Histopathological Spectrum of Endoscopic Gastrointestinal Biopsies: An Experience from a Tertiary Care Centre, Uttarakhand, India

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ABSTRACT

Introduction: The Gastrointestinal Tract (GIT) is the site of numerous pathological lesions from inflammatory to malignant. Endoscopic biopsy plays an important role in detection of early-stage cancers and precursor lesions. It also aids in determining the extent of disease, monitoring response to therapy and for early detection of complications. However, histopathological evaluation serves as gold standard for diagnosis and aids the clinician in deciding further management.

Aim: To determine the histopathological spectrum of gastrointestinal lesions and assess the frequency of benign and malignant tumours in GIT in a tertiary care center in North India.

Materials and Methods: It was a retrospective study in which all endoscopic gastrointestinal biopsies received in Department of Pathology at Shri Guru Ram Rai Institute of Medical and Health Sciences from January 2015 to December 2017 were retrieved. The lesions from oropharynx, oesophagus, stomach, small intestine, large intestine, rectum and anal canal were categorised as neoplastic (further divided as benign and malignant) and

non neoplastic. The results were tabulated and expressed as frequencies and percentages.

Results: Of the 867 cases, 582 were males and 285 were females with a male to female ratio of 2.04:1. The most common age group was sixth decade with a mean age of 53.8 years. Out of total 7782 specimens received, 867 (11.1%) were endoscopic gastrointestinal biopsies. Among all the biopsies evaluated, 116 (13.4%) were from oropharynx, 55 (6.3%) oesophageal, 97 (11.2%) from stomach and Gastroesophageal (GE) junction, 138 (15.9%) from small intestinal and 461 (53.2%) from colorectum and anal canal. Out of 867 biopsies, 659 (76%) were classified as non neoplastic and 208 (24%) were neoplastic. Incidence of malignancy was highest in gastric (29%) and oropharyngeal (28.5%) biopsies while it was least in small intestinal biopsies (4.3%).

Conclusion: In the current study, squamous cell carcinoma and ulcerative colitis were the most prevalent neoplastic and non neoplastic lesions, respectively. It is advisable to interpret and correlate endoscopic findings with histopathology to arrive at a final diagnosis and aid the clinician for further management.

INTRODUCTION

The Gastrointestinal Tract (GIT), which extends from oral cavity to the anus, spanning a length of almost 8-9 meters, is a site of numerous pathological lesions from inflammatory, benign to malignant [1]. According to World Health Organisation (WHO), colorectal and stomach cancers were the second and fourth most common cause of mortality in 2020 worldwide [1]. The Global Cancer Observatory (GLOBOCAN) 2020 estimates of cancer for India depicted that in males, gastric, colorectal and oesophageal cancers were among the top five frequent cancers after oral cavity and lung. In females, colorectal cancer was the fifth most common cause of cancer in India [2].

Endoscopic biopsy plays a crucial role in detection of early stage cancers and precursor lesions. They are performed not only for histological diagnosis but also for determining the extent of disease, monitoring the course, response to therapy and for early detection of complications even in non neoplastic conditions like inflammatory bowel disease [2]. There is no study so far showing distribution of gastrointestinal lesions in the hilly state of Uttarakhand. Hence, present study was undertaken to determine the histopathological spectrum of gastrointestinal lesions and assess the frequency of benign and malignant tumours in GIT in a tertiary care center in Uttarakhand.

MATERIALS AND METHODS

It was a retrospective study in which all endoscopic gastrointestinal biopsies received in Department of Pathology at Shri Guru Ram Rai Institute of Medical and Health Sciences from January 2015

to December 2017 were retrieved and analyzed between January 2018 to June 2019. The study was exempt from approval of Institutional Ethics Committee due to its retrospective nature and use of anonymised data.

Inclusion criteria: All endoscopic gastrointestinal biopsies received in the above-mentioned period were included in the study.

Exclusion criteria: All resection specimens from GIT along with liver and gall bladder specimens were excluded.

Sample size: A total 7782 specimens were received in the Department of Pathology over a period of three years from January 2015 to December 2017. Out of these, 867 (11.1%) were endoscopic biopsies from GIT.

Procedure

Clinical details like age and gender were also retrieved from the archives. Specimens were received in 10% neutral buffered formalin and fixed for 12 hours. After fixation, biopsy was processed and embedded in paraffin with proper orientation, keeping the mucosal surface facing upwards. Three to four micron thick sections were cut and stained with Haematoxylin and Eosin (H&E) stain along with special stains like Giemsa (*Helicobacter pylori*), Ziehl Neelson (acid fast bacilli) and periodic acid schiff stains (fungal hyphae), wherever necessary.

The lesions from oropharynx, oesophagus, stomach, small intestine, large intestine, rectum and anal canal were categorised as neoplastic (further divided as benign and malignant) and non neoplastic (Inflammatory/reactive lesions). No specific criteria was used to classify the lesions apart from mentioned above.

STATISTICAL ANALYSIS

The results were tabulated and expressed using frequencies and percentages using Statistical Package for Social Sciences (SPSS) version 24.0.

RESULTS

The youngest patient was aged two years with a juvenile rectal polyp and oldest was 90-year-old with a colonic adenocarcinoma. Out of the 867 cases, 582 were males and 285 were females with a male to female ratio of 2.04:1. The most common age group was sixth decade with a mean age of 53.8±19.8 years. [Table/Fig-1,2] depict the histopathological findings of some of the non neoplastic, benign and malignant aetiologies evaluated in the present study. Among all the biopsies evaluated, 116 (13.4%) were from oropharynx, 55 (6.3%) from oesophageal, 97 (11.2%) from stomach and GE junction, 138 (15.9%) small intestinal and 461 (53.2%) from colorectum and anal canal. Out of 867 biopsies, 659 (76%) were classified as non neoplastic and 208 (24%) were neoplastic. Among the neoplastic lesions, 22 (10.6%) were benign while 186 (89.4%) were malignant. [Table/Fig-3] summarises the incidence of neoplastic and non neoplastic lesions at various sites of GIT.

Oropharyngeal biopsy (116 cases- 13.4%): Majority of biopsies 81 (70%) cases were from the fifth decade. Neoplastic lesions 63 (54.3%) cases outnumbered the non neoplastic lesions 53 (45.7%) cases [Table/Fig-3].
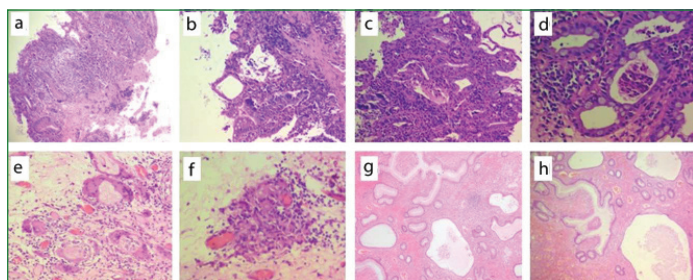
[Table/Fig-1]: Photomicrograph depicting non neoplastic and benign aetiologies of gastrointestinal tract; a-d) Case of ulcerative colitis depicting crypt distortion and destruction with cryptitis and crypt abscess. (100X, 400X, H&E); e-f) Case of tubercular aetiology exhibiting epithelioid cell granulomas with langhans and foreign body type multinucleated giant cells. (400X, H&E); g-h) Case of Solitary Juvenile Rectal Polyp exhibiting cystically dilated glands lying in an oedematous and inflammatory stroma. (400X, H&E).
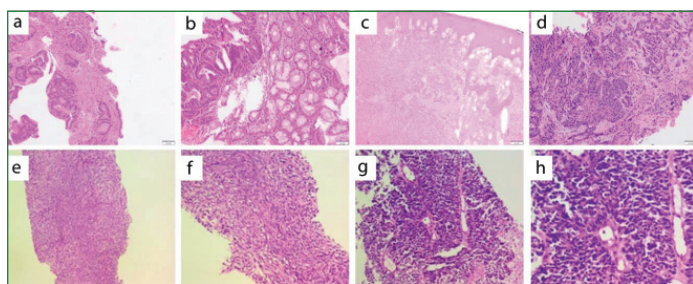
[Table/Fig-2]: Photomicrograph depicting malignant aetiologies of gastrointestinal tract; a-b) Case of Adenocarcinoma rectum exhibiting complex to irregular glands with loss of polarity, enlarged hyperchromatic nuclei. (100X, 400X, H&E); c-d) Case of Squamous cell carcinoma esophagus exhibiting nests of malignant polygonal cells with individual cell keratinization and occasional keratin pearls. (100X, 400X, H&E); e-f) Case of gastrointestinal stromal tumour stomach exhibiting spindle to epithelioid cells with moderate pleomorphism arranged in sheets and fascicles. (100X, 400X, H&E); g-h) Case of neuroendocrine carcinoma stomach exhibiting diffuse sheets and solid nests of markedly atypical cells with high nucleocytoplasmic ratio, scant cytoplasm and nuclear hyperchromasia. (100X, 400X, H&E).

Oesophageal biopsy (55 cases- 6.3%): Most of the oesophageal biopsies 45 (81%) cases were from the seventh decade [Table/Fig-3] with neoplastic lesions 41 (74.5%) cases predominating over the non neoplastic ones 14 (25.5%) cases.

Gastric and GE junction biopsy (97 cases- 11.2%): Among the 138 biopsies, neoplastic lesions 54 (55.7%) cases predominated over the non neoplastic ones 43 (44.3%) cases with the most common age group being 46-60 years 64 (66%) cases.

Site of lesions	Neoplastic		Non neoplastic (n=659)
	Benign (n=22)	Malignant (n=186)	
Oropharynx (n=116)	10 (1.2%)	53 (6.1%)	53 (6.1%)
Oesophagus (n=55)	2 (0.2%)	39 (4.5%)	14 (1.6%)
Stomach and GE junction (n=97)	-	54 (6.2%)	43 (5.0%)
Small Intestine (n=138)	-	8 (0.9%)	130 (15.0%)
Colorectum and anal canal (n=461)	10 (1.2%)	32 (3.7%)	419 (48.3%)

[Table/Fig-3]: Incidence of neoplastic and non neoplastic lesions at various sites of GIT. GE: Gastroesophageal; GIT: Gastrointestinal tract

The histopathological spectrum of oropharyngeal, oesophageal and gastric lesions has been summarised in [Table/Fig-4].

Small Intestinal biopsy (138 cases- 15.9%): The most common age group was the fifth decade 94 (68.1%) cases with non neoplastic lesions 130 (94.2%) cases outnumbering the neoplastic ones (8 cases- 5.8%).

Site	Disease	Diagnosis	No. of cases (%)
Oropharynx (n=116)	Non neoplastic (53)	Non specific inflammation	25 (21.6)
		Hyperplastic epithelium	20 (17.2)
		Lichen planus	2 (1.7)
		Fibroepithelial polyp	6 (5.2)
	Neoplastic (63)	Squamous papilloma	3 (2.6)
		Schwannoma	1 (0.9)
		Squamous cell carcinoma	59 (50.9)
Oesophagus (n=55)	Non neoplastic (n=14)	Oesophagitis	12 (21.8)
		Barretts oesophagus	2 (3.6)
	Neoplastic (n=41)	Squamous papilloma	2 (3.6)
		Squamous cell carcinoma	37 (67.2)
		Malignant Gastrointestinal tumour	2 (3.6)
Stomach and gastro-oeophageal junction (n=97)	Non neoplastic (n=43)	Acute gastritis	7 (7.2)
		Chronic gastritis	20 (20.6)
		Atrophic gastritis	2 (2.1)
		Helicobacter pylori gastritis	13 (13.4)
		Hyperplastic polyp	1 (1)
	Neoplastic (n=54)	Adenocarcinoma	41 (42.3)
		Squamous cell carcinoma	2 (2.1)
		Lymphoma	2 (2.1)
		Neuroendocrine carcinoma	7 (7.2)
		Malignant Gastrointestinal tumour	2 (2.1)

[Table/Fig-4]: Histopathological diagnosis of oropharyngeal, oesophageal and gastric (including Gastroesophageal junction) lesions.

Colorectal and Anal Canal biopsy (461 cases- 53.2%): Among all colorectal and anal canal biopsies, histologically 419 (90.9%) were diagnosed as non neoplastic and 42 cases (9.1%) as neoplastic. The sixth decade was the most common age group involved.

The histopathological spectrum of small intestinal and colorectal biopsies has been summarised in [Table/Fig-5].

Incidence of malignancy was highest in gastric 54 (29%) cases and oropharyngeal 53 (28.5%) cases biopsies while it was least in small intestinal biopsies 8 (4.3%) cases. Out of the total 186 malignant cases, 137 were males and 49 were females with a male: female ratio of 2.8:1. Maximum number of malignant cases of GIT was in the age group 46-60 years comprising 71 out of 186 cases (38.2%). The minimum age of patient having malignancy was 22 years while maximum age was 90 years. The distribution of different GI malignancies based on different age groups and in both sexes is depicted in [Table/Fig-6].

Site	Disease	Diagnosis	No. of cases (%)
Small intestine (n=138)	Non neoplastic (n=130)	Non specific duodenitis	37 (26.8%)
		Suspected celiac	21 (15.2%)
		Tubercular pathology	30 (21.7%)
		Crohns disease	20 (14.5%)
		Non specific ileitis	22 (15.9%)
	Neoplastic (n=8)	Adenocarcinoma	7 (5.1%)
		Lymphoma	1 (0.7%)
Colorectum and anal canal (n=461)	Non neoplastic (n=419)	Ulcerative colitis	178 (38.6%)
		Crohns disease	54 (11.7%)
		Tubercular pathology	23 (5.0%)
		Non specific proctitis	128 (27.8%)
		Aganglionosis	8 (1.7%)
		Juvenile rectal polyp	15 (3.3%)
		Hyperplastic polyp	13 (2.8%)
	Neoplastic (n=42)	Tubular adenoma	4 (0.8%)
		Serrated adenoma	2 (0.4%)
		Tubulovillous adenoma	2 (0.4%)
		Villous adenoma	2 (0.4%)
		Adenocarcinoma	28 (6.1%)
		Squamous cell carcinoma	4 (0.9%)

[Table/Fig-5]: Histopathological diagnosis of small intestinal, colorectal and anal lesions.

Among all the malignant cases, squamous cell carcinoma (51.6%) was the most prevalent diagnosis followed by adenocarcinoma (40.9%).

Age (years)	Adenocarci-noma		Squamous cell carci-noma		Malignant gastrointes-tinal tumour		Lymphoma		Neuroen-docrine carcinoma	
	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male
1-15	-	-	-	-	-	-	-	-	-	-
16-30	2	4	3	-	-	-	-	-	-	-
31-45	8	2	12	6	2	2	2	-	3	-
46-60	17	5	35	12	-	-	-	1	-	1
61-75	17	7	14	7	-	-	-	-	3	-
>75	12	2	5	2	-	-	-	-	-	-
Total	56	20	69	27	2	2	2	1	6	1

[Table/Fig-6]: Distribution of different GI malignancies in different age groups and in both sexes (N=186).

DISCUSSION

Among the 7782 specimens received, 867 were gastrointestinal biopsies. Among oesophageal biopsies, most common age group involved was sixth decade that was similar to Somani NS and Patil P, Jaynul Islam SM et al., and Sharma S et al., [3-5]. However, Mohankumar K and Ramachandran P; and Borges EJ found most of the oesophageal lesions from the fifth decade [6,7].

In the current study, neoplastic lesions outnumbered the non neoplastic lesions, which was comparable to the results of most studies [3-5,8,9]. However, Krishnappa R et al., found a reverse trend [10]. Similar to our results, squamous cell carcinoma was the most common lesion in majority studies [3-5,8,9] except Krishnappa R et al., where non specific oesophagitis was most prevalent [10]. The comparison of oesophageal biopsies in different studies is depicted in [Table/Fig-7a] [3-5,8-10].

Majority of gastric biopsies were done in the sixth decade, which was similar to Sharma S et al., [5]. Most studies showed a predominance of non neoplastic lesions with gastritis being the most common lesion [5,8,10,11]. However, authors observed a predominance

of neoplastic lesions. In the present study, adenocarcinoma was the most common lesion, which was comparable to the findings of Somani NS and Patil P, Jaynul Islam SM et al., and Trisal M et al., [3,4,9].

The comparison of gastric biopsies in various studies is summarised in [Table/Fig-7b] [3-5,8-11]. The most common age group with small intestinal biopsies was the fifth decade, which was similar to the results of Jaynul Islam SM et al., [4]. The non neoplastic lesions outnumbered the neoplastic lesions in all studies including the current study with non specific duodenitis being the most common lesion [3,5,8,11]. However, Jaynul Islam SM et al., and Trisal M et al., demonstrated hyperplastic polyp and villous atrophy as the most prevalent lesion respectively [4,9].

Studies	Place/Year of study	% of biop-sies	Neo-plastic	Non neoplastic	Most common lesion
A) Oesophageal biopsy					
Somani NS and Patil P, [3] (n=100)	Mumbai (2018)	39%	69.2%	30.8%	Squamous cell carcinoma
Jaynul Islam SM et al., [4] (n=110)	Chittagong (2014)	20%	81.8%	18.2%	Squamous cell carcinoma
Sharma S et al., [5] (n=500)	Tanda (2020)	16.2%	77.7%	22.3%	Squamous cell carcinoma
Ganga H and Indudhara PB, [8] (n=163)	Shivamogga (2018)	18.4%	63.3%	36.7%	Squamous cell carcinoma
Trisal M et al., [9] (n= 60)	Jammu (2018)	10%	83.3%	16.6%	Squamous cell carcinoma
Krishnappa R et al., [10] (n= 100)	Bangalore (2013)	25%	44%	56%	Chronic non specific oesophagitis
Present study (n=55)	Dehradun	6.3%	74.5%	25.5%	Squamous cell carcinoma
B) Gastric biopsy					
Somani NS and Patil P, [3] (n=100)	Mumbai (2018)	55%	45.5%	54.5%	Adenocarcinoma
Jaynul Islam SM et al., [4] (n=110)	Chittagong (2014)	66.4%	45.2%	54.8%	Adenocarcinoma
Sharma S et al., [5] (n=500)	Tanda (2020)	36.6%	20.8%	75.9%	Gastritis
Ganga H and Indudhara PB, [8] (n=163)	Shivamogga (2018)	60.1%	8.1%	91.9%	*Helicobacter pylori* gastritis
Trisal M et al., [9] (n=60)	Jammu (2018)	25%	73.3%	26.6%	Adenocarcinoma
Krishnappa R et al., [10] (n=100)	Bangalore (2013)	68%	40%	60%	Chronic non specific gastritis
Hirachand S et al., [11] (n=243)	Kathmandu (2018)	90%	12.4%	86.7%	Gastritis
Present study (n=97)	Dehradun	11.2%	55.7%	44.3%	Adenocarcinoma

[Table/Fig-7]: Comparison of Oesophageal (A) and Gastric biopsy (B).

The comparison of the small intestinal biopsies in different studies is depicted in [Table/Fig-8a] [3-5,8-11]. Majority of colorectal biopsies were from patients in their sixth decade similar to Sharma S et al., [5]. The present study showed a predominance of non neoplastic lesions, which was similar to the findings of Trisal M et al., Abilash SC et al., and Makaju R [9,12,13].

The most frequently observed lesion in current study was ulcerative colitis. Abilash SC et al., and Makaju R also demonstrated colitis as the most common lesion [12,13]. The comparison of colorectal and anal biopsies in various studies is depicted in [Table/Fig-8b] [5,9,12,13]. Authors observed highest number of cases of gastrointestinal malignancies from stomach (54 cases- 29%) and oropharynx (53 cases- 28.5%) while least were from small intestine (8 cases- 4.3%). The other studies showed maximum number of malignant cases from colorectum/anal canal [14-21] except Sharma

S et al., Ganga H and Indudhara PB, Jussawalla DJ et al., who observed majority of malignant cases from oesophagus [5,8,22].

Studies	Place of study	% of biopsies	Neoplastic	Non neoplastic	Most common lesion
A) Small intestinal biopsy					
Somani NS and Patil P, [3] (n=100)	Mumbai (2018)	6%	-	100%	Non specific duodenitis
Jaynul Islam SM et al., [4] (n=110)	Chittagong (2014)	13.6%	13.3%	86.6%	Hyperplastic polyp
Sharma S et al., [5] (n=500)	Tanda (2020)	23.8%	-	100%	Non specific duodenitis
Ganga H and Indudhara PB, [8] (n=163)	Shivamogga (2018)	20.8%	11.8%	88.2%	Chronic non specific duodenitis
Trisal M et al., [9] (n= 60)	Jammu (2018)	15%	22.2%	77.7%	Villous atrophy
Krishnappa R et al., [10] (n= 100)	Bangalore (2013)	7%	28.6%	71.4%	Non specific duodenitis
Hirachand S et al., [11] (n=243)	Kathmandu (2018)	3.7%	-	100%	Non specific duodenitis
Present study (n= 138)	Dehradun	15.9%	5.8%	94.2%	Non specific duodenitis
B) Colorectal and Anal canal biopsy					
Sharma S et al., [5] (n=500)	Tanda (2020)	23.4%	36.8%	55.6%	Adenocarcinoma
Trisal M et al., [9] (n= 60)	Jammu (2018)	50%	40%	60%	Colitis
Abilash SC et al., [12] (n= 250)	Kerela (2016)	100%	39.2%	60.8%	Colitis
Makaju R [13] (n=95)	Kathmandu (2017)	100%	24.2%	60%	Non neoplastic polyps
Present study (n=461)	Dehradun	53.2%	9.1%	90.9%	Ulcerative colitis

[Table/Fig-8]: Comparison of Small intestinal (A) and Colorectal and Anal canal (B) biopsy.

Findings from the study by Somani NS and Patil P, and Krishnappa R et al., showed most of the malignant lesions from stomach [3,10]. The comparison of organ wise distribution of GI malignancies has been depicted in [Table/Fig-9] [3,5,8-10,14-22].

Study	Place/Year of study	Oropharynx	Oesophagus	Stomach and gastro-oesophageal junction	Small intestine	Colorectum and anal canal
Somani NS and Patil P, [3]	Mumbai, (2018)	-	47.9%	52.1%	-	-
Sharma S et al., [5]	Tanda, (2020)	-	46.7%	26.7%	-	26.7%
Ganga H and Indudhara PB, [8]	Shivamogga, (2018)	-	65.5%	24.1%	10.3%	-
Trisal M et al., [9]	Jammu, (2018)	-	16.7%	36.7%	6.7%	40%
Krishnappa R et al., [10]	Bangalore, (2013)	-	36.7%	63.3%	-	-
Prabhakar BR et al., [14]	Amritsar, (1981)	-	31.4%	6%	0.03%	62.3%
Sabharwal BD et al., [15]	Ludhiana, (1975)	-	25.3%	7%	0.5%	62.6%
Thakur RY et al., [16]	Maharashtra, (2016)	-	19.2%	7.6%	5.7%	67.3%
Kamal F et al., [17]	Lahore, (2001)	-	14.9%	34.2%	6.1%	44.7%
Kulkarni PV et al., [18]	Ambajogai, (1996)	-	27.3%	17%	2.6%	53%
Bamanikar S et al., [19]	Pune, (2021)	-	27.4%	24.4%	3%	40.5%
Bazaz-Malik G and Lal N, [20]	Delhi, (1989)	34.5%	6.5%	11.3%	4.4%	43.3%
Parikh BJ and Parikh SB [21]	Ahmedabad, (2016)	-	32.1%	19.8%	7.4%	40.7%
Jussawalla DJ et al., [22]	Aurangabad, (1984)	-	39.2%	29.4%	-	31.5%
Present study	Dehradun	28.5%	21%	29%	4.3%	17.2%

[Table/Fig-9]: Comparison of Organ wise distribution of malignancies of the gastrointestinal tract.

Limitation(s)

It was a retrospective study considering histopathology as gold standard. Immunohistochemistry and molecular studies which are considered an important adjunct to histopathological diagnosis in today's era were not part of the study.

CONCLUSION(S)

A wide spectrum of neoplastic and non neoplastic lesions were observed in the current study across a wide range of age, sex and site distribution. Squamous cell carcinoma was the most common malignant lesion followed by adenocarcinoma while ulcerative colitis was the most common non neoplastic lesion. It is advisable to interpret and correlate colonoscopic/endoscopic findings with histopathology to arrive at a final diagnosis and aid the clinician for further management.

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• Was informed consent obtained from the subjects involved in the study?   NA
• For any images presented appropriate consent has been obtained from the subjects.   NA