BJMS
www.batnajms.net

Batna Journal of Medical Sciences 2026;13(8):08
https://doi.org/10.48087/BJMS.2026.130808

ORIGINAL ARTICLE

Gastrointestinal stromal tumors: a clinicopathological study of 54 cases in an Algerian tertiary center

Mohamed GUERMI[1,2], Rafika BENNOUI[1,2], Nabila MOULAÏ[1,2], Asma ZAMMOUCHI[1,2], Wahiba OUAHIOUNE[1,2]

ABSTRACT

Background and Objective: Gastrointestinal stromal tumors (GISTs) account for approximately 1% of all gastrointestinal neoplasms and are the most common mesenchymal tumors of the gastrointestinal tract. Their heterogeneous biological behavior requires accurate risk stratification to guide prognosis and adjuvant therapy. This study aimed to evaluate the clinicopathological characteristics of GISTs in an Algerian population. **Methods:** This retrospective study included 54 phenotypically confirmed GISTs diagnosed between January 2022 and December 2023 at the Department of Pathology, Blida University Hospital, Algeria. The diagnosis was confirmed by immunohistochemical positivity for CD117 and/or DOG1 in all cases. **Results:** The cohort comprised 26 males and 28 females (male-to-female ratio: 0.93), with a median age of 61.5 years (range: 23–83 years) and a peak incidence between 55 and 74 years. The stomach was the most common primary site (51.85%, n = 28), followed by the small bowel (31.48%, n = 17), peritoneum (7.4%, n = 4), and rectum (3.7%, n = 2). The mean tumor size was 9.77 cm (range: 1–30 cm), with mean sizes of 9.74 cm for gastric tumors and 11.41 cm for small bowel tumors. Spindle-cell morphology predominated (72.22%, n = 39), followed by mixed (16.67%, n = 9) and epithelioid (11.11%, n = 6) subtypes. Three gastric GISTs were associated with colorectal adenocarcinoma, one small bowel GIST was associated with endometrioid carcinoma, and another occurred in a young woman with neurofibromatosis type 1. At diagnosis, 22.22% of patients (n = 12) presented with metastatic disease involving the liver, lymph nodes, or pleuropulmonary sites. According to the modified NIH risk classification, 27.78% of tumors (n = 15) were classified as high risk for recurrence. Notably, 41.18% (7/17) of small bowel GISTs were categorized as high risk at diagnosis. **Conclusion:** Advances in targeted therapies have increased the importance of accurate diagnosis and risk stratification of GISTs. Prognosis is primarily determined by tumor size, mitotic index, and anatomical location, which together define the risk of recurrence and guide therapeutic decision-making.

Keywords: GIST, gastrointestinal stromal tumor, Algeria, risk stratification, small bowel, neurofibromatosis.

1. Department of Anatomical, Cytological, and Molecular Pathology, Blida University Hospital – Algeria. 2. Faculty of Medicine, Cancer Research Laboratory, Saad Dahleb University, Blida 1, Algeria.

Received: 22 Apr 2026
Accepted: 06 Jul 2026

Correspondance to: Mohamed GUERMI
E-mail: mohamedguermi@gmail.com

1. INTRODUCTION

Gastrointestinal stromal tumors (GISTs) are considered the predominant mesenchymal neoplasm of the digestive tract, arising from interstitial cells of Cajal or their precursors, driven primarily by activating mutations in *KIT* or *PDGFRA* genes [1]. Despite representing only 1% of all digestive malignancies, their clinical importance stems from their unpredictable behavior and the availability of effective targeted therapy with imatinib mesylate [2].

The incidence of GISTs is estimated at 10–15 per million per year, but this may be underestimated due to subclinical cases [3]. Gastric GISTs account for 50–60% of cases, followed by the small bowel (30–35%), while colonic, rectal, and esophageal GISTs are rare [4]. Risk stratification (based on tumor size, mitotic count, and location) is essential for predicting recurrence and deciding on adjuvant imatinib therapy [5].

In low- and middle-income countries, data on GIST clinicopathological profiles remain scarce. In Algeria, no large series have been published in the last decade. This study aims to describe the clinicopathological features of 54 GISTs diagnosed in a tertiary referral center in Blida, Algeria, and to compare our findings with the international literature.

2. MATERIALS AND METHODS

Study design and patients: We conducted a retrospective, descriptive, and monocentric study at the Department of Pathology, Blida University Hospital, Algeria, from January 1, 2022, to December 31, 2023. All patients with a histologically and immunohistochemically confirmed diagnosis of GIST were included. Cases with incomplete data or unavailable paraffin blocks were excluded.

Ethical considerations: Patient data were fully anonymized before analysis. Due to the retrospective and non-interventional design of the study, informed consent was waived according to institutional ethical policies. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Pathological examination: Two experienced pathologists reviewed hematoxylin-eosin-stained slides. Tumor size (largest dimension). Mitotic activity was assessed on an equivalent area of approximately 5 mm² (corresponding to 50 HPFs in our microscope configuration), in accordance with international recommendations for GIST risk stratification. Cellularity, necrosis, and morphological type (spindle, epithelioid, or mixed) were recorded. Immunohistochemistry (IHC) was performed on formalin-fixed, paraffin-embedded tissue using antibodies against CD117 (clone 2E4, Dako), DOG1 (clone SP31, Roche), CD34 (clone QBEnd10, Dako), and Ki-67 (clone MIB-1, Dako). Only cases with positive CD117 and/or DOG1 were confirmed as GIST.

Risk stratification: Risk of recurrence was assessed using the modified National Institutes of Health (NIH) consensus criteria [5], which stratify GISTs into very low, low, intermediate, and high risk based on tumor size, mitotic index, and primary tumor location.

Statistical analysis: Data were analyzed using SPSS version 25 (IBM Corp., Armonk, NY, USA). Descriptive statistics (mean, median, range, frequencies) were calculated. Associations between categorical variables were tested using Fisher's exact test; $p < 0.05$ was considered statistically significant.

3. RESULTS

Demographic characteristics

54 patients were included: 26 males (48.15%) and 28 females (51.85%) (**Table 1**), giving a sex ratio of 0.93. The median age was 61.5 years (range 23–83 years), with a peak incidence in the 55–74 years age group (n=31, 57.4%). No pediatric cases were observed.

Table 1. Sex distribution.

Sex	Number of cases (n)	Percentage (%)
Male	26	48.15%
Female	28	51.85%
Total	54	100%

Tumor localization

The stomach was the most common site (28/54, 51.85%), followed by the small bowel (17/54, 31.48%). Peritoneal involvement was noted in 4 cases (7.4%) and corresponded to secondary metastatic dissemination rather than primary GISTs. Two additional mesenteric tumors were classified as probable primary GISTs, the rectum in 2 cases (3.7%), and the colon in 1 case (1.85%). Table 2 summarizes the distribution.

Table 2. Anatomical distribution of GISTs.

Localization	Number (n)	Percentage (%)
Stomach	28	51.85
Small bowel	17	31.48
Peritoneum	4	7.40
Rectum	2	3.70
Colon	1	1.85
Mesentery	2	3.70
Total	**54**	**100**

Tumor size and morphology

Mean tumor size was 9.77 cm (range 1–30 cm). Gastric tumors were smaller (mean 9.74 cm) compared to small bowel tumors (mean 11.41 cm), but this difference did not reach statistical significance (p=0.23) (Fig. 1)**.** Spindle-cell morphology was predominant (39/54, 72.22%) (Fig.**2**), followed by mixed (9/54, 16.66%) and pure epithelioid (6/54, 11.11%). Epithelioid morphology (Fig. 3) was more frequent in gastric (4/28, 14.3%) than in small bowel GISTs (1/17, 5.9%) (Table 3).

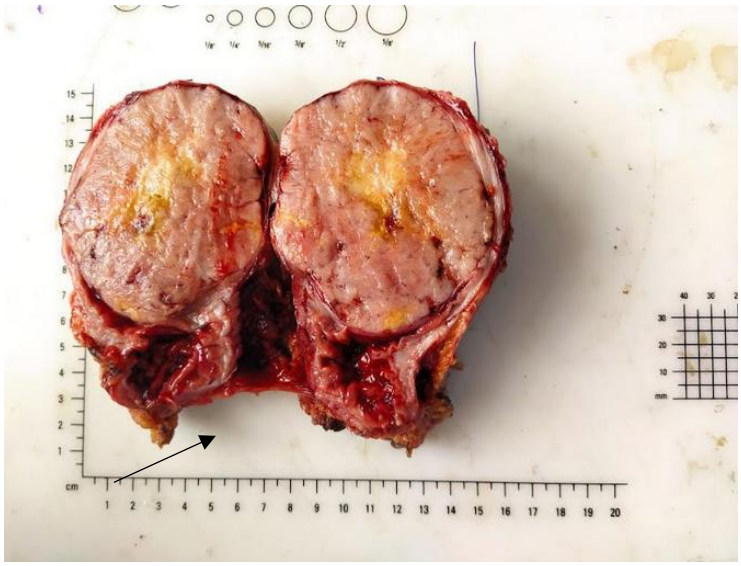

Fig 1. Small bowel GIST in a 43-year-old woman. Well-defined, fleshy mass raising the small bowel mucosa (arrow).

Table 3. Histological subtype.

Histological type	Number of cases (n)	Percentage (%)
Spindle cell	39	72.22%
Mixed	9	16.66%
Epithelioïd	6	11.11%
Total	54	100%

Immunohistochemical profile

All 54 cases expressed CD117 (100%). DOG1 was tested in 45 cases and was positive in 44 (97.8%) (Fig. 2**)**. CD34 was positive in 38/54 (70.4%). Ki-67 proliferation index ranged from 2% to 35% (mean 12.4%). No significant correlation was found between Ki-67 and risk category in this small sample.

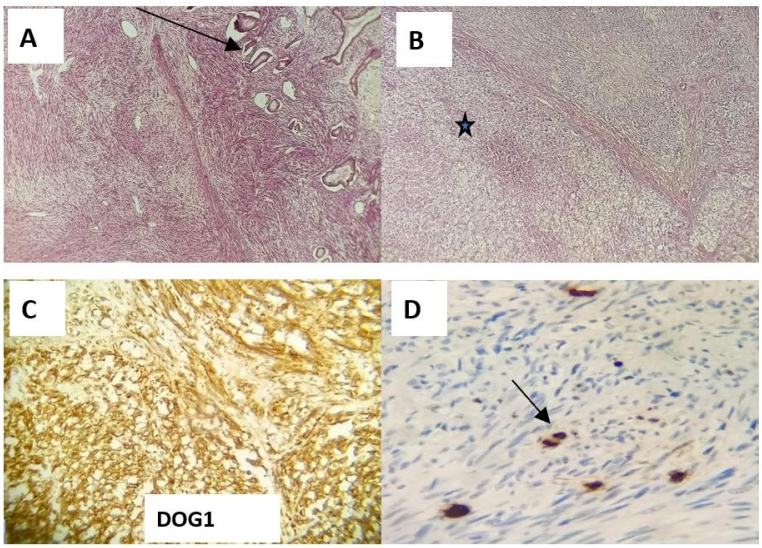

Fig 2. Small bowel spindle-cell GIST in a 43-year-old woman. **A**: Hematoxylin-eosin (H&E) staining showing fascicular spindle-cell proliferation (×100). **B**: Extension to adjacent adrenal tissue (star) (H&E ×100). **C**: Strong diffuse DOG1 cytoplasmic and membranous expression by immunohistochemistry (×400). **D**: Numerous mitotic figures were highlighted by phosphohistone H3 immunostaining (arrow) (×400).

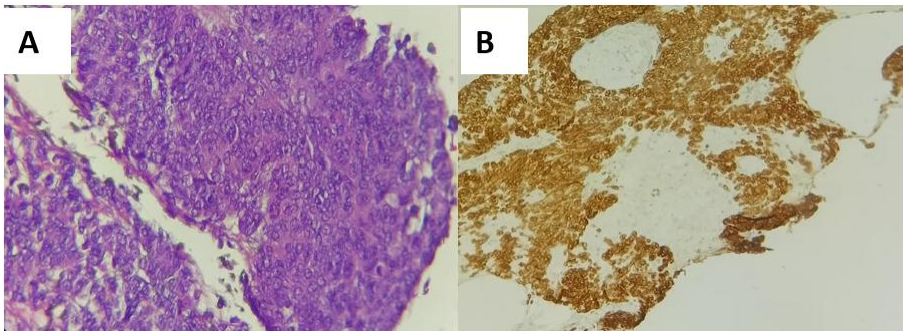

Fig. 3. Metastatic Epithelioid GIST was revealed by liver biopsy in a 49-year-old man. **A**: Epithelioid tumor cells arranged in nests and sheets (H&E ×200). **B**: Diffuse strong cytoplasmic CD117 (KIT) immunoexpression (×200).

Associated neoplasms and syndromic cases

We identified three cases (5.6%) of gastric GIST associated with colorectal adenocarcinoma in elderly patients (synchronous in two, metachronous in one). One small bowel GIST was associated with endometrial endometrioid carcinoma. Notably, one case of small bowel GIST occurred in a 28-year-old woman with neurofibromatosis type 1 (NF1). This tumor was multifocal (two nodules in the jejunum), spindle-cell type, with a low mitotic count (2/50 HPF) but was classified as intermediate risk due to size (6.5 cm).

Metastatic disease at diagnosis

Twelve patients (22.22%) presented with metastases at initial diagnosis: isolated liver metastases (n=7), peritoneal carcinomatosis (n=3), and pleuropulmonary metastases (n=2). All metastatic cases had high-risk features (size >10 cm or mitotic count >10/50 HPF).

Risk stratification

Applying the modified NIH criteria, 15 cases (27.77%) were classified as high risk of recurrence, 12 (22.22%) as intermediate, 16 (29.63%) as low, and 11 (20.37%) as very low risk. Among small bowel GISTs, the proportion of high-risk tumors was significantly higher (7/17, 41.17%) compared to gastric GISTs (5/28, 17.86%). A statistically significant association was observed between small bowel location and high-risk classification (p=0.04). Conversely, no significant association was found between epithelioid morphology and high-risk category (p=0.31). **Table 4** shows the distribution of risk categories by tumor site.

Table 4. Risk of recurrence according to tumor location.

Risk category	Number of cases (n)	Percentage (%)
High risk	15	27.77%
Small intestine GIST (high risk subset)	7 / 17	41.17%
Intermediate	12	22.22%
Low risk	16	29.63%
Very low Risk	11	20.37%
Total	54	100%

4. DISCUSSION

This is one of the largest single-center series of GISTs from North Africa in the last decade. Our findings confirm that the clinicopathological profile of GISTs in Algeria is broadly similar to that reported in European and Asian series, but with some distinctive features.

Demographics and localization

The median age of 61.5 years and slight female predominance are consistent with published data [1,6]. Gastric predominance (51.85%) aligns with Western series (50–60%) but is lower than some Asian reports (up to 70%) [7,8]. The relatively high proportion of small bowel GISTs (31.48%) in our study approaches that reported by Miettinen and Lasota (30–35%) [4]. Notably, small bowel GISTs presented at a larger mean size (11.41 cm) and higher risk category (41% high risk) than gastric GISTs, reflecting their more aggressive natural history and delayed diagnosis due to vague abdominal symptoms [9].

Risk stratification and clinical implications

The finding that 27.8% of our patients were at high risk for recurrence is comparable to the 25–30% reported in large European registries [10]. These findings support previous observations that small bowel GISTs exhibit a more aggressive biological behavior than gastric tumors. However, the proportion of metastatic disease at diagnosis (22.2%) is higher than in high-income countries (10–15%) [11]. This delay may be due to limited access to endoscopic ultrasonography and cross-sectional imaging in Algeria, as well as a lack of awareness among general practitioners. Similar disparities have been reported in other low- and middle-income countries [12].

In Algeria, delayed referral pathways, unequal access to specialized digestive imaging, limited availability of endoscopic ultrasonography outside tertiary centers, and socioeconomic barriers may contribute to late-stage diagnosis and high metastatic rates. Furthermore, molecular testing (KIT/PDGFRA) remains unavailable in many pathology departments, limiting personalized therapeutic stratification.

Associated malignancies and syndromic forms

The association of GIST with other neoplasms (three colorectal adenocarcinomas, one endometrial carcinoma) in 7.4% of our patients is noteworthy. Although the literature reports a 4.5–20% rate of second malignancies in GIST patients [13], our finding underscores the need for thorough oncological workup. The single case of NF1-associated small bowel GIST is typical: NF1 patients develop multifocal, usually spindle-cell GISTs with low mitotic activity, often in the small bowel, and generally lack *KIT/PDGFRA* mutations [14]. None of our patients had a family history suggestive of Carney-Stratakis syndrome or familial GIST.

Comparison with Algerian and regional data

A previous Algerian study by Tebaibia et al. (2014) reported 32 GISTs with a similar age distribution but a lower proportion of small bowel tumors (18.7%) [15]. The increase in small bowel GISTs in our series may reflect improved imaging and surgical referral patterns. Compared to a Moroccan series (Benkirane et al., 2016) with 70% gastric and 20% small bowel GISTs [16], our findings are consistent with North African epidemiology.

Study limitations

The absence of standardized follow-up data and survival analysis significantly limits prognostic interpretation. This limitation is mainly related to the retrospective nature of the study, lack of *KIT/PDGFRA* genotyping (unavailable in our center) and incomplete long-term clinical records in our institutional setting.

5. CONCLUSION

GISTs in Algeria present at an advanced stage with a high proportion of small bowel and high-risk tumors compared to Western series. The association with other malignancies and NF1 is non-negligible. Improved diagnostic strategies, including wider access to endoscopy and cross-sectional imaging, are needed. The establishment of a national GIST registry and availability of molecular testing would facilitate risk-adapted therapy and optimize the use of imatinib adjuvant treatment.

Competing interests: The authors declare that they have no competing interest.

Funding: This research received no external funding.

REFERENCES

1. Miettinen M, Lasota J. Gastrointestinal stromal tumors: pathology and prognosis at different sites. Semin Diagn Pathol. 2006;23(2):70-83. doi:10.1053/j.semdp.2006.09.001
2. Joensuu H, Hohenberger P, Corless CL. Gastrointestinal stromal tumour. Lancet. 2013;382(9896):973-83. doi:10.1016/S0140-6736(13)60106-3
3. Nilsson B, Bümming P, Meis-Kindblom JM, Odén A, Dortok A, Gustavsson B, et al. Gastrointestinal stromal tumors: the incidence, prevalence, clinical course, and prognostication in the preimatinib mesylate era. Cancer. 2005;103(4):821-9. doi:10.1002/cncr.20862
4. Miettinen M, Lasota J. Gastrointestinal stromal tumors: review on morphology, molecular pathology, prognosis, and differential diagnosis. Arch Pathol Lab Med. 2006;130(10):1466-78. doi:10.5858/2006-130-1466-GSTROM
5. Joensuu H. Risk stratification of patients diagnosed with gastrointestinal stromal tumor. Hum Pathol. 2008;39(10):1411-9. doi:10.1016/j.humpath.2008.06.025
6. Fletcher CD, Berman JJ, Corless C, Gorstein F, Lasota J, Longley BJ, et al. Diagnosis of gastrointestinal stromal tumors: a consensus approach. Hum Pathol. 2002;33(5):459-65. doi:10.1053/hupa.2002.123545
7. Kim KH, Nelson SD, Kim DH, et al. Diagnostic relevance of overexpressed KIT/PDGFRA in gastrointestinal stromal tumors. J Pathol Transl Med. 2020;54(1):31-8.
8. Lin SC, Huang MJ, Zeng CY, et al. Clinical characteristics and prognostic factors of gastrointestinal stromal tumors in a Taiwanese cohort. J Formos Med Assoc. 2019;118(8):1215-22.
9. Dematteo RP, Gold JS, Saran L, Gönen M, Liau KH, Maki RG, et al. Tumor mitotic rate, size, and location independently predict recurrence after resection of primary gastrointestinal stromal tumor (GIST). Cancer. 2008;112(3):608-15. doi:10.1002/cncr.23199
10. Casali PG, Zalcberg J, Le Cesne A, Reichardt P, Blay JY, Lindner LH, et al. Ten-year progression-free and overall survival in patients with unresectable or metastatic GI stromal tumors: long-term analysis of the European Organisation for Research and Treatment of Cancer, Italian Sarcoma Group, and Australasian Gastrointestinal Trials Group intergroup phase III randomized trial on imatinib at two dose levels. J Clin Oncol. 2017;35(15):1713-20. doi:10.1200/JCO.2016.71.0228
11. Ducimetière F, Lurkin A, Ranchère-Vince D, Decouvelaere AV, Péoc'h M, Istier L, et al. Incidence of sarcoma histotypes and molecular subtypes in a prospective epidemiological study with central pathology review and molecular testing. PLoS One. 2011;6(8):e20294. doi:10.1371/journal.pone.0020294
12. Ilson DH, van der Graaf WTA. Gastrointestinal stromal tumours: a focus on low- and middle-income countries. Ecancermedicalscience. 2019;13:896.
13. Vassos N, Agaimy A, Hohenberger W, Croner RS. Coexistence of gastrointestinal stromal tumours (GIST) and malignant neoplasms of different origin: prognostic implications. Int J Surg. 2014;12(5):371-7. doi:10.1016/j.ijsu.2014.03.004
14. Miettinen M, Fetsch JF, Sobin LH, Lasota J. Gastrointestinal stromal tumors in patients with neurofibromatosis 1: a clinicopathologic and molecular genetic study of 45 cases. Am J Surg Pathol. 2006;30(1):90-6. doi:10.1097/01.pas.0000176433.81079.bd
15. Tebaibia A, Boudjeniba S, Benhassou M, et al. Profil clinicopathologique des tumeurs stromales gastro-intestinales: à propos de 32 cas. J Afr Cancer. 2014;6(3):153-8.
16. Benkirane A, El Khannoussi B, El Houas H, et al. Les tumeurs stromales gastro-intestinales: expérience marocaine à propos de 85 cas. Pan Afr Med J. 2016;24:101.