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Original Research Article

A Prospective Clinicopathological Study of Non-Neoplastic and Neoplastic Lesions of Upper Gastrointestinal Tract at Tertiary Health Centre in North -West Rajasthan

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Abstract:

This prospective clinicopathological study aimed to evaluate the spectrum of non-neoplastic and neoplastic lesions in the upper gastrointestinal (GI) tract at a tertiary health center in North-West Rajasthan. A total of 344 specimens from the esophagus, stomach, and duodenum were analyzed over 18 months. The study population had a mean age of 36.69 years (range: 1–84 years), with a male predominance (52.9%) and a male-to-female ratio of 1.12:1. Non-neoplastic lesions (66.86%) were more common than neoplastic lesions (31.40%). Celiac disease was the most prevalent non-neoplastic diagnosis (91.0% of duodenal cases), while squamous cell carcinoma (SCC) dominated malignant lesions (97.8% of esophageal cases). Neoplastic lesions were significantly associated with older age groups (51–70 years), whereas non-neoplastic lesions predominated in younger patients (11–20 years, 98.4%). The duodenum was the most frequent site of lesions (65.1%), followed by the esophagus (29.9%) and stomach (4.9%). Gender showed no significant correlation with lesion type ($p = 0.659$). Among malignancies, esophageal SCC (89 cases) and gastric adenocarcinoma (6 cases) were most common. Benign lesions, such as intraepithelial neoplasia and hyperplastic polyps, were rare (3.7%). Comparative analysis with prior studies revealed consistent trends in age and gender distribution but highlighted regional variations in malignancy rates, possibly linked to dietary and environmental factors. The study underscores the high burden of non-neoplastic duodenal pathologies, particularly celiac disease, and emphasizes the need for early histopathological evaluation in upper GI disorders. Findings align with global patterns but reflect unique regional disparities, warranting further research into etiological factors. This work contributes to the understanding of upper GI tract pathologies in North-West Rajasthan, aiding in improved diagnostic and therapeutic strategies.

Keywords: Upper gastrointestinal tract, histopathology, neoplastic lesions, non-neoplastic lesions, squamous cell carcinoma, celiac disease.

Introduction

One of our body's most intricate organ systems is the gastrointestinal system (GIT). The gastrointestinal tract (GIT), in addition to serving as the body's digestive system, is home to a vast network of neuroendocrine cells and what is likely the body's greatest repertoire of lymphoid tissue.[1]

The oesophagus and stomach may be affected by a wide range of infections, inflammatory disorders, vascular disorders, mechanical problems, toxic and physical reactions, including radiation harm and neoplasm.[2] The gastro intestinal tract (GIT) small intestine serves as the primary site for food digestion and absorption, whereas the large intestine's main job is to absorb water and salt. Transport of nutrients and water is connected to some disorders. Malabsorption and diarrhea can result from these mechanisms being disturbed. Additionally, the immune system interacts with a wide variety of antigens found in food and gut microorganisms most frequently in the intestines. Infectious and inflammatory processes typically affect both the small intestine and the large intestine.

Obstructive lesions (adhesions), ischemic bowel disease, infectious enterocolitis, inflammatory bowel disease, granulomatous inflammatory diseases, including tuberculosis, polyps, carcinoma, carcinoid tumors, and lymphomas are just a few of the lesions that can affect the small intestine and

large intestine. Gastrointestinal tumors account for a large proportion of all neoplasms.[3] Mesenchymal and stromal tumors are outnumbered by gastrointestinal mucosa tumors. 70% of all malignancies originating in the digestive system are adenocarcinomas. When metastasis occurs, all tumors, without exception, are incurable. However, cures for lymphoma and stromal tumors are likely to occur with effective treatment.[3] Upper GI disorders are one of the most commonly encountered problems in clinical practice with high degree of morbidity and mortality. Various pathology involving the upper gastrointestinal tract manifest with a similar group of symptoms which are difficult to assess clinically**.** There are several diagnostic investigations available in the evaluation of these symptoms where endoscopy is performed as the initial diagnostic test. [4]

Aims and Objectives

1. To evaluate histopathological features of various lesions of upper gastrointestinal tract.
2. To categorize upper gastrointestinal tract lesions according to age, sex and location.
3. To determine the spectrum of histopathological lesions of upper gastrointestinal tract.

Material & Methods

The study was carried out in the Department of Pathology, Sardar Patel Medical College and Associated Group of Hospitals, Bikaner. It was a hospital based prospective study of resected specimens and biopsies of upper GIT with relevant clinical history and submitted for histopathological examination, processed routinely and examined under microscope. The study was carried out for one and a half years from 01/07/2022 to 31/12/2023. Ethical approval was taken from ethical committee of Sardar Patel Medical College, Bikaner.

Inclusion criteria: Biopsies of oesophagus, stomach, duodenum was included.

Exclusion criteria:

1. Autolyzed specimen.
2. Inadequate and poorly preserved resected specimen
3. All the specimens beyond duodenum.
4. Patients presenting with lesions in the oral cavity & oropharynx

The specimens were fixed in 10% formalin for 4-24 hours. Then gross features were examined, and representative sections was taken. After fixation biopsy was processed and embedded in paraffin with orienting the specimen mucosal surface uppermost. Three-to-four-micron thick sections were cut perpendicular to this surface. Sections were stained with routine Hematoxylin and Eosin stain (H and E) and mounted with coverslips using Distyrene Plasticizer Xylene (DPX) as mountant. Additional sections were stained with Periodic Acid Schiff (PAS) stain & Methenamine Silver stain were performed wherever necessary. Analysis of the spectrum of the lesions, categorize upper gastrointestinal tract lesions according to age, sex and location was done. All tumors were classified according to WHO classification.

Observations and Results

We studied a total of 344 specimens of the Upper GI tract, including the oesophagus, stomach, and duodenum, received at our department. The study population had a mean age of 36.69 years with a standard deviation of 19.961, and an age range of 83 years (minimum age of 1 year and maximum age of 84 years). Males constituted 52.9% of the study population, while females accounted for 47.1%, resulting in a male-to-female ratio of 1.12:1.

Non-neoplastic lesions were the most common (66.86%), followed by neoplastic lesions (31.40%) in the upper gastrointestinal tract. Among the non-neoplastic lesions, celiac disease was the most prevalent diagnosis (91.0% of duodenal cases). Neoplastic lesions were more common in older age groups, with the highest prevalence in the 51-60 age group (75.6%) and the 61-70 age group (85.2%). Non-neoplastic lesions were more common in younger age groups, with the highest prevalence in the 11-20 age group (98.4%). There was no significant correlation between gender and the prevalence of neoplastic or non-neoplastic lesions (p-value = 0.659), as both males and females showed similar distributions of lesion types. The most common site of lesions was the duodenum (65.1%), followed by the oesophagus (29.9%) and stomach (4.9%).

The distribution of non-neoplastic and neoplastic lesions across different age groups is summarized in Table 3. The 51-60 age group had the highest number of neoplastic lesions with 34 (75.6%) cases, whereas the 11-20 age group had the highest number of non-neoplastic lesions with 60 (98.4%) cases. The difference in the occurrence of neoplastic and non-neoplastic lesions showed a significant statistical correlation, with neoplastic lesions being more common in older patients and non-neoplastic lesions in younger age groups (p-value = 0.0001).

Females had 56 (35.4%) neoplastic lesions and 102 (64.6%) non-neoplastic lesions, whereas males had 52 (28.9%) neoplastic lesions and 128 (71.1%) non-neoplastic lesions. No significant correlation was found between lesion types and gender (p-value = 0.659).(Table no. 4)

Out of 224 cases, the duodenum had the highest number of cases, with celiac disease being the most common diagnosis (194 cases, 91.1%), followed by

chronic duodenitis (13 cases, 6.1%). In the oesophagus, out of 7 non-neoplastic lesion cases, reflux oesophagitis was the most common (4 cases, 57.1%), followed by Barrett's oesophagus (2 cases, 28.6%). In the stomach, chronic gastritis (4 cases, 40.0%) was the most common lesion, followed by hyperplastic polyp (3 cases, 30.0%).

Benign lesions by site and diagnosis are categorized in Table 5. The oesophagus had the highest number of benign lesions, with intraepithelial neoplasia (high-grade and low-grade) being the most common diagnoses.

Malignant lesions by site and diagnosis are summarized in Table 6. The oesophagus had the highest number of malignant lesions, with squamous cell carcinoma (SCC) being the predominant diagnosis (89 cases, 97.8%). The duodenum and stomach also had cases of adenocarcinoma.

On analysing the occurrence of adenocarcinoma, the stomach had the highest number of cases (6 cases, 46.2%), followed by the duodenum (5 cases, 38.5%) and oesophagus (2 cases, 15.4%). On comparing the age and gender distribution of adenocarcinoma in the upper GI tract, the majority of cases were observed in the 51-60 age group (7 cases, 53.3%), followed by the 41-50 age group (4 cases, 30.8%). Females accounted for 7 cases (53.8%), while males had 6 cases (46.2%). The distribution was even, with no statistically significant difference.

The distribution of squamous cell carcinoma (SCC) in the upper GI tract is analysed. The highest number of cases occurred in the 51-60 age group (26 cases, 28.9%), followed by the 61-70 age group (22 cases, 24.2%). Females had 47 cases (52.2%), while males had 43 cases (47.8%). The difference was not statistically significant.

Table 1: Age group and Gender wise distribution of cases:-

	Sex					
Age Group	**Female**	**Percent**	**Male**	**Percent**	**Total**	**Percent**
1 - 10	16	53.3%	14	46.7%	30	8.7%
11 - 20	25	41.0%	36	59.0%	61	17.7%
21 - 30	26	52.0%	24	48.0%	50	14.5%
31 - 40	32	51.6%	30	48.4%	62	18.0%
41 - 50	24	46.2%	28	53.8%	52	15.1%
51 - 60	18	40.0%	27	60.0%	45	13.1%
61 - 70	14	51.9%	13	48.1%	27	7.8%
71 - 80	6	42.9%	8	57.1%	14	4.1%
81 - 90	1	33.3%	2	66.7%	3	0.9%
Total	162	47.1%	182	52.9%	344	100.0%

Table 2: Distribution of cases according to site of lesion

Specimen	**Frequency**	**Percent**
Duodenum	224	65.1
Oesophagus	101	29.4
Stomach	19	5.5
Total	344	100.0

Table 3: Distribution of Non neoplastic and neoplastic lesions in different age groups

Age Group	**Neoplastic**		**Non Neoplastic**		**Total**	
	Count	**%**	**Count**	**%**	**Count**	**%**
1 - 10	1	3.7%	26	96.3%	27	8.0%
11 - 20	1	1.6%	60	98.4%	61	18.0%
21 - 30	3	6.1%	46	93.9%	49	14.5%
31 - 40	10	16.4%	51	83.6%	61	18.0%
41 - 50	23	45.1%	28	54.9%	51	15.1%
51 - 60	34	75.6%	11	24.4%	45	13.3%
61 - 70	23	85.2%	4	14.8%	27	8.0%
71 - 80	10	71.4%	4	28.6%	14	4.1%
81+	3	100.0%	0	0.0%	3	0.9%
Total	108	32.0%	230	68.0%	338	100.0%

Chi-square	**152.530**
df	8
Sig.	0.0001

Table 4: Distribution of Non neoplastic and neoplastic lesions in between genders

Sex	**Neoplastic**	**Non Neoplastic**	**Total**
Female	56	102	158
Male	52	128	180
Total	108	230	338

Chi-square	.195
df	1
Sig.	0.659

Table 5: Non-Neoplastic lesions in the present study

Site	**Diagnosis**	**No. of Cases**	**Percent**
Duodenum	Celiac disease	194	91.1%
	Chronic Duodenitis	13	6.1%
	Eosinophilic duodenitis	1	0.5%
	Peptic Duodenitis	5	2.3%
	Total	213	100.0%
Oesophagus	Barrett's Oesophagus	2	28.6%
	Candida oesophagitis	1	14.3%
	Reflux oesophagitis	4	57.1%
	Total	7	100.0%
Stomach	Acute gastritis	1	10.0%
	Chronic Gastritis	4	40.0%
	Fundic Gland polyp	1	10.0%
	Hyperplastic polyp	3	30.0%
	Perforation	1	10.0%
	Total	10	100.0%

Table 6: Malignant lesions in the present study:-

Site	**Diagnosis**	**Count**	**%**
Duodenum	Adenocarcinoma	5	100.0%
	Total	5	100.0%
Oesophagus	Adenocarcinoma	2	2.2%
	Squamous cell carcinoma	89	97.8%
	Total	91	100.0%
Stomach	Adenocarcinoma	6	85.7%
	Squamous cell carcinoma	1	14.3%
	Total	7	100.0%

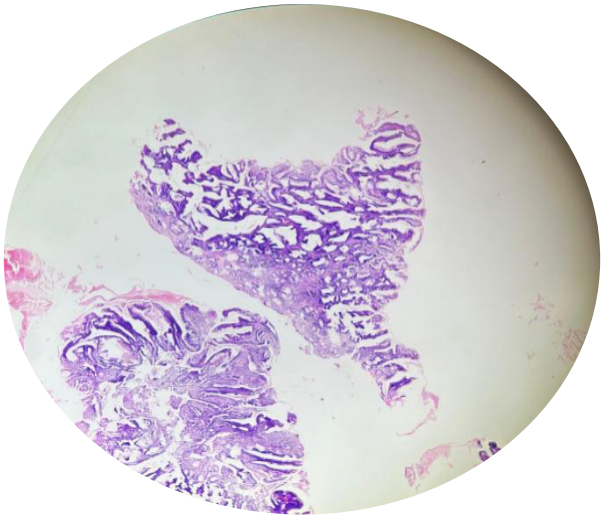

Figure 1: Gastric polyp, 10X, H& E

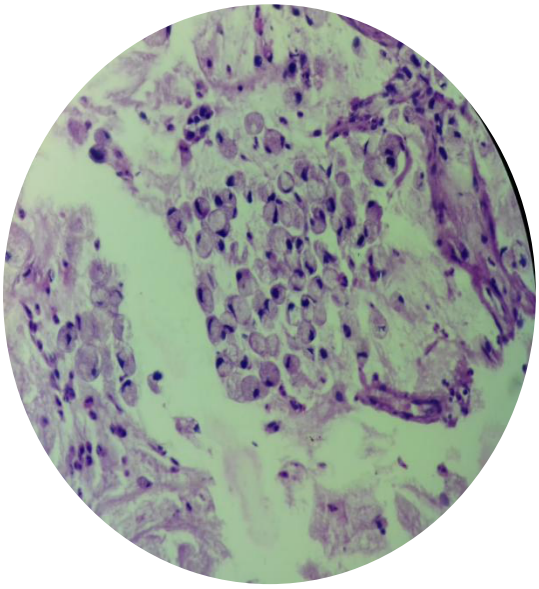

Figure 2: Gastric adenocarcinoma,40X, H& E

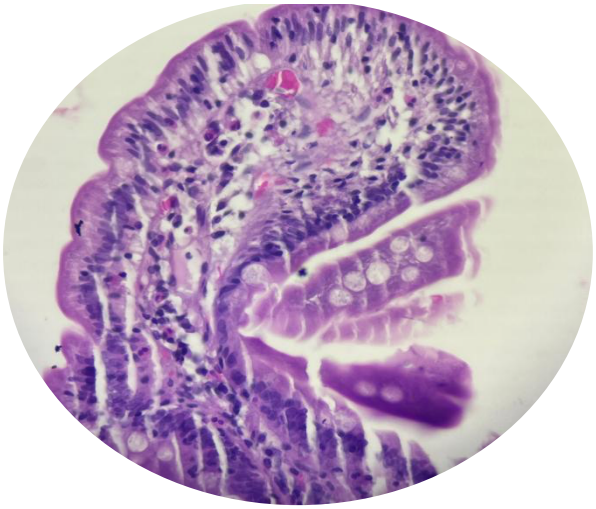

Figure 3: Eosinophilic duodenitis,40X, H&E

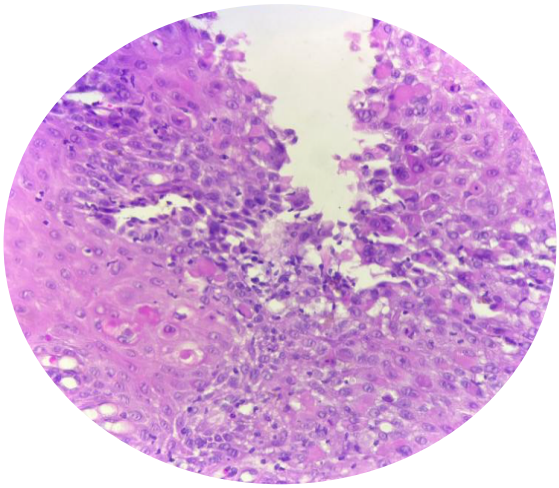

Figure 4: Squamous cell carcinoma Oesophagus, 40X, H&E

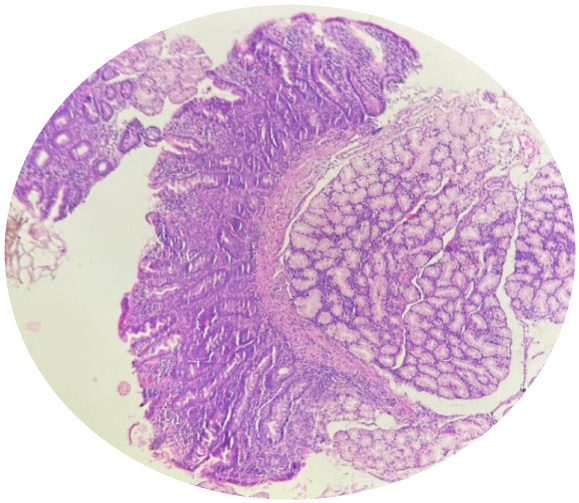

Figure 5: Celiac Disease, 10X, H&E

Discussion: Most previous studies reported male predominance as shown in the below table which is in agreement with our study. Krishnappa, Rashmi, et al. and Shanmugasamy K et al found most cases in fifth decade which is near to our results. The age distribution in these studies also showed a higher prevalence of lesions in middle-aged adults, consistent with the current study's findings.

Table 7: Age and Gender prevalence in different studies

S. No.	Study	Mean Age	Male : Female Ratio	Age Group with maximum cases
1	Krishnappa, Rashmi, et al.[5]	-	2.03:1	41 - 50
2	Shanmugasamy K et al [6]	-	1.5:1	41–50
3	Neha Satyanarayan Somani et al.[8]	-	-	51 - 60
4	Present Study	36.69	1.12:1	31-40 (18%)

The most common site of lesions in this study was the duodenum (65.1%), followed by the oesophagus (29.9%) and stomach (4.9%). Dr. Ganga H et al (2018)[10] reported maximum number of cases in duodenum (34 cases, 20.85%), which is concordant with our study. Most previous studies also report non neoplastic lesions as the more common occurrence in their study as shown in the table 17. [5,7,10]

Table 8: Comparison of non-neoplastic and neoplastic lesions in different studies

S. No.	Study	Non Neoplastic	Neoplastic
1	Krishnappa, Rashmi, et al.[5]	60%	40%
2	Rosy Khandelia et al.[7]	67.8%	32.1%
3	Dr. Ganga H et al [10]	61.34%	20.24%
4	Present Study	66.86%	31.40%

Majority of the neoplastic lesions in our study were found to be malignant with only 3.7% benign and 0.9% intermediate lesion. Out of the 4 benign lesions there were 2 cases of Intraepithelial Neoplasia Low grade of oesophagus and 1 case of Intraepithelial Neoplasia high grade of oesophagus and 1 case of Adenomatous polyp low grade of stomach. Inflammatory myofibroblastic tumor of stomach was accounted as 1 case of intermediate lesion.

Malignant lesions were most common in 41 – 50 yrs with 23 (22.3%) cases followed by 51 – 60 yrs with 33 (32.0%) cases and 61 – 70 yrs with 23 (22.3) cases in the present study. Maximum number of malignant lesions were seen in Oesophagus in our study with 91 cases followed by 7 in stomach and 5 in duodenum. Squamous cell carcinoma was the most prevalent (89, 97.8%) lesion of oesophagus with 2 (2.2%) reported as adenocarcinoma on morphology. Mishra R et al [11] also reported squamous cell carcinoma (42.2%) as the most common malignancy in their study.

Higher incidence of oesophageal carcinoma in Indian subcontinents may be due to interplay of different environmental conditions such as dietary factors with underlying poor nutritional status. Consumption of red chillies which has substantial amounts of N-nitroso compounds could also be a major contributing factor in this area.[13] In stomach Adenocarcinoma was the most prevalent (6, 85.7%) lesion and 1 (14.3%) reported as squamous cell carcinoma of stomach on morphology. Mohd. Afroz et al [9] in their study reported that on histological examination, 100% of stomach biopsies were reported as Adenocarcinoma. Similar findings were also observed in studies conducted by Ganga H et al,[10] Neha Satyanarayan Somani et al.[8] and Saurabh Sharma et al.[14]

All the 5 malignant cases of duodenum were reported as adenocarcinoma on morphology. Previous studies done by Sahu PR et al [12] and Neha Satyanarayan Somani et al.[8] reported all benign lesions in duodenum which is in contrast to our present study. Ours is a tertiary totally care regional cancer centre and we receive cancer patients from a large geographical area that is why the cases of malignant lesions are more predominant in our study.

Conclusion

The findings of this study provide a comprehensive overview of the distribution and types of non-neoplastic and neoplastic lesions in the upper gastrointestinal tract. The results are consistent with previous studies in several aspects, such as the higher prevalence of lesions in males, the predominance of duodenal lesions, and the higher incidence of neoplastic lesions in older adults. However, some differences in prevalence rates of specific lesions and age distributions highlight the need for further research to understand the underlying factors contributing to these variations.

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