e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(10); 627-632

Original Research Article

Analysis of Gastric Carcinoma Histopathologically with Related Precursor Lesions

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Received: 01-07-2025 / Revised: 15-08-2025 / Accepted: 21-09-2025
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Conflict of interest: Nil

Abstract

Background: The most significant and prevalent type of tumor in the stomach is gastric carcinoma. Due to its involvement in the development of chronic gastritis, Helicobacter pylori (H. Pylori) has been identified as a significant causative factor in gastric carcinoma. The study of gastric carcinoma with associated precursor lesion in various studies has shown variable results. The purpose of this study is to examine the histology of gastric carcinoma in relation to age, sex, anatomical location, and morphology. Additionally, to examine the correlation between precursor lesions and stomach carcinoma.

Methods: This study was conducted at the department of pathology, KMCH, Katihar, Bihar. The total number of 83 endoscopic gastric biopsies and gastrectomy specimens received from department of surgery of Katihar Medical College and Hospital, Katihar, Bihar from August 2022 to July 2023 were included in the study.

Results: Gastric carcinoma was most common in males and in the 7th decade. Most common histological type of tumor was intestinal type 78.3%, seen in the 7th decade followed by diffuse type 21.7% in the 6th decade. Precursor lesions were positive in out of 70cases of gastric carcinoma. And chronic atrophic gastritis was found in 42% of cases, dysplasia in 33% and intestinal metaplasia in 36%. H. pylori were positive in 54.3% cases; among them 56.4% cases were intestinal type of carcinoma and 46.6% were diffuse type of carcinoma.

Conclusion: Although series was small our findings in this study were quite prominent and therefore indicate need for further studies of histological types its association with precursor lesion and H.pylori in larger population as there is high risk of gastric carcinoma in South India.

Keywords: Gastric carcinoma, precursor lesions, chronic atrophic gastritis, Intestinal metaplasia, Dysplasia, H. pylori.

Introduction

The most significant and prevalent type of tumor in the stomach is gastric carcinoma.[1] Stomach adenocarcinoma is uncommon in individuals under 40 and mainly affects the elderly. The incidence of stomach carcinoma varies as well; those born in third-world countries are more likely to have intestinal carcinoma affecting the distal stomach.[2] Due to its involvement in the development of chronic gastritis, Helicobacter pylori (H. Pylori) has been identified as a significant causative factor in gastric carcinoma.[3]

There are two types of adenocarcinoma classified on the basis of histopathology. Intestinal type adenocarcinoma is the most common type associated with H.pylori infection and other precursor lesions including chronic multifocal atrophic gastritis associated with gastric dysplasia, gastric adenomas. The other designated as diffuse type does not show these associations and appear denovo.[4] There is significant association seen between gastric carcinoma and grades of dysplasia in the adjacent mucosa.[5] This study was intended to study the association of gastric carcinoma with precursor lesions and also to study histopathology of gastric carcinoma with regard to sex, age, anatomical location and morphology.

Material and Methods

This study was conducted at the department of pathology of Katihar Medical College and Hospital, Katihar, Bihar from August 2022 to July 2023. Total number of 83 endoscopic gastric biopsies and gastrectomy specimens received from department of surgery of KMCH, Katihar, and Bihar were included in the study.

All endoscopic gastric biopsies and gastrectomy specimen of histologically diagnosed as gastric carcinoma are included in the study. Gastric

biopsies with inadequate biopsy material and gastric lesions other than carcinoma are excluded. Endoscopic Biopsies were taken and spread gently on a piece of filter paper 2x2cm. The raw surface adhered to the filter paper so curling of the tissue was prevented, then the tissue was put in 10% formalin along with the filter paper for 24hours. After fixation tissue bits were taken for routine processing and tissues were embedded in paraffin wax. Sections were cut serially at a thickness of 4-5 microns at multiple levels. Tissues from the representative sites of gastrectomy specimens were also fixed in 10% formalin for 24 hours and further processed as endoscopic biopsies. Haematoxylin and eosin stained sections were examined for histopathological typing, for precursor lesions like chronic atrophic gastritis, intestinal metaplasia, dysplasia, adenoma and for presence of H. pylori. Special stains like Giemsa staining were done for demonstration of H. pylori and PAS with Alcian blue at pH 2.5 was done for intestinal metaplasia. Proportions (%) are worked out to classify the gastric biopsy specimens according to various morphologic features. Epi info package is used for the data entries and statistical analysis.

Results

The total number of 83 cases of gastric carcinoma was evaluated out of which 25were gastrectomy specimens and 58were from gastric endoscopic biopsy. Out of 83 cases the maximum number of cases i.e. 24(28.9%) were in the age group of 61-70 and least number of cases i.e. 5(6%) were seen in the 21-30age group. Youngest patient in our study was 27yr old and oldest was 90yr, with mean age of 58.5years. 51(61.4%) were male and 32(38.6%) were female, with male to female ratio of 1.6:1. In the study only 79cases could be assessed for location of the tumor in which 55(69.6%) were located in antrum, followed by fundus in 13(16.5%) and cardia in 11(13.9%) cases.

Bormann classification was used to classify the gross type of tumor. Gross type was evaluated for 39cases out of which maximum number i.e. 17(43.6%) were of ulcerative type followed by fungating type 14 (35.9%) and polypoidal type 7(17.9%). Only one (2.6%) case showed diffuse type. Lauren classification was used to classify histological type of tumor. Out of 83 cases maximum were intestinal type i.e. 65(78.3%) (Fig 1a), followed by diffuse type 18(21.7%) (Fig 1b).

There were no cases of mixed type in this study. Table 1 shows the age distribution of different histological type of gastric carcinoma, which shows intestinal type of carcinoma to be most common in the 7th decade i.e. 20 (30.8%) and least in the age group of 21-30 i.e. 5 (7.7%). Diffuse type of carcinoma was common in the 6th decade i.e. 6 (33.3%) and no case was found in the age group of 21-30. Both intestinal and diffuse type of carcinoma was more common in males.

Table 1: Age distribution of different histological types of Gastric carcinoma

	Histology		
Age, Range	**Diffuse**	**Intestinal**	**Total**
21-30 (%)	0 0.0%	5 7.7%	5 6.0%
31-40 (%)	4 22.2%	7 10.8%	11 13.3%
41-50 (%)	2 11.1%	11 16.9%	13 15.7%
51-60 (%)	6 33.3%	15 23.1%	21 25.3%
61-70 (%)	4 22.2%	20 30.8%	24 28.9%
>71 (%)	2 11.1%	7 10.8%	9 10.8%
Total (%)	18 100.0%	65 100.0%	83 100.0%

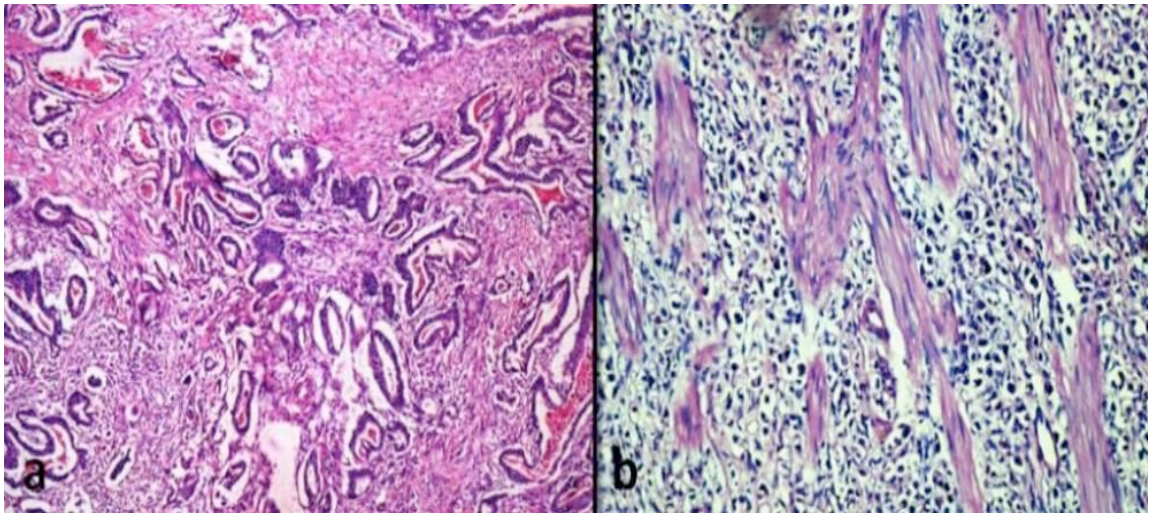

Figure 1: (a) Adenocarcinoma – Intestinal type. H&E x100, (b) Adenocarcinoma – Diffuse type. H&E x400

In our study only 70 had surrounding mucosa which was studied for precursor lesions. Out of 70, 55 cases were intestinal type and 15 were diffuse type.

Out of 55 cases of intestinal type 28 (50.9%) had precursor lesion and out of 15 cases of diffuse type only 5 (33.3%) had precursor lesions rest 37(52.9%) cases showed no precursor lesions. Out of 33 cases chronic atrophic gastritis was found in 14(42%) cases, dysplasia in 11 (33%) and intestinal metaplasia in 12(36%). H. pylori was positive in 38(54.3%) out of 70cases of gastric carcinoma.

Among them 31/55(56.4%) cases were intestinal type and 7/15(46.6%) were diffuse type.

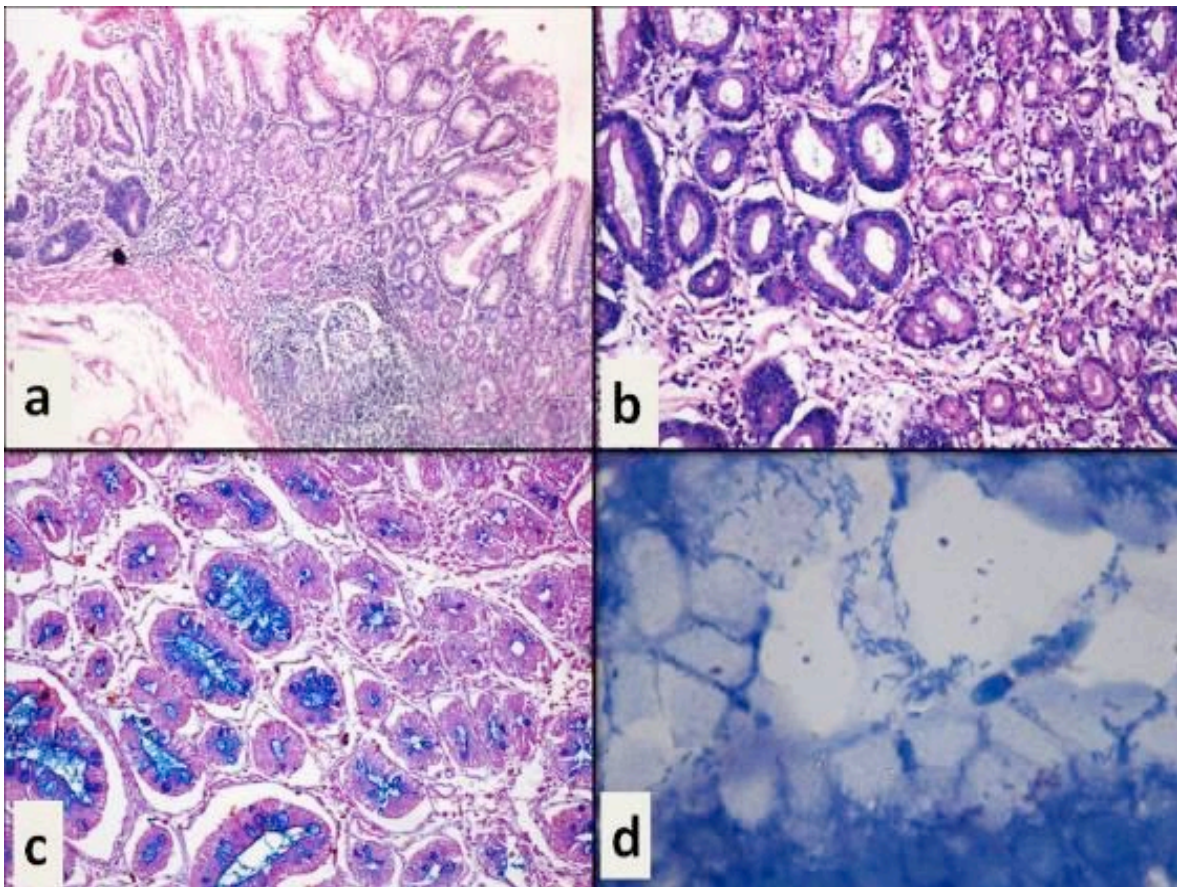

Figure 2: (a) Chronic atrophic gastiritis with dysplastic glands H&E x100, (b) Dysplasia with surrounding normal mucosa. H&E x400, (c) Intestinal metaplasia with Alcian blue stain at PH 2.5. H&E x400, (d) H. pylori Giemsa stain x1000 Oil immersion

Discussion

In our study, out of 83 cases of gastric carcinoma, the age of patients ranged from 27 to 90 years with a mean age of 58.5 years. The peak occurrence of gastric carcinoma was in 6th and 7th decades, with 25.3% and 28.9% respectively. Only 6% of cases were in the third decade of life. Our finding is in accordance with study by Stemmermann et al having age range of 26-97 years with median of 61.5 years in their study, and F. Kitahara et al who reported mean age of 64years.[6, 7] This frequency of age distribution may be related to two factors. Majority of gastric carcinomas arise from precursor lesions which take many years to develop. Secondly, there is a delay in diagnosis of gastric carcinoma due to lack of early symptoms. Early gastric carcinoma causes non-specific gastrointestinal complaints, such as dyspepsia, in only 50% of patients. Up to 90% of patients of gastric carcinoma in western countries who present with advanced carcinoma have more serious symptoms such as abdominal pain, bleeding, vomiting, or severe weight loss.[8]

In our study, males showed a higher incidence of gastric carcinoma as compared to females with male to female ratio being 1.6:1. This is in accordance with other studies shown by Stemmermann et al showed ratio of 1.45:1, Antonioli et al & Lopez-Carrillo L et al showed ratio of 1.2:1.[6, 9,10]

Out of 83 cases studied only 79 cases could be assessed for location of the tumor and for the remaining four cases location was not available. [9, 11]

Only 39 cases were assessed based on gross morphology and for the remaining 31 cases information on gross morphology was not available. In our study 17 (43.6%) cases were of ulcerative type and the least common was diffuse type one case (2.6%). These findings are in accordance with study by Antonioli DA et al which showed Ulcerative 67.5%, Fungating 15%, Polypoidal 7.5%, Diffuse 10%.[9]

Lauren classification was used to classify tumors histopathologically. The frequency of histological type of carcinoma when compared with other studies in developed countries showed that frequency of intestinal carcinoma is relatively higher in our study and in an another study done in India by Sethi et al.[6] This presumably parallels with the etiological role of H.pylori whose incidence is known to be decreased in developed countries and is highest in patients of lower socioeconomic strata of developing countries.

In our study, intestinal type of carcinoma was most commonly seen in the 7th decade and diffuse type was commonly seen in the 6th decade. Age specific trend in our study is in correlation with other studies by Lopez et al and Sipponen et al which showed intestinal carcinoma in age group of 61.7±12years & 67±9years and diffuse carcinoma in the age of 50.8years±15yrs & 59±10years respectively.[10, 14] The M: F (Male: Female) ratio for intestinal (1.6:1) and diffuse type (1.57:1)of gastric carcinoma in our study is compared with other studies by Stemmermann et al, Lopez et al, Lauren Pa et al, Sipponen et al, which showed ratio of 2:1, 1.8:1, 1.5:1, 1.46 for intestinal carcinoma respectively. And ratio of 0.62:1, 0.9:1, 0.9:1, 0.84:1 for diffuse type of carcinoma respectively.[6, 10, 13, 14]

M:F ratio for intestinal carcinoma in our study correlates with other studies which shows male predominance. But there is a clear discrepancy in M:F ratio for diffuse type carcinoma. In the above studies diffuse carcinoma is more common in females than males and our study showed male preponderance. This variable result can be attributed to the limited number of cases included in our study done for only limited period of time. Other studies are population based which included large number of patients over a long period of time.

We evaluated 70 cases for the presence of precursor lesions and H.pylori infection as the rest of 13 cases of endoscopic biopsies lacked surrounding mucosa. Out of 70 cases, precursor lesions were found in 33 (47.1%). No precursor lesion was found in the remaining 37 (52.9%).

Chronic atrophic gastritis (Fig 2a) was found in 14(42%) cases, dysplasia (Fig 2b) in 11 (33%) and intestinal metaplasia (Fig 2c) in 12 (36%). PAS with Alcian blue at pH 2.5 was done on sections which showed goblet cells in H&E..[15] In the entire study commonest precursor lesion is chronic atrophic gastritis followed by intestinal metaplasia and dysplasia. However the frequency of dysplasia is relatively high in our study compared with the other two studies. In another study by Sethi et al where only intestinal metaplasia was studied in association with gastric carcinoma, IM in surrounding mucosa was seen in 45/57(78%) cases. In our study IM of surrounding mucosa was seen in only12/33 (36%) cases. The frequency of IM is more in the other study when compared to ours as it included only gastrectomy specimens where the entire specimen could be sampled and examined. Our study included endoscopic gastric biopsy specimens also which had limitation of extensive sample examination.

Helicobacter pylori has been reported to be linked with many diseases like several benign, premalignant and malignant lesions of the stomach including chronic gastritis, atrophic gastritis, intestinal metaplasia, gastric adenomas, gastric hyperplastic polyps, adenocarci-nomas of the distal

part of the stomach and lymphoma of mucosa associated lymphoid tissue.[16] H.pylori classified as a group I carcinogen by WHO is strongly associated with gastric carcinoma. H.pylori infection is found in both intestinal and diffuse type of gastric carcinoma.[8]

Our study assessed the association of H.pylori with gastric carcinoma. All the biopsies were stained with Giemsa and studied for H.pylori. H.pylori (Fig 2d) was positive in 38 (54.3%) out of 70 cases. Among them 31/55 (81.5%) cases were of intestinal type and 7/15 (18.5%) were diffuse type.

In a study by Kim CG et al on 194 consecutive patients with gastric adenocarcinoma, the overall infection rate of H.pylori was 84%, where H.pylori was evaluated by serology, histology and rapid urease test.[17] Biopsy was taken from multiple sites which included antrum, lesser curvature, upper body lesser curvature (UBLC) and upper body greater curvature (UBGC). In our study it was positive in only 54% of cases probably as our study included only histological examination of endoscopic gastric biopsy from single site which comprised large number of cases in our study.

In our study we assessed H.pylori association with different histological types of gastric carcinoma. H.pylori was positive in 38 (54.3%) out of 70 cases, among them 31/55 (56.4%) cases were intestinal type and 7/15 (46.6%) were diffuse type. Craanen et al showed H.pylori in 61.3% of intestinal type and in 54.5% of diffuse type in a study done on gastrectomy specimens of early gastric carcinomas diagnosed in the period 1973 to 1990.[18] Our study consisted of 25 gastrectomy specimen and 45 gastric endoscopic biopsies which showed H.pylori in 56.4% of intestinal type and in 46.6% of diffuse type of gastric carcinoma. Our study results are in accordance with study of Craanen et al.

Conclusion

The most notable finding of our study was the preponderance of diffuse type of gastric carcinoma in all age groups and intestinal type mainly in the older age group with similarity of sex distribution among the two histological types showing male preponderance.

Study of precursor lesions revealed a closer relationship to intestinal type of gastric carcinoma than diffuse type. It is however important to note that existence of a relationship does not necessarily imply that precursor lesions are factors which predispose to gastric carcinoma. Precursor lesions in present study were seen only in 33 out of 70 gastric carcinomas. These numbers were insufficient to support any statement on association between precursor lesions and histological type of gastric carcinoma. H.pylori is considered as Group I carcinogen by WHO and it is proven to cause intestinal type of gastric carcinoma. However H.pylori is also found in diffuse type. Our study shows almost equal incidence of H.pylori in gastric carcinoma of diffuse and intestinal type implying H.pylori is not the sole risk factor and future studies should be directed at identifying other factors that increase risk of gastric carcinoma.

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