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Histological Spectrum and Classification of Gastric and Gastro-Oesophageal Junction Cancers in South-East Nigeria: A Retrospective Study

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ABSTRACT

Background:

Gastric and gastro-oesophageal junction cancers encompass a heterogeneous group of malignancies with distinct histological and biological characteristics. Histological classification remains central to diagnosis, prognostication, and therapeutic decision-making, particularly in settings where molecular profiling is not routinely available.

Objective:

This study examined the histological spectrum and classification patterns of gastric and gastro-oesophageal junction cancers diagnosed over a ten-year period in Anambra State, South-East Nigeria.

Methods:

A retrospective review was conducted of gastric and gastro-oesophageal junction cancer cases diagnosed between January 2011 and December 2020 across four major histopathology laboratories in Anambra State. Archived haematoxylin and eosin–stained slides and paraffin blocks were reviewed. Tumours were classified according to the 2019 World Health Organization classification of gastric tumours, with carcinomas further categorised using the Lauren classification system. Descriptive statistics and chi-square testing were applied, with statistical significance set at $p < 0.05$.

Results:

Ninety-three cases met inclusion criteria. Carcinomas constituted the majority of tumours, followed by mesenchymal

tumours, lymphomas, and neuroendocrine tumours. Tubular adenocarcinoma was the most frequent carcinoma subtype, while intestinal-type carcinoma predominated under the Lauren classification. Most graded carcinomas were well differentiated. No statistically significant associations were identified between histological subtype and patient age or sex.

Conclusion:
Gastric and gastro-oesophageal junction cancers in this setting are dominated by epithelial malignancies, particularly tubular and intestinal-type adenocarcinomas. The observed histological profile aligns with patterns reported across Nigeria and other low- and middle-income settings, underscoring the continuing relevance of morphology-based classification in regional cancer practice.

Keywords: Gastric cancer, gastro-oesophageal junction cancer, histological classification, adenocarcinoma, WHO classification, Lauren classification, Nigeria

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INTRODUCTION

Gastric and gastro-oesophageal junction cancers continue to contribute substantially to global cancer morbidity and mortality. Although incidence has declined in many parts of the world, these malignancies remain a major public health concern, particularly in low- and middle-income countries where late presentation is common and access to specialist diagnostic and therapeutic services is limited. Global estimates indicate that gastric cancer remains among the leading causes of cancer deaths, with a significant proportion of cases diagnosed at advanced stages, especially in regions with constrained health infrastructure (Sung et al., 2021; Wong et al., 2021; Morgan et al., 2022). In such settings, histopathological evaluation remains central to diagnosis, prognostication, and treatment planning, as advanced molecular profiling is often unavailable or unaffordable.

Histological classification systems play a crucial role in understanding tumour biology and guiding clinical decision-making. The World Health Organisation (WHO) classification of gastric tumours provides a comprehensive morphology-based framework that supports consistent diagnostic practice across institutions and countries (Nagtegaal et al., 2019; Cree et al., 2020; Lam, 2021). The Lauren classification, despite being introduced several decades ago, continues to be widely used because of its simplicity and its ability to distinguish biologically meaningful subtypes with differing epidemiological patterns and clinical behaviour (Lauren, 1965; Webster et al., 2021; Costache et al., 2023). Collectively, these systems offer complementary perspectives that enhance diagnostic accuracy and facilitate meaningful comparisons across populations and research settings.

In Nigeria, most published research on gastric cancer has focused on clinicopathological patterns, demographic characteristics, and anatomical site distribution. Studies from different regions have documented variations in age at presentation, tumour location, and histological subtype, yet relatively few have applied contemporary

WHO and Lauren classification frameworks in a systematic manner (Okuchukwu & Olayiwola, 2025; Osinowo et al., 2023; Yibrehu et al., 2024). Regional differences in tumour composition and subtype prevalence remain insufficiently explored, particularly in South-East Nigeria, where access to specialist pathology services varies considerably. Understanding these patterns is important for improving diagnostic accuracy, informing clinical management, and supporting future epidemiological research.

This study aimed to characterise the histological spectrum of gastric and gastro-oesophageal junction cancers diagnosed over a ten-year period in Anambra State. The analysis applied current WHO and Lauren classification systems to provide a detailed, pathology-centred account of tumour types, histological subtypes, and grading patterns. The study contributes to the limited body of region-specific research on gastric cancer in South-East Nigeria and offers insights that may support improved diagnostic practice and inform future investigations into the epidemiology of upper gastrointestinal malignancies in the region.

MATERIALS AND METHODS

Study Design and Setting

This retrospective descriptive study examined gastric and gastro-oesophageal junction cancers diagnosed between 1 January 2011 and 31 December 2020. Cases were sourced from four major histopathology laboratories in Anambra State, South-East Nigeria: Nnamdi Azikiwe University Teaching Hospital, Nnewi; Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Awka; Pathocon Specialist Clinic and Research Institute, Nnewi; and Nkeoma Specialist Hospital, Onitsha. These centres serve diverse urban and semi-urban populations, providing a broad representation of cases diagnosed within the region.

Case Selection

Eligible cases included all gastric and gastro-oesophageal junction biopsy and gastrectomy specimens diagnosed as malignant during the study period. Only cases with well-preserved paraffin-embedded tissue blocks and adequate accompanying clinicopathological information were included. Cases were excluded if biodata were incomplete, tissue blocks were missing, or available material was insufficient for reliable histological assessment.

Histopathological Review and Classification

Archived slides and paraffin blocks were retrieved for detailed review. Where existing slides were faded, damaged, or inadequate, new sections were cut and stained with haematoxylin and eosin. Tumours were classified using the 2019 World Health Organization classification of gastric tumours. Carcinomas were further categorised according to the Lauren classification system. Tumour grading was applied only to tubular and papillary adenocarcinomas, in line with current World Health Organization recommendations. All reviews were conducted by experienced histopathologists to ensure consistency and diagnostic accuracy.

Data Analysis

Data were analysed using descriptive statistics to summarise demographic characteristics and histological patterns. Associations between histological subtype and patient age or sex were examined using the chi-square test. Statistical significance was set at $p < 0.05$. All analyses were performed using SPSS version 29.

Ethical Considerations

Ethical approval for the study was obtained from the Ethics Committee of Nnamdi Azikiwe University Teaching Hospital, Nnewi. All patient identifiers were removed before analysis to ensure confidentiality and compliance with ethical standards.

RESULTS

Overall Histological Spectrum of Tumours

A total of 93 gastric and gastro-oesophageal junction cancers met the inclusion criteria for histological analysis. Carcinomas constituted the majority of tumours, followed by mesenchymal tumours, while lymphomas and neuroendocrine tumours were infrequently encountered (Figure 1).

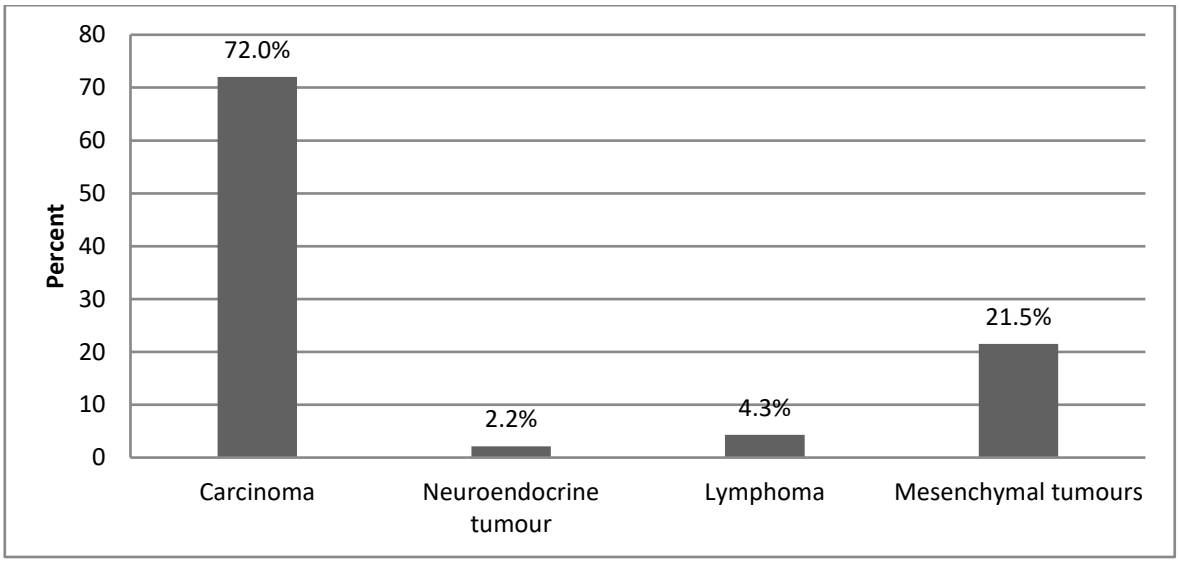

Fig 1: Bar chart showing tumour histological type of 93 gastric and GEJ cancers

Mesenchymal tumours represented just over one-fifth of all cases. Gastrointestinal stromal tumours accounted for the overwhelming majority within this group, with only isolated cases of leiomyosarcoma and angiosarcoma identified (Figure 2).

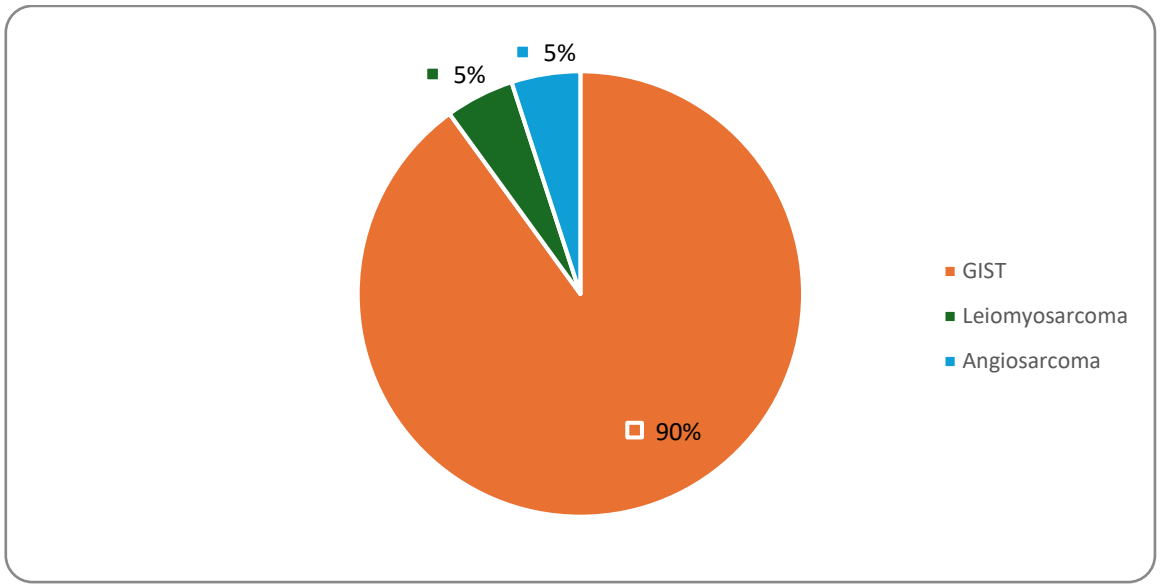

Fig 2: Pie chart showing distribution of mesenchymal tumours.

Distribution of Tumour Types Across Age Groups

Cross-tabulation of tumour histological type against age range demonstrated that carcinomas were most frequently diagnosed in the sixth and seventh decades of life (Table 1). Mesenchymal tumours were distributed across a wider age range, including younger age groups. Statistical analysis showed no significant association between tumour type and age.

Table 1: Age range distribution of various tumour types

		Tumour Type				
		Carcinoma	Neuroendocrine tumour	Lymphoma	Mesenchymal tumours	Total
Age range in years	20-29(% within tumour type)	0(0.0%)	0(0.0%)	0(0.0%)	2(10.0%)	2(2.2%)
	30-39 (% within tumour type)	9(13.4%)	0(0.0%)	1(25.0%)	2(10.0%)	12(12.9%)
	40-49 (% within tumour type)	10(14.9%)	0(0.0%)	1(25.0%)	3(15.0%)	14(15.1%)
	50-59(% within tumour type)	11(16.4%)	2(100.0%)	1(25.0%)	6(30.0%)	20(21.5%)
	60-69 (% within tumour type)	22(32.8%)	0(0.0%)	0(0.0%)	5(25.0%)	27(29.0%)
	70-79(% within tumour type)	11(16.4%)	0(0.0%)	1(25.0%)	2(10.0%)	14(15.1%)
	>79(% within tumour type)	4(6.0%)	0(0.0%)	0(0.0%)	0(0.0%)	4(4.3%)
Total(% within tumour type)		67(100.0%)	2(100.0%)	4(100.0%)	20(100.0%)	93(100.0%)

P=0.314

Histological Classification of Carcinomas (WHO Classification)

Of the 67 carcinomas identified, tubular adenocarcinoma was the most frequent histological subtype (Table 2). Poorly cohesive carcinomas, including signet ring cell carcinoma and other poorly cohesive variants, together accounted for a substantial proportion of cases. Less common subtypes included mixed adenocarcinoma, squamous cell carcinoma, mucinous adenocarcinoma, papillary adenocarcinoma, and other rare histological variants.

Table 2: Histological types of gastric and GEJ carcinomas (WHO classification).

		Count	Percent %
Carcinoma Histological Type (WHO)	Tubular Adenocarcinoma	31	46.3%
	Poorly Cohesive Carcinoma; Other Subtypes	13	19.4%
	Poorly Cohesive Carcinoma; Signet Ring Cell Type	8	11.9%
	Mixed Adenocarcinoma	5	7,5%
	Squamous Cell Carcinoma	4	6.0%
	Mucinous Adenocarcinoma	2	3.0%
	Papillary Adenocarcinoma	2	3%
	Other Histologic Subtypes	2	3.0%
	Total	67	100.0%

Lauren Classification of Gastric Carcinomas

Application of the Lauren classification system showed that intestinal-type carcinoma was the predominant subtype, followed by diffuse-type carcinoma (Figure 3). Mixed and indeterminate types were infrequent. Cross-tabulation of Lauren subtype with patient age and sex revealed no statistically significant associations.

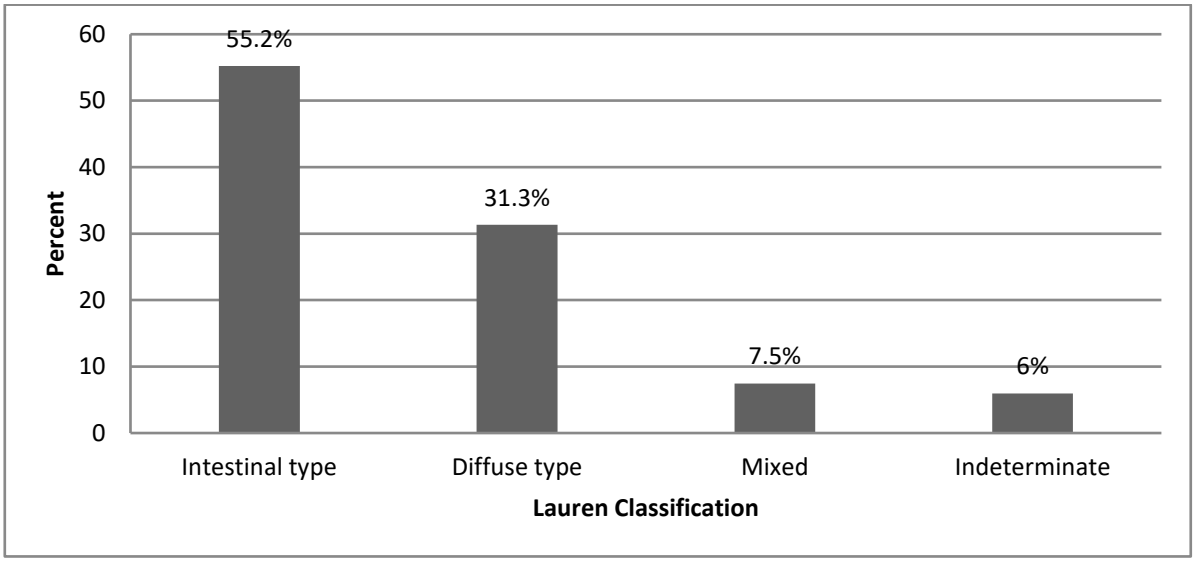

Fig 3: Lauren classification of carcinomas

Tumour Grading of Eligible Carcinomas

Grading was applied only to tubular and papillary adenocarcinomas in accordance with current World Health Organization recommendations. Most graded tumours were classified as well differentiated, while a smaller proportion were poorly differentiated (Figure 4). No significant associations were identified between tumour grade and patient age or sex.

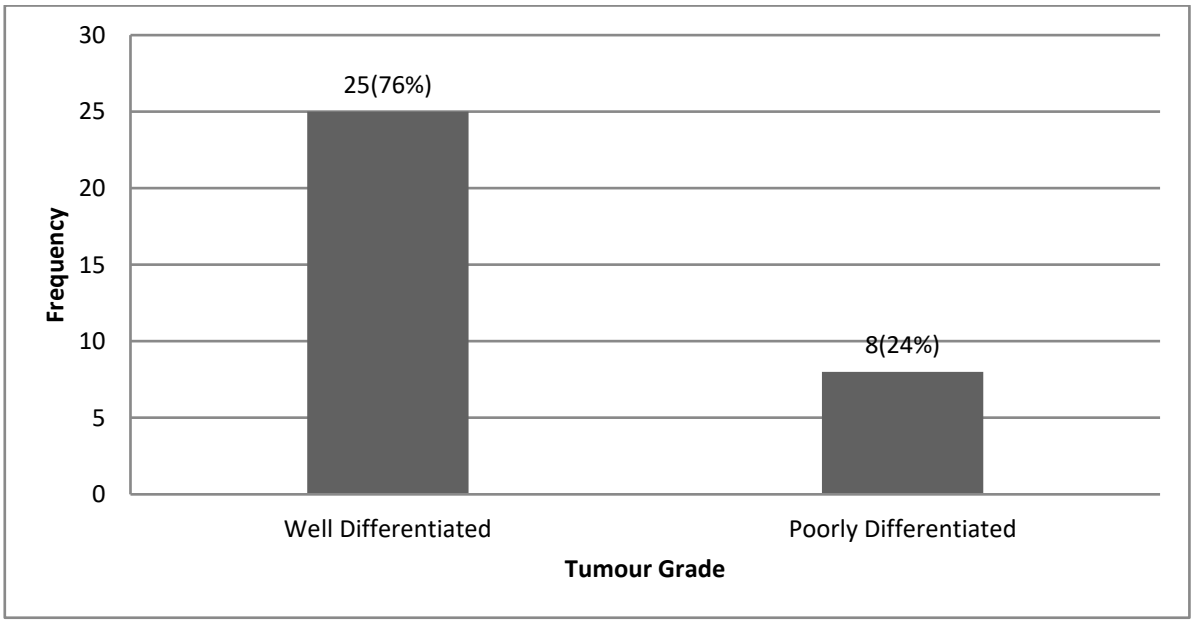

Fig 4: Bar Chart showing tumour grade of carcinomas

Representative Histomorphological Features

Representative photomicrographs illustrating the major carcinoma subtypes and mesenchymal tumours identified in this study are presented to demonstrate defining histological features (Fig. 5-9).

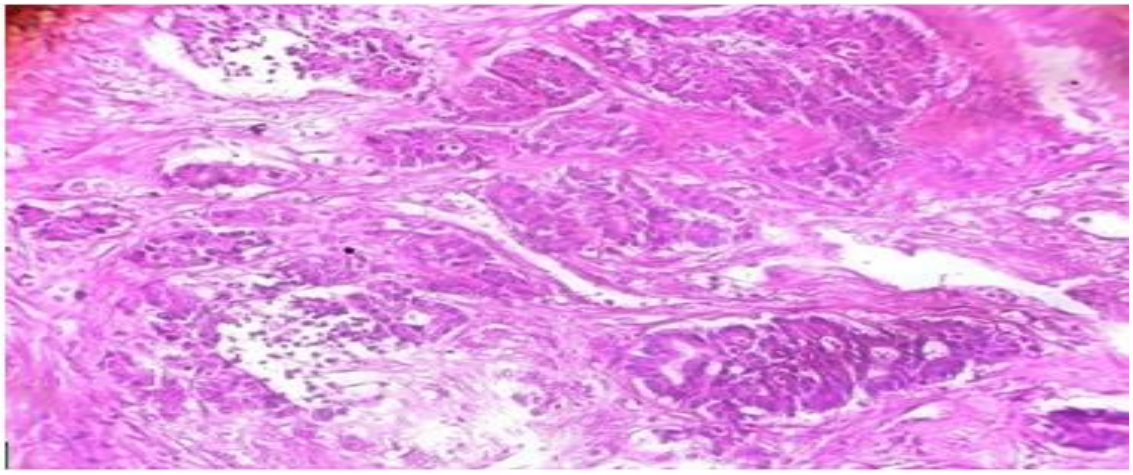

Fig 5: Tubular adenocarcinoma showing fused tubules forming cribriform structures (H&E ×200).

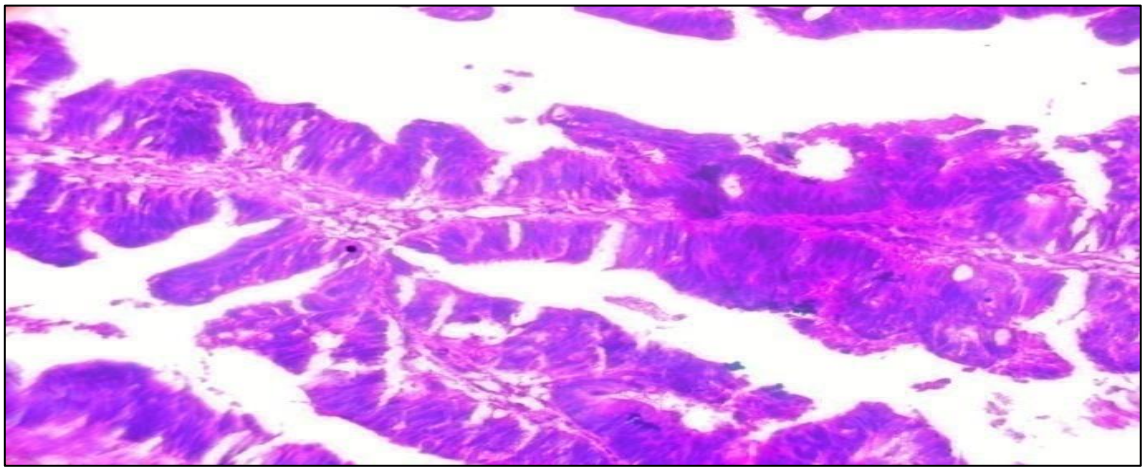

Fig 6: Papillary adenocarcinoma exhibiting branching papillae (H&E ×400).

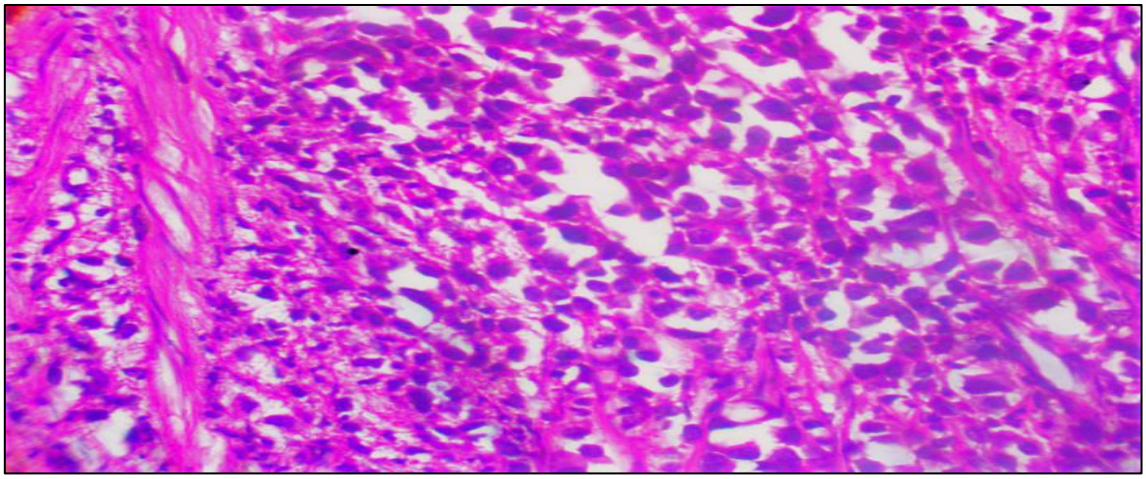

Fig 7: Poorly cohesive carcinoma showing isolated and small clusters of neoplastic cells (H&E ×400).

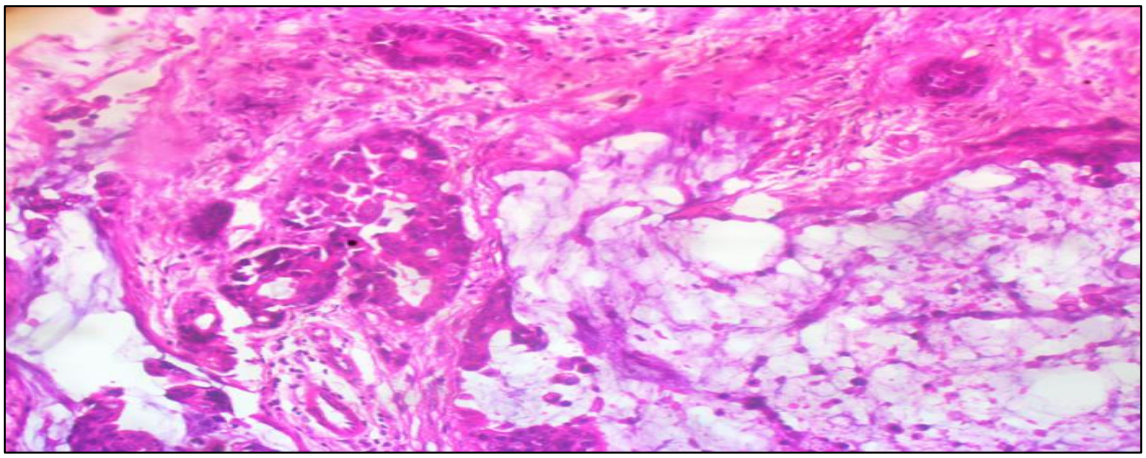

Fig 8: Mucinous carcinoma showing malignant glands surrounded by pools of mucin (H&E ×400).

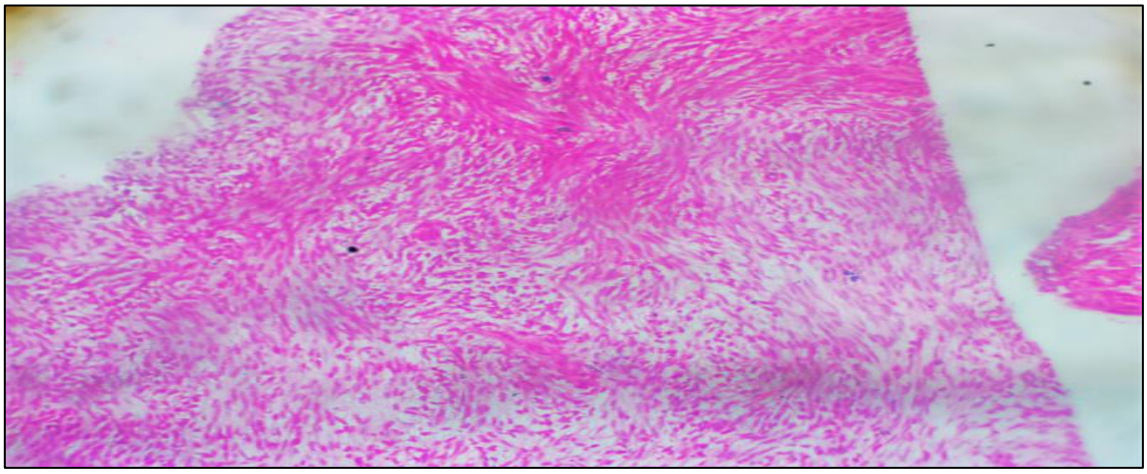

Fig 9: Gastrointestinal stromal tumour with spindle cells disposed in interlacing fascicles (H&E ×200).

Across all analyses, no statistically significant associations were identified between tumour histological subtype, grade, and patient demographic variables.

DISCUSSION

This study provides a detailed account of the histological spectrum of gastric and gastro-oesophageal junction cancers in Anambra State, using contemporary classification systems to review cases diagnosed over a ten-year period. The predominance of carcinomas observed in this series aligns with findings from other Nigerian regions, where epithelial malignancies consistently represent the overwhelming majority of gastric cancers (Sabageh et al., 2023). This pattern reinforces the central role of adenocarcinoma in gastric cancer pathology within the country and reflects broader global trends.

Tubular adenocarcinoma emerged as the most common carcinoma subtype, a finding consistent with reports from both Nigerian and wider African studies. Reviews from Ile-Ife and Makurdi similarly identified tubular adenocarcinoma as the dominant histological pattern, supporting its recognised prominence within the World Health Organization classification of gastric tumours (Gbaa et al., 2025; Sabageh et al., 2023). The predominance of intestinal-type carcinoma under the Lauren system further mirrors established global patterns, particularly in regions with a high prevalence of chronic gastritis and Helicobacter pylori-associated gastric pathology. Intestinal-type carcinomas are frequently linked to long-standing mucosal injury and environmental risk factors, which remain relevant in many low-resource settings.

Mesenchymal tumours accounted for a higher proportion of cases than reported in several Nigerian studies from

other regions. The predominance of gastrointestinal stromal tumours within this group is consistent with their recognised status as the most common mesenchymal neoplasm of the gastrointestinal tract. However, the absence of immunohistochemical characterisation in this study reflects routine diagnostic limitations in many regional laboratories. Immunohistochemistry is essential for confirming gastrointestinal stromal tumours, particularly through markers such as KIT and DOG1, and its absence highlights an important methodological gap that future studies should address to improve diagnostic accuracy.

Gastric lymphomas and neuroendocrine tumours were uncommon in this series, which aligns with their known global incidence patterns. These tumours represent a small fraction of gastric malignancies worldwide, and their low frequency in this study is consistent with findings from other Nigerian and African centres (Ray-Offor & Obiorah, 2021; Ezejiofor et al., 2024; Tagar et al., 2025). Although the limited number of cases restricted further subgroup analysis, their presence underscores the need for continued vigilance in recognising non-adenocarcinoma gastric malignancies, particularly in settings where diagnostic resources may be constrained.

The predominance of well-differentiated tumours among graded adenocarcinomas is also in keeping with observations from other Nigerian centres. Histological grading remains an important component of prognostic assessment, even in the absence of advanced molecular profiling. Well-differentiated tumours are generally associated with more favourable outcomes, although late presentation remains a major challenge in Nigeria and may diminish the prognostic advantage typically associated with lower-grade lesions.

The findings contribute to the growing body of region-specific evidence on gastric cancer in Nigeria. They highlight the continued relevance of histopathology in characterising tumour patterns and underscore the need for improved diagnostic capacity, including wider access to immunohistochemistry and, where feasible, molecular testing. Strengthening these diagnostic pathways will support more accurate classification, better prognostication, and improved patient management across the region.

CONCLUSION

This ten-year review provides a comprehensive picture of the histological patterns of gastric and gastro-oesophageal junction cancers diagnosed in Anambra State. The findings confirm that epithelial malignancies dominate the landscape, with tubular and intestinal-type adenocarcinomas forming the core of the disease burden. These patterns reflect long-standing observations in global gastro-intestinal oncology, yet they also highlight the continued relevance of morphology-based diagnosis in regions where access to advanced molecular techniques remains limited.

The presence of mesenchymal tumours, particularly gastrointestinal stromal tumours, as a notable minority underscores the need for improved diagnostic capacity. Although these tumours were identifiable on routine haematoxylin and eosin staining, the absence of immunohistochemistry limits the ability to confirm their lineage with certainty. Expanding diagnostic resources to include immunohistochemical markers would strengthen accuracy and support more refined tumour classification in future studies.

The rarity of gastric lymphomas and neuroendocrine tumours in this series is consistent with their known epidemiological profiles, yet their identification reinforces the importance of maintaining a broad diagnostic perspective when evaluating upper gastrointestinal lesions. Even though the numbers were small, their presence demonstrates the heterogeneity of gastric malignancies and the need for continued vigilance in routine diagnostic practice.

The predominance of well-differentiated adenocarcinomas among graded tumours offers some insight into tumour biology within the region, although the clinical advantage typically associated with lower-grade lesions may be offset by the late presentation that characterises gastric cancer in Nigeria. This highlights the ongoing challenge of delayed diagnosis and the need for earlier detection strategies.

The study provides a valuable regional baseline for understanding the histopathological spectrum of gastric and gastro-oesophageal junction cancers in South-East Nigeria. It reinforces the central role of histopathology in cancer diagnosis and offers a foundation for future comparative, epidemiological, and translational research. Strengthening diagnostic infrastructure, improving access to ancillary testing, and promoting

earlier clinical presentation will be essential steps toward improving outcomes for patients with these malignancies.

AUTHOR CONTRIBUTION

All authors contributed meaningfully to the development of this study. K.G.I. led the conception and design of the work, while data collection across the four participating histopathology laboratories was coordinated jointly by K.G.I. and the collaborating authors. Tissue retrieval, slide review, and histopathological classification were undertaken collectively, with K.G.I. providing oversight and all authors participating in diagnostic verification and consensus review of challenging cases. Data extraction, organisation, and statistical analysis were performed by the full author team. K.O.O., C.O., and C.E.E. prepared the initial manuscript draft, and all co-authors contributed to critical revision of the text, interpretation of findings, and refinement of the final manuscript. All authors approved the final version and accept responsibility for the accuracy and integrity of the work.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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