ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 03 | March - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

"EVALUATION OF IMPRINT CYTOLOGY AND BIOPSY IN DIAGNOSIS OF GASTROINTESTINAL LESIONS"

Pathology

Dr. Tripti Kashyap Assistant Professor, T.S. Misra Medical College & Hospital Lucknow Uttar Pradesh.

Dr. Muktakar Singh Assistant Professor, T.S. Misra Medical College & Hospital Lucknow Uttar Pradesh.

Dr. Jyothi Mishra Professor and HOD Pathology, Government Medical College, Bulandshahar.

Dr. Divyansh Upadhyay Resident Doctor department of Radiology, T.S. Misra Medical College & Hospital Lucknow Uttar Pradesh

ABSTRACT

Background: Gastrointestinal (GI) lesions encompass a broad range of inflammatory, benign, and malignant conditions, often presenting with overlapping symptoms. Rapid and accurate diagnosis is essential to guide treatment and improve outcomes. Imprint cytology has gained significance as a simple, inexpensive, and rapid adjunct to histopathology for evaluating gastrointestinal biopsies. **Objectives:** To evaluate the diagnostic role of imprint cytology in gastrointestinal lesions, assess cytomorphological alterations, and correlate cytological findings with histopathology to determine diagnostic accuracy. **Methods:** A prospective analytical study was performed on 60 gastrointestinal biopsies at Sharda Hospital, Greater Noida. Imprint smears were prepared from fresh biopsy samples and compared with histopathological sections. Diagnostic performance was evaluated using sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). **Results:** The colon was the most frequent site (43.4%), followed by the esophagus (23.3%) and stomach (11.7%). Inflammatory and malignant lesions were equally distributed (46.6% each), and benign lesions accounted for 6.6%. Imprint cytology demonstrated strong correlation with histopathology in distinguishing inflammatory from malignant lesions. *Helicobacter pylori* was detected in two cases on histopathology but was negative on imprint cytology. Abdominal pain was the most common presenting symptom (44%). **Conclusion:** Imprint cytology is a rapid, cost-effective, and reliable diagnostic tool that correlates well with histopathology. It enhances early diagnosis and aids prompt clinical management, particularly for inflammatory and malignant gastrointestinal lesions.

KEYWORDS

Imprint cytology, gastrointestinal lesions, biopsy correlation, histopathology, diagnostic accuracy, *Helicobacter pylori*, malignancy.

INTRODUCTION

The gastrointestinal (GI) tract performs essential functions of digestion, absorption, and excretion, coordinated through complex anatomical and physiological processes [1]. The mucosal lining, composed of epithelial, glandular, and stromal elements, is constantly exposed to mechanical, chemical, and microbial insults, predisposing it to a wide spectrum of lesions ranging from benign inflammatory conditions to malignant neoplasms [2]. Gastrointestinal cancers, particularly those of the stomach and colon, rank among the leading causes of cancer-related morbidity and mortality worldwide, reflecting their major global health burden [3].

The incidence of gastric carcinoma remains high in developing countries, with significant variation based on dietary habits, genetic predisposition, and infection with *Helicobacter pylori* [4]. Early diagnosis remains a challenge as symptoms are often nonspecific, leading to delayed detection and poor prognosis [5]. The histopathological classification of GI lesions, though well established, depends heavily on obtaining adequate tissue samples for definitive diagnosis. Endoscopic biopsy continues to be the gold standard; however, limitations such as sampling error, crush artifacts, and delayed reporting may hinder timely clinical decisions [6].

Imprint cytology has emerged as a rapid, cost-effective, and reliable adjunctive diagnostic method that allows cytomorphological evaluation of fresh biopsy specimens [7]. It enhances intraoperative and endoscopic diagnostic accuracy and provides valuable preliminary information before formal histopathology [8]. The technique also facilitates early distinction between benign and malignant lesions, guiding prompt therapeutic intervention [9]. Despite its simplicity and high diagnostic yield, imprint cytology remains underutilized in many resource-limited settings due to lack of awareness and comparative validation studies [10].

MATERIALS AND METHODS

Study Design: Prospective Analytical Study

Source Of Data: All the patients who underwent GI biopsy with adequate material were selected.

Study Place: Department of Pathology in collaboration with Department of Surgery, School of Medical Sciences and Research, Sharda Hospital and University, Greater Noida.

Sample Size: 60 cases

Inclusion Criteria:
Patients in whom upper and lower GI lesion were indicated for biopsy

Exclusion Criteria
- Uncooperative Patients
- Fulminant colitis
- Bleeding disorders

Method Of Collection Of Data:
1. Detailed Clinical History
2. Endoscopic Findings

Statistical Analysis
Correlation of imprint cytology with histopathology was analysed by calculating the Pearson's correlation the sensitivity, specificity, positive and negative predictive value.

RESULTS

Table 1: Organ Wise Distribution Of Cases

S. No.	Organ Involved	No. of cases	Percentage (%)
1	Esophagus	14	23.3
2	Pharynx	2	3.4
3	Stomach	7	11.7
4	Colon	26	43.4
5	Ano-Rectum	6	9.9
6	Hepatobiliary	5	8.3
	Total	**60**	**100**

In table 1 maximum number of lesions were in colon 26 (43.4%) followed by esophageal lesions 14 (23.3%). The minimum number of lesions 2 (3.4%) were from the pharynx.

In the figure 1, 25 patients presented with upper gastrointestinal complaints. The most common complaint was pain in abdomen / epigastric pain (44%) followed by weight loss (32%) and pain and difficulty in deglutition for liquids and solids (12%). Only one patient (4%) presented with abdominal lump.

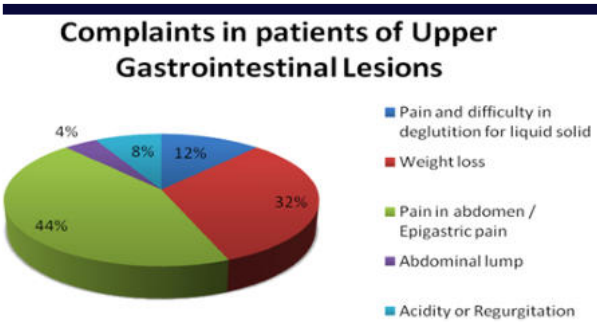

Figure 1: Distribution Of Complaints In Patients Of Upper Gastrointestinal Lesions

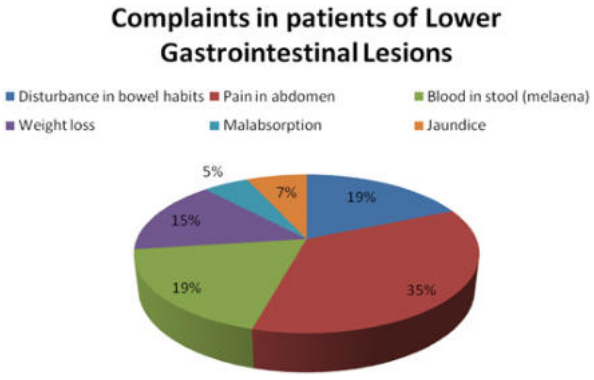

Figure 2: Distribution Of Complaints In Patients Of Lower Gastrointestinal Lesions

Figure 2 Shows Fifty nine patients presented with lower gastrointestinal complaints. The most common complaint was pain in abdomen (35%) followed by disturbance in bowel habits and malena (11%) and then weight loss (15%). Only 3 patients (5%) presented with malabsorption.

Table 2: Site-wise Distribution Of Inflammatory & Neoplasm (benign & malignant) Lesions On Imprint Cytology

S. No.	Site of lesion	Inflammatory	Neoplasm		Total
			Benign	Malignant	
1	Esophagus	3		11	**14**
2	Pharynx			2	**2**
3	Stomach	4	1	2	**7**
4	Colon	17	2	7	**26**
5	Ano rectum	3	1	2	**6**
6	Gall bladder	1		4	**5**
	Total	**28**	**4**	**28**	**60**

Table 2 represent Out of 60 patients, 28 patients (46.6%) presented with inflammatory lesions. The equal number of patients i.e. 28(46.6%) had malignancy. Four (6.6 %) patients had benign lesions. The inflammatory lesion and benign lesions were maximum in the colon 17 (60.7%) and 2 (50%) respectively. The most common site for malignant lesions was esophagus 11 (39.2%).

Table 3: Age-wise Distribution of Neoplastic (benign &malignant) Lesions On Imprint Cytology

S. No.	Class Interval Age (Years)	Inflammatory	Benign	Malignant	Inadequate for comments	Total
1	< 20	4	-	-	-	4
2	21-29	4	2	-	-	8
3	30-39	3	-	-	1	5
4	40-49	6	1	2	-	9
5	50-59	-	1	11	-	12
6	60-69	5	-	8	-	11
7	>70	4	-	7	1	11
	Total	28	4	28	2	60

In table 3, Out of 60 patients 28 patients (46.6%) presented with inflammatory lesions. The equal number of patients 28(46.6%) had malignancy. Four (6.6 %) patients had benign lesion. The maximum number of inflammatory lesions 6 (21.4 %) were in 40-49 years, benign were 2 (50%) in 21-29 years and malignant in 11 were (39.2%) 50-59 years.

Table 4: Helicobacter Pylori Findings On Imprint Cytology And Histopathology (n=2)

Imprint Cytology	Histology		Total
	Negative For H pylori	Positive For H pylori	
Negative for H pylori	-	2	2
Positive for H pylori	-	-	-
Total	-	2	2

Table 4 shows There were two cases (22 years and 28 years males) which showed H. Pylori on histopathology and PAS stain. Both cases (100%) were negative for H. Pylori on imprint cytology.

DISCUSSION

The present study included sixty gastrointestinal biopsy cases analyzed by imprint cytology and histopathology. The colon was the most commonly involved organ, accounting for 43.4% of all lesions, followed by the esophagus (23.3%) and stomach (11.7%). These findings closely align with those of *Kaur et al.* (2016), [8] who also reported the predominance of upper gastrointestinal lesions-particularly esophageal and gastric-among malignant cases in a North Indian cohort. However, the higher frequency of colonic involvement in the present study reflects a broader distribution of lower GI pathology compared to the upper GI predominance observed in earlier series. The hepatobiliary (8.3%) and anorectal (9.9%) sites contributed fewer cases, suggesting that imprint cytology can successfully be applied across diverse gastrointestinal sites. Pain abdomen or epigastric discomfort (44%) was the most common upper GI symptom, consistent with the nonspecific presentations described in *Adlekha and Chadha* (2015), [10] while weight loss and dysphagia were also significant, supporting the observation that malignancies often present late with systemic and obstructive features. Lower gastrointestinal complaints, predominantly abdominal pain (35%) and altered bowel habits (11%), were similar to the clinical spectrum noted in *Kaur et al.* (2016). [8] The study also found an equal distribution of inflammatory and malignant lesions (46.6% each), highlighting the diagnostic challenge of differentiating these entities. Comparable diagnostic diversity was observed by *Adlekha and Chadha* (2015), [10] though their cohort primarily demonstrated infectious and inflammatory pathology related to *H. pylori*. Age-wise, malignancies were most frequent between 50–59 years (39.2%), which correlates with the typical onset of gastrointestinal carcinoma in middle to late adulthood, as noted in Indian population studies. Two cases (22 and 28 years) showing *H. pylori* on histopathology but negative on imprint cytology represent a unique finding, underscoring imprint cytology's variable sensitivity in early or localized infection, a limitation previously acknowledged by *Adlekha and Chadha* (2015).[10]

CONCLUSION

The present prospective analytical study demonstrates that imprint cytology serves as a rapid, reliable, and cost-effective adjunct to biopsy in the diagnosis of gastrointestinal lesions. Among sixty analyzed cases, the colon was the most commonly involved organ (43.4%), followed by the esophagus and stomach. An equal distribution of inflammatory and malignant lesions (46.6% each) highlights the broad diagnostic spectrum encountered in gastrointestinal pathology. Imprint cytology correlated well with histopathological findings, effectively identifying cellular details such as nuclear atypia, glandular arrangements, and inflammatory backgrounds essential for differentiating benign, inflammatory, and malignant lesions. Its diagnostic accuracy was particularly high in ulcerated or friable mucosal samples where tissue yield was optimal. While imprint cytology showed reduced sensitivity for *Helicobacter pylori* detection, it provided valuable preliminary impressions before biopsy confirmation. Overall, the study concludes that imprint cytology enhances diagnostic efficiency, enables earlier clinical decision-making, and remains a practical, adjunctive tool in gastrointestinal lesion evaluation.

Conflict Of Interest: *None.*

Funding: *None.*

Ethical Approval: *Obtained.*

Consent: *Written consent secured.*

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