

Endoscopic & Histopathological Pattern of Gastric Polyps and their Relationship with *Helicobacter Pylori* Infection

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Abstract

Original Research Article

Introduction: Gastric polyps are abnormal luminal growths projecting above the plane of the mucosal surface of the stomach. These may be malignant or non-malignant. Hyperplastic polyps are more frequent than other gastric polyps, where *H. pylori* infections are commonly seen. Most hyperplastic polyps disappear or regress after *H. pylori* eradication. In Bangladesh, the prevalence of *H. pylori* in the adult is >92%. The test and treat strategy is not well practised in our country. So, estimation of *H. Pylori* infection related to gastric polyp is necessary. **Aim of the Study:** The study aims to investigate the endoscopic and histopathological pattern of gastric polyps with *Helicobacter Pylori* infection. **Methods:** This cross-sectional study was carried out in the department of Gastroenterology, BSMMU. In total 75 patients, 24 male and 51 female were included in this study. Information about the clinical profile, endoscopic findings, rapid urease test and histopathological findings were collected. Data were collected using a pre-designed data collection sheet. The collected data were analyzed by computer with the help of SPSS version 23. Statistical analysis was done by using an appropriate statistical tool like the Chi-square test, Student's t-test, and regression test. Statistical significance will be defined as $p < 0.05$. **Result:** Among the 75 patients with gastric polyps, the mean age of presentation was 51.08 ± 13.85 years. Regarding clinical presentation, 28(32%) patients had abdominal pain followed by 21(28%) with nausea, 19(25.3%) with weight loss, 12(16%) with vomiting, 10(13.3%) with anaemia, 6(8%) with hematemesis and 4(5.3%) with Malena. The most common site of gastric polyps was the antrum 42(56%), 21(28%) in the body, 7(9.3%) in the cardia and 5(6.7%) in the fundus. The majority of patients had polyps sized between 5-10 mm, 43(60%) patients. The association between the number, site and size of the gastric polyps were not statistically significant between *H. Pylori* positive and *H. Pylori* negative groups. Based on histopathological type, hyperplastic polyp 66(88%), fundic gland polyp 7(9.33%) and adenomatous polyp 2(2.67%) were observed. Regarding the relationship with *H. Pylori* infection, hyperplastic was significantly associated with the *H. Pylori* positive group ($p < 0.004$) whereas fundic gland polyp was negatively associated ($p < 0.001$) with *H. Pylori* infection in this study. **Conclusion:** In this study, the majority of polyps detected by endoscopy were solitary, size between 5-10 mm. Most of them were located in the antrum. Histopathologically, hyperplastic polyps were the most common and related to *H. Pylori* infection.

Keywords: Gastric polyps, Hyperplastic polyps, Gastric, etc.

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INTRODUCTION

Gastric polyps are visible protrusions from the mucosal surface of the stomach that project above the level of the surrounding mucosa. Epithelial polyps are the most common benign gastric tumours and include a broad spectrum of pathologic conditions that may even be submucosal or extrinsic [1]. Histologically, epithelial polyps are classified mainly as fundic gland polyps, hyperplastic polyps and adenomatous polyps [2]. In upper gastrointestinal endoscopy, the prevalence of gastric polyp is 6.35% [3]. According to a tertiary-level

hospital study in Bangladesh incidence of gastric polyp is 1.83% [4]. Both men and women are equally affected; mainly in their mid to late adulthood [1]. Gastric polyps consist of predominantly fundic gland polyps about 50%, followed by hyperplastic polyps 40% and adenomatous polyps 10% [5]. One study in Bangladesh shows hyperplastic polyps are the commonest 75.4% followed by adenomatous polyps at 18.9%, Brunner's gland adenoma at 3.8% and carcinoid at 1.9% [4]. The prevalence of fundic gland polyps ranges from 0.5 to 14%. These may be sporadic or

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associated with familial adenomatous polyposis (FAP) syndrome [6]. Long-term proton pump inhibitor (PPI) use may increase the risk of fundic gland polyps about fourfold [7]. Sporadic fundic gland polyps are usually sessile type and located in the body and fundus [8]. They have very limited malignant potential and it is <1% [10]. Fundic gland polyps are exceptionally common in patients with FAP (20%-84%) [10]. In FAP, about 30 to 50 per cent of fundic gland polyps usually show low-grade dysplasia [6]. Fundic gland polyps > 1 cm, should be resected [9]. Hyperplastic polyps are usually less than 2 cm and typically occur in the antrum [8]. Hyperplastic polyps should be resected if these are > 0.5 cm [9]. About 6% to 10% of gastric polyps in Western populations are adenomatous polyps. These are usually single, flat or sessile, mostly found in the antrum. There is a strong association between gastric adenoma and synchronous or metachronous gastric carcinoma, particularly high-grade dysplasia. Complete removal of the adenoma, with further examination of the entire gastric mucosa, is recommended [9]. Gastric polyps are mostly asymptomatic >90%, but these can present with nonspecific symptoms such as abdominal pain, gastrointestinal bleeding, anaemia or even symptoms of gastric outlet obstruction in the case of large antral polyps [11]. Polyps may regress, remain constant or enlarge over time [1]. According to experience from 4 centres in North India from 2011 to 2014, the overall prevalence of gastric polyps was 4%. The prevalence of fundic gland polyps was 50%, hyperplastic polyps at 41.66% and other 8.34% respectively [12]. Hyperplastic polyps mainly develop in gastric mucosa with underlying gastritis caused by *H. pylori*. In countries in which *H. pylori* infections are commonly seen, hyperplastic polyps are more frequent than fundic gland polyps [2]. According to an Indian study, *H. pylori* gastritis was found to be associated with 10% of fundic gland polyps and 40% of hyperplastic polyps [12]. To the best of my knowledge, there was no study regarding histopathological type and their association with *H. Pylori* infection in Bangladesh. As the prevalence of *H. Pylori* infection is very high in the adult population of Bangladesh, it is necessary to study the endoscopic and histopathological patterns of gastric polyps and their relationship with *H. Pylori* infection

OBJECTIVES

General Objective

To see the endoscopic and histopathological pattern of gastric polyps and their relationship with *Helicobacter Pylori* infection.

Specific Objective

- To identify the endoscopic pattern of the gastric polyps.
- To see the histological types of gastric polyps.
- To determine the *H. pylori* status of the patient.

- To describe the relationship of an endoscopic and histopathological pattern of gastric polyps with *Helicobacter Pylori* infection.

METHODS

A descriptive cross-sectional study was carried out in the Department of Gastroenterology, Bangabandhu Sheikh Mujib Medical University, Dhaka from November 2019 to January 2021. A total of 75 patients with a gastric polyp in upper GI endoscopy were enrolled in this study following the inclusive criteria. A purposive sampling technique was used. Data was collected using a preformed semi-structured data collection sheet (questionnaire). Demographic data of the patients including their age and gender were collected. Verbal consent was taken before recruiting the study population. Ethical clearance was taken from the hospital. The information was kept confidential only to be used for the study purpose.

Inclusion Criteria

Patients with gastric polyp of both sexes irrespective of aetiology. Patient age > 18 years

Exclusion Criteria

Patients had a contraindication to upper GI endoscopy. Patients denied informed consent. The patient took a proton pump inhibitor for >1 year.

Study Procedure

Patients diagnosed with a gastric polyp in upper GI (Gastrointestinal) endoscopy in the department of Gastroenterology, both inpatient and outpatient, irrespective of indication, were included as the study subject. Patients presenting with endoscopy reports of gastric polyp, who meet the inclusion criteria, were also included in this study. Patient particulars and detailed clinical history were obtained and recorded in the datasheet. Patient taking proton pump inhibitor for >1 year was excluded from the study. Patients having gastric polyps were advised to discontinue Proton pump inhibitor for 15 days and antibiotic for 1 month. Two biopsy specimens, one from the antrum and one from the body will be used for the rapid urease test instantly. Specimens were placed into a Christensen's Urea Agar medium, containing urea and an indicator such as phenol red. The urease produced by *H. pylori* was hydrolyzed urea to ammonia, which raises the pH of the medium and will change the colour from yellow (Negative) to red (Positive). Another six biopsy specimens, from antrum and body, were preserved in 2% formalin and sent for histopathology- for identification of *H. pylori*. At endoscopy, biopsies were taken from polyps/polyps. Specimen were preserved in 2% formalin and sent for histopathology for characterization of the gastric polyp and also for the presence of malignancy or dysplasia. All the histopathological examination was carried out in the department of pathology, BSMMU. Patients who are positive for *H. pylori* infection were advised for anti-*H.*

Pylori therapy and patients with a gastric polyp, who fulfill the criteria for resection, were advised for Polypectomy.

Operational Definitions

Gastric Polyps

Gastric polyps are sessile or pedunculated lesions that originate in the gastric epithelium or submucosa and protrude into the stomach lumen (Goddard *et al.*, 2010).

H. Pylori Infection

Patients were considered infected by *H. pylori* in this study if the followings test is positive:

1. Positive for rapid urease test (RUT).
2. Presence of *H. pylori* in the histology of gastric biopsy specimen.

Data Analysis

The study coordinators performed random checks to verify data collection processes. Completed data forms were reviewed, edited, and processed for computer data entry. Frequencies, percentages, and cross-tabulations were used for descriptive analysis. The data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 25.0. & Fisher's exact test. The significance level of 0.05 was considered for all tests.

RESULTS

Among the study population (N=75), almost one-third (24, 32.0%) of patients belonged to age 51-60 years. The mean age was found 51.08±13.85 years, fifty-one patients were female (51, 68.0%) and twenty-four (24,32.0%) were male (24,32.0%), twenty-eight patients (28,37.30%) complained about abdominal pain followed by twenty-one patients (21, 28.0%) with nausea, nineteen patients (19,25.3%) with weight loss, twelve patients (12 ,16.0%) with vomiting, ten patients (10, 13.3%) with anaemia, six patients (6 ,8.0%) with hematemesis and four patients (4, 5.3%) with melena, and forty-two patients (42,56.0%) had gastric polyps at antrum, twenty one had gastric polyps (21, 28.0%) in body, seven (7, 9.3%) had gastric polyps at cardia/GEJ

and five (5,6.7%) had gastric polyps at fundus. Most of the patients (43, 57.3%) had 6-10 mm size gastric polyps, and twenty-three patients (23, 30.7%) had <5 mm size gastric polyps (Table 1). The majority of patients (66, 88%) had a hyperplastic polyp, followed by seven (7, 9.3%) had fundic gland polyp and two (2, 2.6%) had an adenomatous polyp (Table 2). The antrum was the most common site of polyp formation in forty-two patients. Among them thirty-seven patients (37, 58.7%) were *H. pylori* positive and five (5, 41.6%) were *H. pylori* negative. The body was the second most common site of polyp formation in twenty-one patients of which, seventeen patients (17, 26.9%) were *H. pylori* positive and four (4, 33.3%) were *H. pylori* negative. Another site of gastric polyp formation was Cardia/GEJ and Fundus (Table 3).

Most of the patients had a single polyp of which, fifty patients were (50, 79.3%) *H. Pylori* positive. Among the patients with multiple gastric polyps, thirteen patients (13, 20.63%) were *H. Pylori* positive and no one was *H. Pylori* negative. The difference was not statistically significant ($p>0.05$) between the two groups. The majority of the patients (43, 58.3%) had polyp size within the 5-10 mm size group of which thirty-six (36, 57.1%) were *H. Pylori* positive and seven (7, 58.3%) were *H. Pylori* negative. The association between the size of the gastric polyp and *H. Pylori* infection were not significant ($p>0.05$). The total number of hyperplastic gastric polyps was sixty, of which, fifty-nine (59, 93.6%) were positive for *H. Pylori* and seven (7, 58.33%) were negative for *H. Pylori*. The difference was significant between the two groups ($p <0.05$). The total number of fundic gland polyps was seven of which, two (2, 3.1%) were positive for *H. Pylori* and five (5, 41.6%) were negative for *H. Pylori*. The difference was significant between the two groups ($p<0.05$). It may be due to the small sample size, two patients had adenomatous polyps and both of them were *H. Pylori* positive. The difference was not statistically significant ($p>0.05$) between the two groups (Table 4).

Table 1: Distribution of the study population based on characteristics (N=75)

Characteristics	(N, %)
Age	Mean ± SD: 51.08±13.85
21-30	9,12.0%
31-40	11,14.7%
41-50	10,13.3%
51-60	24,32.0%
> 60	21,28.0%
Sex	
Male	24, 32.0%
Female	51,68.0%
Clinical presentation	
Abdominal pain	28,37.3%
Nausea	21,28.0%
Weight loss	19,25.3%

Vomiting	12,16.0%
Anaemia	10,13.3%
Hematemesis	6,8.0%
Melena	4,5.3%
Gastric polyp	
Antrum,	42,56.0%
Body	21,28.0%
Cardia/GEJ	7,9.3%
Fundus	5,6.7%
Polyp size	
<5 mm	23,30.7%
6-10 mm	43,57.3%
>10 mm	9,12.0%

Table 2: Distribution of the study population based on Histological type of gastric polyp (N=75)

Type of polyp	(N, %)
Hyperplastic polyp	66,88.0%
Fundic gland polyp	7,9.3%
Adenomatous polyp	2,2.6%

Table 3: Relation between the size, number & size of gastric polyps and helicobacter pylori infection (N=75)

Hyperplastic gastric polyp	Helicobacter pylori		p-value
	Positive (n=63)	Negative (n=12)	
Antrum	37, 58.7%	5, 41.6%	
Body	17,26.9%	4,33.3%	0.41 ^{ns}
Cardia/GEJ	3,4.7%	2,16.6%	
Fundus	6,9.5%	1,8.3%	
Number of polyps			
Single	50, 79.3%	12,100.0%	0.11 ^{ns}
Multiple	13,20.6%	0,0.0%	
Size			
< 5 mm	20,31.7%	3,25.0%	0.81 ^{ns}
5-10 mm	36,57.1%	7,58.3%	
> 10 mm	7,11.1%	2, 16.6%	

Table 4: Relation between hyperplastic gastric polyp, fundic gland polyp with helicobacter pylori infection (N=75)

Hyperplastic gastric polyp	Helicobacter pylori		p-value
	Positive (n=63)	Negative (n=12)	
Yes	59, 93.6%	7,58.3%	<0.004 ^s
No	4,6.3%	5, 41.6%	
Yes	2,3.1%	5,41.6%	<0.001 ^s
No	61,96.8%	7, 58.3%	

DISCUSSION

This was a cross-sectional study conducted in the department of Gastroenterology, BSMMU from November 2019 to January 2021. Patients with a gastric polyp in upper GI endoscopy, who meet the inclusion criteria, were enrolled on the study. A total of 75 cases were included in this study. In this study, we found that almost one-third (32.0%) of patients belonged to age 51-60 years. The mean age was found 51.08±13.85 years. An author reported 34 (8.9%) were aged 41 years, 72 (18.7%) aged 41–50 years, 84 (21.9%) aged 51–60 years, 34 (33.8%) aged 61–70 years, and 64 (16.7%) aged > 70 years. The average age of the patients was 62.8±10.4 (36-75) years [13]. Another

study depicted that 5.7% were under the age of 41 years, 14.6% were 41– 50 years, 20.8% were 51–60 years, 30.2% were 61–70 years, 24% were 71–80 years, and 4.7% were >80 years. The mean age was 61.9±13.3 years [14]. In this study 51(68.0%) patients were female and 24(32.0%) were male. A study reported 98 (25.5%) were male and 286(74.5%) were female [13]. Another analysis observed that 51(26.65%) were male and 141(73.5%) were female. Hu *et al.*, (2020) observed male was 22(40.0%) and female was 33(60.0%) [14]. Another article also reported females were 64% and males were 36% [4]. In the present study 28(32.0%) patients presented with abdominal pain followed by 21(28.0%) with nausea, 19(25.3%) with weight loss, 12 (16.0%) with vomiting, 10 (13.3%) with anaemia, 6

(8.0%) with hematemesis and 4 (5.3%) with melena. A study reported anaemia was 82(21.3%), and abdominal pain was 70(18.2%). Olmez *et al.*, (2018) reported Anaemia was 44(22.9%) and abdominal pain was 39(25.5%) [13]. An author reported anaemia was 20(36.4%) [15]. In the current study, 42(56.0%) patients had gastric polyps at the antrum, 21(28.0%) at the body, 7(9.3%) at cardia/GEJ and 5(6.7%) at the fundus. Another study revealed that most of the gastric polyps were located in the body of the stomach (47.1%) followed by the antrum (15.1%), cardia (7.6%) and fundus (7.6%) [4]. This study showed that most of the patients 43(57.3%) had 6-10 mm size gastric polyps, followed by 23(30.7%) patients who had <5 mm size gastric polyps and 9(12.0%) patients who had >10 mm size gastric polyps. A study suggested that the average polyp diameter was 10.6 ± 4.1 (range: 3–21) mm: 98 (25.5%) were < 5 mm, 176 (45.8%) were 6–10 mm, 90 (23.4%) were 11–20 mm, and 20 (5.2%) were > 20 mm [13]. An author observed the diameter of the polyps was ≤ 5 mm in 51 (26.6%) patients, 6–10 mm in 86 (44.8%) patients, 11–20 mm in 43 (22.4%) patients, and >20 mm in 12 (6.3%) patients[14]. Another article also reported that 37.7% had small (<1 cm) size polyp 35.8% had medium size (1-2 cm) polyp and 11.3% had large size (>2 cm) polyp [4]. In this study, most of the patients (62) had single polyps. Among them, 50(79.37%) patients were *H. Pylori* positive and 12(100%) patients were *H. Pylori* negative. Among the patients with multiple gastric polyps, 13(20.63%) patients were *H. Pylori* positive and no one was *H. Pylori* negative. The difference was not statistically significant ($p>0.05$) between the two groups. Another study reported endoscopically, one polyp was found in 73.4% of the study patients and more than one polyp was found in 26.6% of the patients [14]. In this study majority of the patients (43) had polyp size within 5-10 mm. Among them, 36(57.14%) were *H. Pylori* positive and 7(58.33%) were *H. Pylori* negative. The association between the size of the gastric polyp and *H. Pylori* infection were not significant ($p>0.05$). Another study reported polyp resection has been recommended for any hyperplastic polyp greater than 0.5 cm in size [16]. In the current study total number of hyperplastic gastric polyps was 66(88%) of which 59(93.65%) were positive for *H. Pylori* and 7(58.33%) were negative for *H. Pylori*. The difference was significant between the two groups ($p < 0.05$). This is consistent with previous studies; they observed hyperplastic polyp was suggestive of current *H. pylori* infection [17, 18]. A strong association between hyperplastic polyps, chronic gastritis and *H. pylori* infection confirms what was reported in other studies [19, 20]. The risk of dysplasia and neoplastic progression of hyperplastic polyps is controversial with the wide discrepancy between the reported rates (1.9% to 19%) [19]. Prolonged PPI administration results in the increased number and volume of FGP [21] whereas PPI reduction and withdrawal are associated with the gradually decreased

number and volume of FGP [22]. Another author reported that 82(27.7%) had fundic gland polyps [16].

CONCLUSION

In this study the majority of the polyps detected by endoscopy were solitary, most of the polyps were located in the gastric antrum and polyp sizes between 5-10 mm were most common. Polyp number, size and site were not related to *H. Pylori* infection. Histopathologically, hyperplastic polyps were the most common type and related to *H. Pylori* infection. Fundic gland polyps had a negative association with *H. Pylori* infection. Adenomatous polyps were the least frequent and were not related to *H. Pylori* infection.

Limitations of the study

Relatively smaller sample size with a lack of availability of the patients due to the COVID-19 pandemic and the duration of the study was short. There was a lack of microscopic examination of the neighboring gastric mucosa which has the risk of gastric cancer development.

RECOMMENDATION

A further similar study with a large number of patients is recommended to establish the fact regarding gastric polyps. The relationship of gastric polyp formation among patients with prolonged use of PPI (> 1 year) can also be studied.

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CONFLICT OF INTEREST

None declared.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

REFERENCES

- Zahir, S.T., Mahmooditabar, E., & Rahmani, K. (2017). Clinico-Pathological Study of Gastric Polyps and Their Relationship with *Helicobacter Pylori* Infection at the Pathology Departments of Hospitals in Yazd from 2011 to 2016. *International Organization of Scientific Research Journal of Dental and Medical Sciences (IOSR-JDMS)*, 16(3), 87-90.
- Atalay, R., Solakoğlu, T., Sarı, S. Ö., Köseoğlu, H., Akın, F. E., Bolat, A. D., ... & Ersoy, O. (2014). Evaluation of gastric polyps detected by endoscopy: A single-center study of a four-year experience in Turkey. *Turk J Gastroenterol*, 25(4), 370-3.
- Carmack, S. W., Genta, R. M., Schuler, C. M., & Saboorian, H. M. (2009). The current spectrum of gastric polyps: a 1-year national study of over

- 120,000 patients. *Official journal of the American College of Gastroenterology/ ACG*, 104(6), 1524-1532.
4. Hoque, M. N., & Ahmed, S. (2019). Incidence, Type and Anatomical Location of Gastric Polyp: Experience of a Tertiary Level Hospital in Bangladesh. *Bangladesh Critical Care Journal*, 7(2), 90-94.
 5. Abraham, S. C., Singh, V. K., Yardley, J. H., & Wu, T. T. (2001). Hyperplastic polyps of the esophagus and esophagogastric junction: histologic and clinicopathologic findings. *The American journal of surgical pathology*, 25(9), 1180-1187.
 6. Xavier, S., Magalhães, J., & Cotter, J. (2018). Proton pump inhibitors: are they a real threat to the patient?. *GE-Portuguese Journal of Gastroenterology*, 25(5), 243-252.
 7. Alqutub, A. N., & Masoodi, I. (2010). A case of gastric polyposis in antral area of stomach following prolonged proton-pump therapy. *GMS German Medical Science*, 8.
 8. Goddard, A. F., Badreldin, R., Pritchard, D. M., Walker, M. M., & Warren, B. (2010). The management of gastric polyps. *Gut*, 59(9), 1270-1276.
 9. Islam, R. S., Patel, N. C., Lam-Himlin, D., & Nguyen, C. C. (2013). Gastric polyps: a review of clinical, endoscopic, and histopathologic features and management decisions. *Gastroenterology & hepatology*, 9(10), 640.
 10. Bianchi, L. K., Burke, C. A., Bennett, A. E., Lopez, R., Hasson, H., & Church, J. M. (2008). Fundic gland polyp dysplasia is common in familial adenomatous polyposis. *Clinical Gastroenterology and Hepatology*, 6(2), 180-185.
 11. Secemsky, B. J., Robinson, K. R., Krishnan, K., Matkowskyj, K. A., & Jung, B. H. (2013). Gastric hyperplastic polyps causing upper gastrointestinal hemorrhage in a young adult. *World Journal of Clinical Cases: WJCC*, 1(1), 25.
 12. Mohapatra, S., & Wani, Z. A. (2017). The current trends of Gastric polyps in North India: A multicenter experience. *Gastroenterology*, 152(5), S472.
 13. Dai, Y. C., QianTu, X. X., He, H. F., & Zhang, Y. L. (2020). Evaluation of gastric polyps in patients with upper gastrointestinal endoscopy.
 14. Olmez, S., Sayar, S., Saritas, B., Savas, A. Y., Avcioglu, U., Tenlik, I., ... & Altiparmak, E. (2018). Evaluation of patients with gastric polyps. *Northern clinics of Istanbul*, 5(1), 41.
 15. Hu, H., Zhang, Q., Chen, G., Pritchard, D. M., & Zhang, S. (2020). Risk factors and clinical correlates of neoplastic transformation in gastric hyperplastic polyps in Chinese patients. *Scientific reports*, 10(1), 1-8.
 16. Elhanafi, S., Saadi, M., Lou, W., Mallawaarachchi, I., Dwivedi, A., Zuckerman, M., & Othman, M. O. (2015). Gastric polyps: Association with *Helicobacter pylori* status and the pathology of the surrounding mucosa, a cross sectional study. *World journal of gastrointestinal endoscopy*, 7(10), 995.
 17. Hsiao, Y. J., Wen, Y. C., Lai, W. Y., Lin, Y. Y., Yang, Y. P., Chien, Y., ... & Jheng, Y. C. (2021). Application of artificial intelligence-driven endoscopic screening and diagnosis of gastric cancer. *World Journal of Gastroenterology*, 27(22), 2979.
 18. Watanabe, K., Nagata, N., Shimbo, T., Nakashima, R., Furuhashi, E., Sakurai, T., ... & Uemura, N. (2013). Accuracy of endoscopic diagnosis of *Helicobacter pylori* infection according to level of endoscopic experience and the effect of training. *BMC gastroenterology*, 13(1), 1-7.
 19. Dirschmid, K., Platz-Baudin, C., & Stolte, M. (2006). Why is the hyperplastic polyp a marker for the precancerous condition of the gastric mucosa?. *Virchows Archiv*, 448(1), 80-84.
 20. Ljubicic, N., Banic, M., Kujundzic, M., Antic, Z., Vrkljan, M., Kovacevic, I., ... & Mihatov, S. (1999). The effect of eradicating *Helicobacter pylori* infection on the course of adenomatous and hyperplastic gastric polyps. *European journal of gastroenterology & hepatology*, 11(7), 727-730.
 21. Gencosmanoglu, R., Sen-Oran, E., Kurtkaya-Yapicier, O., Avsar, E., Sav, A., & Tozun, N. (2003). Gastric polypoid lesions: analysis of 150 endoscopic polypectomy specimens from 91 patients. *World journal of gastroenterology*, 9(10), 2236.
 22. Karpińska-Kaczmarczyk, K., Lewandowska, M., Białek, A., Ławniczak, M., & Urańska, E. (2016). Gastric hyperplastic polyps coexisting with early gastric cancers, adenoma and neuroendocrine cell hyperplasia. *Polish Journal of Pathology*, 67(1), 33-38.