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To Assess Various Upper Gastrointestinal Endoscopic Biopsies on Histopathology in Patients Attending Tertiary Level Care Hospital

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ABSTRACT

Background: In clinical practice, upper gastrointestinal tract disorders represent a constantly encountered challenge with a range of conditions impacting them. The conclusive identification of these disorders relies on histopathological confirmation, forming a pivotal foundation for devising appropriate treatment strategies. We aimed to study various histopathological diagnoses of upper gastrointestinal endoscopic biopsies of patients with gastrointestinal symptoms and establish a clinic-pathological correlation.

Methods: This descriptive cross-sectional study took place within the Department of Pathology, J.L.N. Medical College, Ajmer from July 2022 to June 2023; encompassing an aggregate of 217 upper gastrointestinal tract biopsies. Exclusions were made for patients exhibiting lesions in the oral cavity, pharynx, and beyond the second segment of the duodenum.

Results: Out of 217 biopsies, 100 were from the duodenum, 59 from the esophagus, 48 from the stomach and 10 from the gastro-esophageal junction. The average age was 46 years with a male-to-female ratio of 1.03:1. Pain abdomen was the most common symptom. On endoscopy, 56.68% of lesions were non-neoplastic while 43.32% were neoplastic. In terms of histopathology, the most prevalent lesion in the esophagus was squamous cell carcinoma (66.10%). The most commonly encountered gastric lesion was acute gastric ulcer (35.40%). Chronic nonspecific duodenitis (53%) was most common in duodenum. There was an agreement between endoscopy and histopathology in 69.60% of cases.

Conclusion: Endoscopic examination and biopsy are an excellent procedure for precise evaluation of patients with upper gastrointestinal symptoms. These findings could ameliorate clinical practice by guiding diagnostic and therapeutic approaches tailored to individual patient needs, ultimately improving patient outcomes and survival rates.

Key-words: Duodenum, Endoscopy, Esophagus, Gastrointestinal tract (GIT), Histopathological

INTRODUCTION

The upper gastrointestinal tract (GIT) comprises the esophagus, stomach, and part of the duodenum, spanning a length of 80 cm. We come across a wide spectrum of lesions in clinical practice ranging from non-neoplastic, and pre-neoplastic to neoplastic arising from upper GIT that cause a great deal of morbidity and mortality.[1,2]

As per the National Cancer Registry, esophageal and gastric cancers are the most frequently occurring cancers in men, while esophageal carcinoma positions third amongst women, following carcinoma of the breast and cervix in the Indian subcontinent.[3] Cancers of the upper GIT are the most lethal of all the malignancies. Hence, their early detection can greatly increase the patient's survival rate.[4]

Endoscopy in amalgamation with biopsy is a diagnostic tool for the assessment of patients with upper GIT

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symptoms like dysphagia, dyspepsia, odynophagia, recurrent heartburn suggesting gastro-esophageal reflux disease (GERD), persistent nausea and vomiting, abdominal pain, upper gastrointestinal bleeding or anemia, weight loss, atypical chest pain or other non-specific symptoms that are difficult to assess clinically.[5]

Histopathological study of biopsy specimens is considered the gold standard for diagnosis of endoscopically detected lesions. It not only confirms endoscopic diagnosis in suspected malignancies or rules them out in the endoscopically benign-appearing lesions but also provides an excellent opportunity for clinicians and pathologists to establish a correlation between the clinical data and endoscopic findings with the pathological lesions.[6,7]

Thus, endoscopic biopsies play a crucial role in detecting lesions at an early stage, preventing their progression to carcinoma, monitoring the course, determining the extent of the disease, surveillance of premalignant conditions, and follow-up of patients.[2,8]

MATERIALS AND METHODS

Place of study- This descriptive cross-sectional study was conducted in the Department of Pathology at Jawaharlal Nehru Medical College and the Associated Group of Hospitals, Ajmer (Rajasthan), over one year from July 2022 to June 2023.

Study population- Patients scheduled to undergo upper gastrointestinal endoscopy.

Inclusion criteria

- All patients irrespective of age and gender were included in the study.
- All endoscopic mucosal biopsies of lesions present in the esophagus, stomach and duodenum (first and second part).

Exclusion criteria

- Patients with lesions in the oral cavity and pharynx.
- Patients who presented with lesions beyond the second part of the duodenum.
- All samples that were not labelled properly and inadequate or autolysed.
- Resection specimens.

Research Design- A convenient sampling technique was used in the study. The patients were subjected to endoscopy under moderate sedation or general anaesthesia after obtaining consent and detailed clinical history, and a biopsy was taken from the margins of the lesion. All the biopsies were fixed in 10% neutral buffered formalin for a period of 4 to 6 hours. After adequate fixation, the tissue was processed, and 3 to 5-micrometre thick sections were cut on a rotatory microtome. Each section was then stained with Harris's hematoxylin and eosin. Any other relevant special stains (like long-standing Giemsa for *H. pylori*, Alcian blue-PAS for intestinal metaplasia, etc.) were done as per requirement. The sections were studied microscopically. If the tissues were inadequate, a biopsy was repeated.

Statistical Analysis- Statistical testing was performed using SPSS version 28.0. Continuous variables are expressed as mean±standard deviation (SD), while categorical variables are presented as absolute numbers and percentages. Nominal categorical data between two or more variables were compared using the Chi-square test or Fisher's exact test, as appropriate. The diagnostic performance measures, including sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were reported for the correlation between endoscopic and histopathological findings. A p-value of less than 0.05 was considered statistically significant.

Ethical Approval- The study was conducted after obtaining permission from the Institutional Ethical Committee. All the data collected was kept strictly confidential and used for this study as described below. A written informed consent (English/Hindi) was taken from the subjects and/or their attendants before the recruitment of the subjects in the study.

RESULTS

A total of 217 upper gastrointestinal biopsies were studied from July 2022 to June 2023 for one year in the Department of Pathology, J.L.N. Medical College, Ajmer (Rajasthan). The largest group was those aged 51-60 years followed by 31-40 years. The 0-10 years group was the smallest, while only 0.9% were aged over 80 years. Overall, the mean age of the participants was 46.01 years with a standard deviation of 20.57 years. The age range of the population was from 2 to 85 years. The median age was 50 years, with an interquartile range (IQR) of 27 to 63 years (Table 1).

Table 1: Age distribution of the study population

Age group (years)	Frequency	Percentage
0 – 10	6	2.8%
11 – 20	31	14.3%
21 – 30	29	13.4%
31 – 40	46	21.2%
41 – 50	41	18.9%
51 – 60	50	23.0%
71 – 80	12	5.5%
>80	2	0.9%
Total	217	100%
Mean±SD	46.01±20.57 years	

The gender distribution of the study population was almost evenly split with 110 males and 107 females (male: female ratio-1.03:1). Significant differences were observed in stomach and duodenum biopsies, where the duodenum had the highest number of biopsy cases, totalling 100, with 37.3% in males and 55.1% in females, suggesting a significantly higher proportion of females undergoing duodenal biopsies (Table 2).

Table 2: Gender-wise distribution of biopsy sites

Site of biopsy	Male	Female	Total
Esophagus	34	25	59
Gastro-esophageal junction	4	6	10
Stomach	31	17	48
Duodenum	41	59	100

The overall distribution of histopathological findings varied significantly among different age groups, indicating age-related differences in lesion patterns. Most of the lesions were inflammatory, the majority of which were seen in 11-20 years of age. Benign, pre-malignant and malignant lesions were most reported in 61-70 years of age (Table 3).

Table 3: Distribution of histopathological lesions across different age groups

Age group (years)	Inflammatory	Benign	Pre-malignant	Malignant
0 – 10	6	0	0	0
11 – 20	31	0	0	0
21 – 30	28	0	1	0
31 – 40	13	0	0	4
41 – 50	19	0	0	10
51 – 60	19	1	3	17
61-70	20	2	9	20
71-80	4	1	1	6
>80	1	1	0	0
Total	141	5	14	57

In contrast to the duodenum and stomach where inflammatory lesions were frequent (95 and 38 cases respectively), malignant lesions showed a predominance in both esophagus (42 cases) and the gastro-esophageal junction (6 cases) (Table 4).

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Table 4: Distribution of histopathological lesions across biopsy sites

Site of biopsy	Inflammatory	Benign	Pre-malignant	Malignant
Esophagus	7	1	9	42
Gastro-esophageal junction	1	0	3	6
Stomach	38	3	0	7
Duodenum	95	1	2	2
Total	141	5	14	57

The most common symptom was pain in the abdomen, reported by 90 participants followed by weight loss and anemia, which affected 74 and 72 participants respectively. The least common symptom was constipation, noted only in 8 participants. Malignancies presented with dysphagia mostly (37 cases).

Out of 141 inflammatory lesions, 75 showed duodenal scalloping with decreased fold height on endoscopic appearance (Fig. 2), followed by ulcer (24 cases) (Fig. 3). Benign lesions had equal frequency (1 case each) of granular mucosa, thickened mucosal folds, mucosal erosion, stricture and exophytic growth. Pre-malignant lesions mostly showed stricture on endoscopy (3 cases out of 14). 15 out of 57 malignant lesions had ulcerative growth.

The analysis of 217 cases revealed a significant correlation between the type of lesion observed on endoscopy and the histopathological diagnosis ($p<0.001$), with a strong sensitivity of 98.7%, thereby indicating the ability of endoscopy to accurately detect neoplastic lesions further confirmed by histopathology. Specificity, however, was comparatively lower at 86.5%, suggesting that some non-neoplastic lesions observed on histopathology were observed as neoplastic on endoscopy. PPV was 79.8%, indicating that among the lesions identified as neoplastic by endoscopy, approximately 80% were confirmed as such by histopathology. NPV was high at 99.2%, indicating that the likelihood of a lesion being non-neoplastic when identified as such on endoscopy was very high. The diagnostic accuracy was 90.8% and the $p<0.001$. The agreement between the two parameters was calculated using a kappa value that was documented to be 0.70 representing a substantial agreement (Tables 5 & 6).

Table 5: Association between non-neoplastic and neoplastic lesions on endoscopy and histopathology

Type of lesion on endoscopy	Type of lesion on histopathology		p-value
	Non-neoplastic	Neoplastic	
Non-neoplastic	122	1	<0.001**
Neoplastic	19	75	
Total	141	76	

***signifies highly significant p-value <0.001; Test used: Chi-square test*

Table 6: Diagnostic value of endoscopic findings to differentiate between non-neoplastic and neoplastic lesions

Sensitivity	98.7%
Specificity	86.5%
PPV	79.8%
NPV	99.2%
Accuracy	90.8%
Kappa value	0.70

p-value= <0.001

The correlation analysis of the data showed that out of the total 217 cases, a majority of 151 cases demonstrated a concordant relation, indicating agreement between the variables studied. Conversely, 66 cases exhibited a discordant relationship, suggesting disagreement between the variables (Fig. 1).

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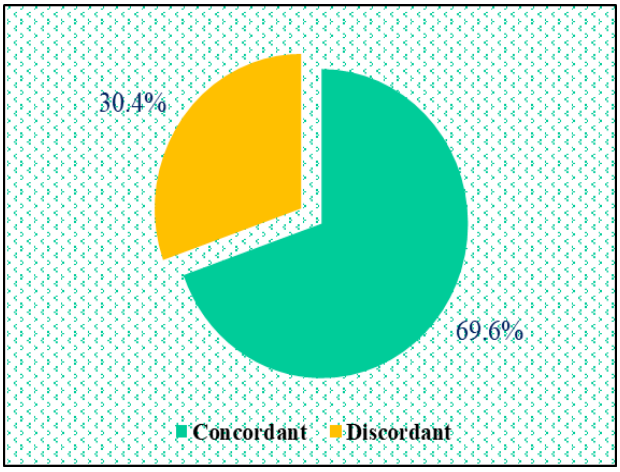

Fig. 1: Correlation of endoscopic diagnosis with histopathological findings

5 out of 59 esophageal biopsies that were suspected to be malignant on endoscopy were reported as esophagitis (4 cases) and hyperplasia (1 case) on histopathology. The correlated spectrum included esophagitis (3 cases), dysplasia (7 cases), squamous cell carcinoma (SCC) in situ (2 cases), SCC (39 cases) (Fig. 4), and adenocarcinoma (3 cases).

9 out of 48 gastric endoscopic diagnoses did not correlate with histopathology. Of these, 7 cases that were suspected to be carcinoma were reported as gastritis (4 cases), and 3 were confirmed as benign on histopathology. The remaining 2 discordant cases that were suspicious to be GIST (gastro-intestinal stromal tumor) and lymphoma were reported as gastritis and reactive gastropathy, respectively on histopathology. The concordant cases included 22 cases of peptic ulcer, 10 cases of gastritis (Fig. 5), and 7 cases of adenocarcinoma (Fig. 6).

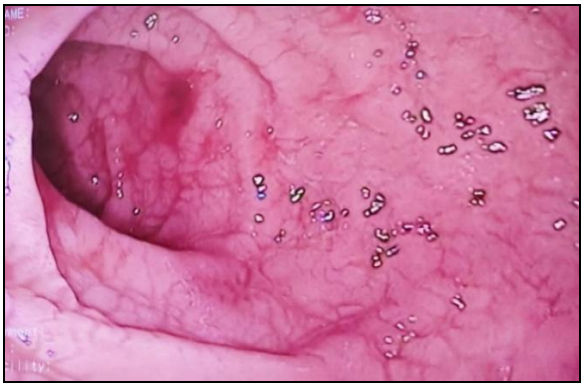

Fig. 2: Celiac disease: duodenal scalloping on endoscopy

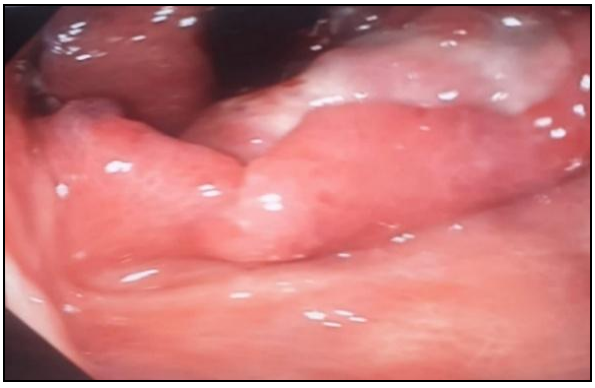

Fig. 3: Peptic ulcer on endoscopy

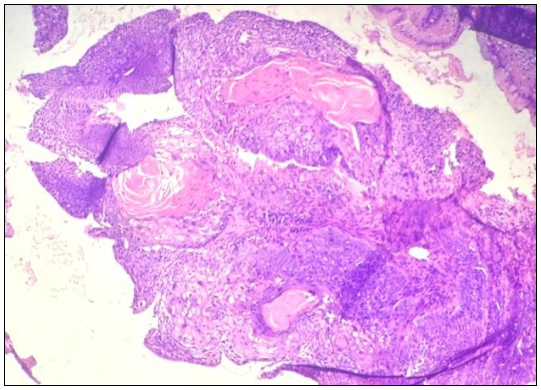

Fig. 4: Well differentiated squamous cell carcinoma esophagus (H&E, 10X)

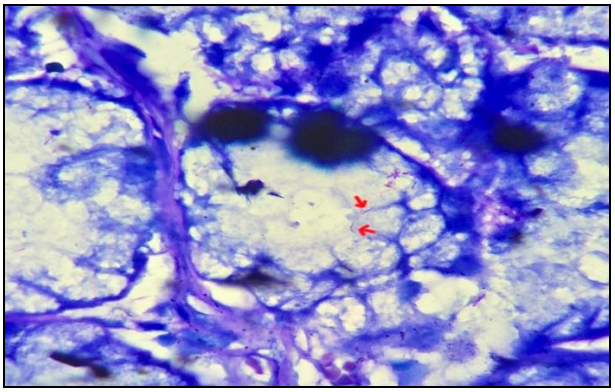

Fig. 5: *H. pylori* gastritis (Long standing Giemsa, 100X)

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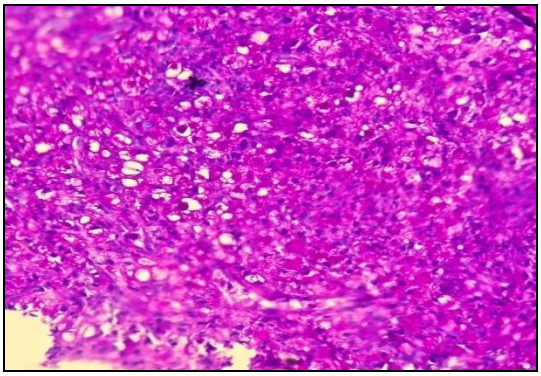

Fig. 6: Adenocarcinoma Stomach- signet ring cell type (PAS, 40X)

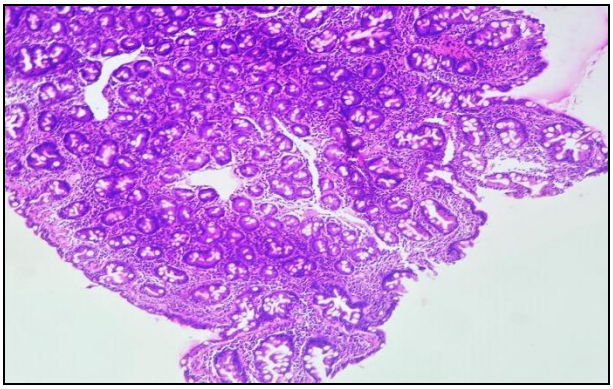

Fig. 7: Celiac disease (H&E, 10X)

52 out of 100 duodenal biopsies came out to be discordant. The majority of these (41 cases) were suspected to be malabsorption syndrome or celiac disease. However, they were diagnosed as chronic non-specific duodenitis (39 cases), peptic duodenitis with *H. pylori* (1 case) and dysplasia (1 case) on histopathological examination. 9 cases of endoscopically diagnosed carcinoma were reported as chronic non-specific duodenitis in histopathology. Out of 6 cases suspected as duodenitis, one disagreed with histopathology and turned out to be a case of celiac disease. A single case of Brunner gland hyperplasia was reported on histopathology which was diagnosed as a polyp on endoscopy. The remaining gamut of congruent lesions included 39 cases of celiac disease (Fig. 7), 5 cases of duodenitis, 1 case of ulcer and dysplasia each and 2 cases of adenocarcinoma.

The gastro-esophageal junction biopsies showed absolute concordance between endoscopy and histopathology with 3 cases of Barrett's esophagus, 6 malignant cases, and a single case of inflammation.

DISCUSSION

In the present study, the peak incidence of esophago-gastro-duodenal lesions was in the 6th decade. Studies done by Nazrin *et al.* [9] and Parikh *et al.* [10] show similar results with the greatest impact in the age range of 51-60 years. The male-to-female ratio was found to be 1.03:1 similar to the study done by Parikh *et al.* [10]. This contrasts with the various studies done earlier suggesting a male preponderance like Rashmi *et al.* [11], Hussain *et al.* [12], and Sharma *et al.* [13]. The changing pattern observed in the present study could be due to increasing smoking trends in females and awareness leading to early screening and diagnosis.

The most common chief complaint in our study was abdominal pain which was similar to the studies done by Sharma *et al.* [13], Godkhindi *et al.* [14] and Memon *et al.* [15]. However, dyspepsia was the most common reason for requesting an upper endoscopy in the study by Anjana *et al.* [7]. Duodenum was the frequently observed site on endoscopic biopsy due to the higher prevalence of celiac disease in the population, in contrast to Nazrin *et al.* [9], Parikh *et al.* [10], Hussain *et al.* [12] and Sharma *et al.* [13], where the stomach was the most common site.

In the present study, most of the lesions were non-neoplastic, comparable to the findings noticed by Bhanarkar *et al.* [2], Parikh *et al.* [10], Rashmi *et al.* [11], Srivastava *et al.* [16] and Rani *et al.* [17]. However, the study by Nazrin *et al.* [9] showed a higher preponderance of neoplastic lesions. Chronic non-specific duodenitis was the most common lesion encountered overall similar to the findings of Parikh *et al.* [10] and Abilash *et al.* [18]. Celiac disease was seen in 40% of duodenal biopsies comparable to the study performed by Rani *et al.* [17].

Squamous cell carcinoma was the commonest lesion in the esophagus comprising 66.1% of the cases like the findings observed by Anjana *et al.* [7], Sharma *et al.* [8], Nazrin *et al.* [9] and Rani *et al.* [17]. Most of these squamous cell carcinomas were moderately differentiated like the studies done by Rashmi *et al.* [11], Rani *et al.* [17], and Abilash *et al.* [18]. Neoplastic lesions made up a major proportion of gastro-esophageal junction biopsies in our study like the study by Nazrin *et al.* [9]. Barrett's esophagus and SCC were in major proportions in our study in contrast to the study done by Nazrin *et al.* [9] where esophagitis and adenocarcinoma were more common.

Non-neoplastic lesions comprised a major proportion of gastric biopsies in our study (79.17%) indistinguishable

from the studies conducted by Anjana *et al.* [7], Parikh *et al.* [10], Rani *et al.* [17] and Abilash *et al.* [18]. The cases of chronic non-specific gastritis were 18.8% and acute gastritis were 4.2% comparable to the studies performed by Abilash *et al.* [18] and Bhide *et al.* [19].

Most of the gastric adenocarcinomas were moderately differentiated. This differed from the study done by Abilash *et al.* [18], which showed most cases to be well differentiated but with a similar incidence of poorly differentiated adenocarcinoma. The present study showed a 69.60% correlation between endoscopic and histopathological diagnosis similar to the studies performed by Sharma *et al.* [8], Pailoor *et al.* [20], Islam *et al.* 21].

CONCLUSIONS

In this study, we concluded that non-neoplastic lesions were more frequent than neoplastic ones in stomach and duodenum while the reverse was true for esophagus and gastro-esophageal junction. The correlation of endoscopic and histopathological findings was found to be 69.60% highlighting the efficacy of endoscopy in identifying a wide spectrum of lesions and reflecting important advances in understanding the pathophysiology of the disease and prognosis after staging in case of carcinomas. The study highlights the clinical significance of endoscopic biopsy in diagnosing upper GIT lesions. The comprehensive analysis of biopsy findings across different age groups and gender distributions provides valuable insights into the epidemiology and emphasizes the importance of early detection and intervention, particularly in potentially lethal malignancies. To conclude, endoscopy is incomplete without biopsy and histopathology is the gold standard in diagnosing endoscopically detected lesions. The biopsy samples can be further confirmed by resection specimens.

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Final approval- Aparna Rathi, Neena Kasliwal

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