acidic.[6] The median pH of the human stomach is 1.4. During the inter-digestive phase, which typically lasts about 16 hours a day, the pH can rise to as high as 5.0, while during the short phases when food is ingested, the pH can drop to <1.0.[7] HP can colonize and cause infection in this acidic environment. Moreover, in-vitro studies have demonstrated that an alkaline environment has a negative effect on the development of HP.[8]

Our study aims to determine whether there are changes in the colonization of HP, a bacterium that thrives and grows in the normally acidic environment of the stomach, under higher pH levels (due to bile reflux).

Materials and Methods

Between December 2022 and December 2023, data of patients who underwent gastroscopy for any reason in the endoscopy department of our hospital were retrospectively reviewed.

The study was approved by our hospital. Local Ethics Committee, 2024/44.

The diagnosis of DGR was based on the observation of bile-stained fluid in the stomach or bile reflux during the procedure as seen by endoscopy. The control group, without a diagnosis of DGR, consisted of patients who underwent gastroscopy for any reason within the last six months of 2023.

The diagnosis of HP was established through the direct visualization of the bacterium in endoscopic biopsy material taken from at least two different sites, stained with Giemsa.

Demographic data of the patients were obtained through file scanning. Patients with missing or inaccessible data, those who had biopsies taken from only one location, those with malignancies, those under 18 years of age, or those who had received HP eradication treatment were excluded from the study.

All statistical analyses were performed with SPSS software, Windows version 25.0 (SPSS Inc., Chicago, IL, USA). Data were summarized as mean±standard deviation, numbers (n), and percentages (%). Categorical variables were compared using the chi-square test. When a categorical variable was compared with a numerical value, the Mann-Whitney U test was used. All statistical calculations were two-tailed, and a p-value <.05 at the 95% confidence interval was considered statistically significant.

Results

Between December 2022 and December 2023, a total of 4,316 patients underwent gastroscopy. DGR was identified in 743 of these patients, resulting in a detection rate of 17.2% among those who underwent gastroscopy. The number of patients who underwent gastroscopy and had their data reviewed in the last six months of 2023 was 827.

The total number of patients included in the study was 249, with 107 patients identified as having bile reflux. The number of patients without bile reflux was 142. Among all patients, HP positivity was found in 87 patients (34.9%).

According to the inclusion criteria, the number of patients identified with DGR was 107. Among these patients, 40.2% (n=43) were male and 59.8% (n=64) were female, with a mean age of 51.3±14.2 years.

In the group without DGR, there were a total of 142 patients. Of these, 40.1% (n=57) were male, and 59.9% (n=85) were female, with a mean age of 52.2±14.0 years.

No statistical difference was found between the two groups in terms of gender distribution (p=0.994) and age (p=0.632) (Table 1).

Among the patients diagnosed with DGR, 29 (27.1%) had undergone cholecystectomy, while 15 (14.0%) patients had gallstones. In the group with DGR, HP positivity was detected in 31.8% (n=34) of patients, whereas in the other group, this rate was 37.3% (n=53) (p=0.363) (Table 2).

Discussion

In our study, when patients with DGR were compared with the control group, there was no significant difference in HP infection. A review of the literature and similar studies revealed that a study conducted in 2021 found no significant effect of DGR on HP colonization and the development of pre-malignant gastric lesions.[9] Similarly, a study in 2022 observed a negative correlation between the presence of

Table 1. Comparison of Helicobacter pylori Presence in Patients with and without Duodenogastric Reflux

	Duodenogastric Reflux		
	No	Yes	p
H. Pylori, n (%)			
No	69 (48.6)	72 (68.6)	0.363
Yes	73 (51.4)	33 (31.4)	

Table 2. Demographic Characteristics of Patients by Duodenogastric Reflux Status

	Duodenogastric Reflux		
	No	Yes	p
Age (Mean±SD)	52.2±14.0	51.3±14.2	0.994
Sex, n (%)			
Male	57 (40.1)	43 (40.2)	0.632
Female	85 (59.9)	64 (59.8)	

bile reflux and the likelihood of HP infection, though the finding was not statistically significant (p=0.104).[10] A study within a pediatric group in our country in 2019 also found no significant difference between cases with DGR and the control group in terms of the presence and intensity of HP alongside the presence and severity of gastritis (p=0.947).[11]

The prevalence of DGR in our study was found to be 17.2%. According to the literature, while one study reported a detection rate of 16.7%,[4] another study found this rate to be 21.3%.[12] It is known that interventions involving the biliary tract or cholecystectomy can increase bile reflux[4]; however, since our study did not review data from patients who had undergone cholecystectomy or had biliary interventions, we cannot provide information about the prevalence of DGR in these patients.

The rate of HP positivity among all patients in our study was found to be 34.9%. Worldwide, the prevalence of HP varies from 18.9% to 87.8% and increases with worsening socioeconomic conditions. In the same vein, the prevalence of HP in our country has been determined to be approximately 77.2% (ranging from 71.4% to 83.1%).[13]

The relationship between bile reflux and intestinal metaplasia, a pre-cancerous lesion for gastric cancer, has been widely reported and accepted. DGR causes mucosal damage in the stomach. Regardless of HP infection, DGR is an independent risk factor for the development of gastric cancer.[14] The role of bile reflux in the process of intestinal metaplasia continues even after the eradication of HP. Intestinal metaplasia caused by bile reflux is primarily mediated by bile acids and regulated by several critical molecules and signaling pathways.[15] A study conducted in 1998 found no significant difference in the frequency of HP infection between patients with and without bile reflux (p=0.67); however, a significant difference was observed in the rate of metaplasia between patients with both bile reflux and HP infection compared to those without either condition (p=0.02). As a result, it was concluded that bile reflux and HP infection play a significant role in the development of gastric cancer through a synergistic effect.[16]

A study conducted in 2022 showed that DGR causes changes in the stomach microbiota aside from HP In patients with DGR in the absence of HP infection when compared to other patients, the richness (according to Sobs and Chao1 indexes; p<0.05) and diversity (according to Shannon indexes; p<0.05) of the gastric mucosa microbiota were found to be higher. In patients with bile reflux, genera such as Comamonas, Halomonas, Bradymonas, Pseudomonas, Marinobacter, Arthrobacter, and Shewanella were more prevalent, while in those without bile reflux, genera such as Haemophilus, Porphyromonas, and Subdoligranum were more dominant.[17]

Our study has certain limitations. It is retrospective in nature. We lacked standardization in detecting bile reflux. The use of proton pump inhibitors (PPI) or ursodeoxycholic acid by patients was not considered.

Conclusion

When the studies in the literature are considered, it is evident that there is a strong relationship between DGR, HP infection, and the development of gastric mucosal damage and pre-cancerous lesions. However, consistent with the data in the literature, as observed in our study, these two factors are independent of each other, and no relationship has been identified between HP infection and bile reflux.

Disclosures

Ethichs Committee Approval: The study was approved by our hospital. Local Ethics Committee, 2024/44.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – F.M.; Design – C.B.O.; Supervision – F.M.; Materials – M.S.; Data collection and/or processing – Z.S.T. ; Analysis and/ or interpretation – İ.A.; Literature search – F.M.; Writing – F.M.; Critical review – C.B.O.

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