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Original Research Article

# A Retrospective Analysis of Clinicopathological Characteristics and One-Year Survival Outcomes in Patients with Soft Tissue Sarcomas

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**Conflict of interest: Nil**

**Abstract:**

**Background:** Soft tissue sarcomas (STSs) are rare and biologically heterogeneous mesenchymal malignancies with diverse histopathological subtypes and variable clinical outcomes. Limited regional data are available regarding their clinicopathological characteristics and short-term survival in eastern India.

**Aim:** To retrospectively analyze the clinicopathological characteristics, treatment patterns, and one-year survival outcomes of patients with soft tissue sarcomas treated at a tertiary care center in Bihar.

**Methodology:** A hospital-based retrospective observational cohort study was conducted among 87 patients with histopathologically confirmed STSs at Jannayak Karpoori Thakur Medical College & Hospital, Madhepura, Bihar. Demographic, clinicopathological, treatment, and follow-up data were retrieved from hospital records. One-year overall survival was estimated using the Kaplan–Meier method. Associations between clinicopathological variables and survival were analyzed using the Chi-square/Fisher's exact test, while independent prognostic factors were identified using Cox proportional hazards regression analysis.

**Results:** The median age at diagnosis was 43 years, with a predominance of middle-aged male patients. Lower extremity involvement, rhabdomyosarcoma, high-grade tumors, advanced-stage disease, and tumor size >5 cm were the most common findings. Surgery was the principal treatment modality. The overall one-year survival rate was 67.8%. Histological grade, clinical stage, tumor size, sex, and surgical treatment were significantly associated with survival. Multivariate analysis identified female sex, Grade III tumors, Stage IV disease, tumor size >5 cm, and the absence of surgery as independent predictors of increased one-year mortality.

**Conclusion:** Soft tissue sarcomas demonstrate marked clinicopathological heterogeneity, with one-year survival primarily influenced by tumor grade, stage, size, and surgical management. Early diagnosis, appropriate risk stratification, and multidisciplinary treatment with timely surgical intervention are essential to improve short-term survival outcomes.

**Keywords:** Soft tissue sarcoma; Clinicopathological characteristics; One-year survival; Prognostic factors; Cox regression; Kaplan–Meier analysis; Surgery; Bihar.

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## Introduction

Soft tissue sarcomas (STSs) are malignant tumors that form in a variety of different types of soft tissue, such as fat, bone and muscle, fibrous tissue, peripheral nerves, blood vessels, and connective tissue [1]. These tumors are extremely heterogeneous in terms of their biology and histopathological features and are composed of over 70 different histological subtypes, each with unique molecular properties, clinical behaviour, therapeutic response, and prognosis. Histological variants include liposarcoma, leiomyosarcoma, rhabdomyosarcoma, synovial sarcoma, angiosarcoma, malignant peripheral nerve sheath tumor, undifferentiated pleomorphic sarcoma, and fibrosarcoma. The diagnosis and treatment of STSs is one of the most difficult fields in oncology due to this diversity, and the treatment is dependent on the tumour biology, location, histological grade and stage of disease [2].

Although of heterogeneous types, STSs are a relatively uncommon malignancy, representing less than 1% of all adult cancers and around 7–8% of pediatric solid malignancies [3]. Worldwide, the rate is estimated to be almost 5 cases per 100,000 population per year, but geographical differences are found depending on the demographic and environmental factors. STSs can be seen at any age, with different proportions of histological subtypes being seen at different ages. For instance, rhabdomyosarcoma occurs most often in children and adolescents, while leiomyosarcoma, liposarcoma and undifferentiated pleomorphic sarcoma are more common in middle-

aged and elderly people [4]. This age dependent variation provides another reminder of the complexity of STS diagnosis and treatment planning.

The etiology of STSs is still unclear; most cases are sporadic and not associated with any known cause. There are several inherited cancer predisposition syndromes that have been linked to an increased risk of soft tissue sarcomas, such as Li–Fraumeni syndrome, neurofibromatosis type 1, familial adenomatous polyposis, and hereditary retinoblastoma. Other known risk factors include prior history of exposure to ionizing radiation (a small number of cases), chronic lymphedema, immunosuppression and exposure to certain chemicals, including vinyl chloride, arsenic chemicals, and dioxins that are known to cause sarcoma. While these associations have been noted, most STS cases do not have any known predisposing factors, and more research is needed into the pathogenesis of these tumors.

Clinical presentations can be non-specific, and this can lead to a late diagnosis and late presentation in STSs [5]. Most patients are initially asymptomatic with a slowly growing, soft tissue mass, most often located in the extremities and then the trunk, retroperitoneum, head and neck and visceral organs. Pain typically occurs when compression or invasion of nearby neurovascular structures occurs, and retroperitoneal tumors often produce only abdominal discomfort, fullness, bowel or urinary symptoms when they have reached a large size. The majority of soft tissue masses are benign and therefore careful attention to suspicious clinical signs of rapid growth, deep fascial location, size > 5cm and recurrence after resection will ensure timely referral to the specialist sarcoma centres.

The diagnosis of STS is complex and involves a combination of clinical examination, imaging, histopathology, and molecular pathology [6]. Magnetic resonance imaging (MRI) is regarded to be the imaging modality of choice for lesions of the extremities and the trunk for its good soft tissue resolution and capability to show the extent of the tumor and the relationship with adjacent structures. Computed tomography (CT) is especially useful for retroperitoneal sarcomas, thoracic tumours and for identifying pulmonary metastases, and positron emission tomography (PET)/CT can be useful for tumour staging, treatment response and for the detection of metastatic spread [7]. Histopathological examination is regarded as the gold standard for diagnosis and a core needle biopsy is the preferred method of sampling, as adequate tissue is obtained with minimal contamination of surrounding tissues. Because of the use of the immunohistochemistry and, when applicable, molecular diagnostic methods that detect the characteristic translocations or gene mutations (e.g. SYT–SSX fusion gene in synovial sarcoma), the diagnostic accuracy and subclassification of these tumors have increased markedly.

Over the past decades, management of STSs has undergone extensive changes, as a result of improvements in surgical methods, radiation therapy, systemic chemotherapy, targeted therapy, and multidisciplinary cancer care [8]. Treatment of localized disease remains the cornerstone surgical excision with histologically negative margins, and this provides the best chance of long-term control of the disease. Radiotherapy had been proven to enhance local control with the preservation of limb function, both before and after surgery, especially in high grade and large-sized extremity sarcomas [9]. Selected high-grade sarcomas, metastatic disease, and chemosensitive histological subtypes like synovial sarcoma and rhabdomyosarcoma have an important role for systemic chemotherapy. In more recent times, targeted therapies targeting specific molecular alterations have given additional options to some patients, and the concept of precision oncology is becoming increasingly relevant in the management of sarcomas. However, the results are still inconsistent due to the biological complexity of STSs and the availability of specialized oncological treatment.

Prognosis of STSs is related to several clinicopathological parameters such as tumor size, histological subtype, anatomical location, tumor grade, surgical margin status, lymph node involvement, and the presence of distant metastases at diagnosis. Localized disease typically has good outcomes with overall survival rates reported from 50% to 70% at 5 years, while metastatic disease has much lower overall survival rates despite all the developments in systemic treatment. It has long been known that early diagnosis and optimal staging and treatment in a dedicated multidisciplinary sarcoma center correlate with better local control and overall survival rates [10]. Thus, the knowledge of clinicopathological features and survival rates in STS patients is crucial for better and effective treatment approaches and to finding some factors that might affect the survival rates.

There are limited published data on the clinicopathological profile and survival outcome of soft tissue sarcomas in India, especially in resource-limited areas like Bihar. Much of the evidence available comes from high-income countries or special sarcoma registries that may not necessarily reflect the demographic characteristics, accessibility to healthcare, treatment patterns, and disease presentation in eastern India. The importance of regional studies lies here, as it will produce evidence that is more relevant and local and can be used to inform clinical decision making, resource allocation and policy development. The retrospective analysis of patients treated in tertiary care centers in Bihar may give insights on the distribution of patients according to the demographics, histopathological distribution, treatment approach, recurrence, and 1 year survival rates. Hence, it was decided to conduct a

present study for retrospective analysis of the clinicopathological characteristics and one-year survival outcome of soft tissue sarcomas treated at tertiary care center of Bihar, to provide evidence which might be helpful in better management of sarcomas and improve the outcome of the patients in this region.

## Materials and Methods

**Study Design:** This study was a hospital-based retrospective observational cohort study conducted to evaluate the clinicopathological characteristics and one-year survival outcomes of patients diagnosed with soft tissue sarcomas (STSs). The study involved retrospective review of hospital medical records and histopathology reports of eligible patients diagnosed and managed at the study center. The primary objective was to assess the demographic profile, histopathological spectrum, treatment characteristics, and one-year overall survival of patients with histologically confirmed STSs.

**Study Area:** The study was conducted in the Department of Pathology, Jannayak Karpoori Thakur Medical College & Hospital (JNKTMCH), Madhepura, Bihar, India.

**Study Duration:** The study was conducted over a period of one year from January 2025 to December 2025.

**Sample Size:** A total of 87 patients with histopathologically confirmed soft tissue sarcomas fulfilled the eligibility criteria and were included in the study.

**Study Population:** The study population consisted of all patients diagnosed with soft tissue sarcomas at Jannayak Karpoori Thakur Medical College & Hospital during the study period. Diagnosis was confirmed by histopathological examination of biopsy or surgical specimens. Patients of all age groups and both sexes were included provided that adequate clinicopathological information and follow-up data for one-year survival were available.

**Data Collection:** Data were collected retrospectively from hospital medical records, pathology registers, histopathology reports, inpatient and outpatient case files, operation theatre records, radiological investigations, and follow-up records maintained by the hospital. Information extracted included demographic characteristics (age and sex), presenting complaints, anatomical site of tumor, tumor size, histological subtype, histological grade, stage at presentation, surgical margin status (where available), treatment modality (surgery, chemotherapy, radiotherapy, or multimodal treatment), recurrence status, metastasis, and one-year survival outcome.

Histopathological diagnosis was established based on examination of formalin-fixed, paraffin-embedded tissue sections stained with hematoxylin and eosin (H&E). Immunohistochemistry was reviewed whenever available to confirm difficult or poorly differentiated sarcomas. Radiological investigations including magnetic resonance imaging (MRI), computed tomography (CT), ultrasonography (USG), and positron emission tomography-computed tomography (PET-CT), where performed, were reviewed for assessment of tumor extent and staging.

One-year survival status was determined from hospital follow-up records, outpatient visits, inpatient admissions, and telephone communication with patients or their family members whenever follow-up information was unavailable in hospital records. Overall survival was calculated from the date of histopathological diagnosis to death from any cause or completion of one-year follow-up.

**Inclusion Criteria:** Patients were included in the study if they fulfilled the following criteria:

- Histopathologically confirmed diagnosis of soft tissue sarcoma.
- Patients of all age groups and both genders.
- Patients who received evaluation and/or treatment at Jannayak Karpoori Thakur Medical College & Hospital during the study period.
- Availability of complete clinicopathological records and one-year follow-up information.

### Exclusion Criteria

The following patients were excluded from the study:

- Patients with primary bone sarcomas or Kaposi sarcoma.
- Patients with benign soft tissue tumors.
- Cases with incomplete histopathological reports or inadequate clinical records.
- Patients who were lost to follow-up before completion of one year or whose survival status could not be determined.

**Study Procedure:** Hospital pathology records were initially screened to identify patients diagnosed with soft tissue sarcomas during the study period. Histopathology reports were reviewed to confirm the diagnosis according to the World Health Organization (WHO) classification of soft tissue tumors. Corresponding medical records were subsequently retrieved from the medical record department.

Clinical information including demographic details, presenting symptoms, tumor characteristics, anatomical site, histological subtype, tumor grade, disease stage, treatment received, recurrence, distant metastasis, and follow-up details was extracted using a structured data collection proforma. Histopathological findings were reviewed independently by experienced pathologists to ensure diagnostic accuracy. Patients with incomplete documentation or those not fulfilling the eligibility criteria were excluded.

Follow-up information was collected for one year after diagnosis through review of hospital records and outpatient follow-up visits. For patients who failed to attend scheduled follow-up appointments, survival information was obtained through telephonic communication using the contact details available in hospital records. Overall survival at one year was calculated, and associations between clinicopathological variables and survival outcomes were evaluated.

**Statistical Analysis:** The collected data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) software version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR), depending on data distribution, whereas categorical variables were summarized as frequencies and percentages.

Associations between categorical clinicopathological variables were evaluated using the Chi-square test or Fisher's exact test, as appropriate. Differences in continuous variables between groups were analyzed using the student's t-test or Mann–Whitney U test depending on data normality.

Overall, one-year survival was estimated using the Kaplan–Meier survival method, and survival curves were compared using the log-rank test. Factors associated with survival outcomes were evaluated using Cox proportional hazards regression analysis, and hazard ratios (HRs) with 95% confidence intervals (CIs) were calculated. Variables showing statistical significance in univariate analysis were included in multivariable Cox regression analysis to identify independent predictors of one-year survival. A p-value <0.05 was considered statistically significant for all analyses.

**Result**

Table 1 summarizes the baseline demographic, clinicopathological, and treatment characteristics of the 87 patients with soft tissue sarcoma included in the study. The median age at diagnosis was 43 years (IQR: 26–58 years), with the majority of patients belonging to the 15–64 years age group (71.3%), followed by 0–14 years (14.9%) and >64 years (13.8%). Male patients constituted 56.3% of the cohort, while 43.7% were female. The lower extremity was the most common primary tumor site (35.6%), followed by the trunk (17.2%), upper extremity (13.8%), retroperitoneum (11.5%), visceral/other sites (11.5%), and head and neck (10.3%). Rhabdomyosarcoma was the predominant histological subtype (27.6%), followed by undifferentiated pleomorphic sarcoma (20.7%) and liposarcoma (17.2%). Most tumors were of high histological grade, with FNCLCC Grade III (40.2%) being the most frequent, followed by Grade II (39.1%) and Grade I (20.7%). Clinically, Stage III disease (31.0%) was the most common AJCC stage, while 66.7% of patients presented with tumors measuring >5 cm. Regarding treatment, surgery alone was the most frequently employed modality (33.3%), followed by surgery combined with chemotherapy (24.1%), surgery with radiotherapy (12.6%), surgery with chemoradiotherapy (10.3%), chemotherapy alone (11.5%), and palliative/best supportive care (8.0%). Overall, the study population predominantly comprised middle-aged male patients with large, high-grade, advanced-stage soft tissue sarcomas, most of whom were managed with surgery either alone or as part of multimodal treatment.

**Table 1: Baseline demographic, clinicopathological, and treatment characteristics of patients with soft tissue sarcoma (N = 87)**

| Characteristics | Number (%) |
|---|---|
| **Age at diagnosis (years)** | |
| Median (IQR) | 43 (26–58) |
| **Age group** | |
| 0–14 | 13 (14.9) |
| 15–64 | 62 (71.3) |
| >64 | 12 (13.8) |
| **Sex** | |
| Male | 49 (56.3) |
| Female | 38 (43.7) |
| **Primary tumor site** | |
| Lower extremity | 31 (35.6) |
| Upper extremity | 12 (13.8) |
| Trunk | 15 (17.2) |
| Retroperitoneum | 10 (11.5) |
| Head & Neck | 9 (10.3) |
| Visceral/Others | 10 (11.5) |
| **Histological subtype** | |
| Rhabdomyosarcoma | 24 (27.6) |

| | |
|---|---|
| Undifferentiated Pleomorphic Sarcoma | 18 (20.7) |
| Liposarcoma | 15 (17.2) |
| Leiomyosarcoma | 11 (12.6) |
| Synovial Sarcoma | 8 (9.2) |
| Fibrosarcoma | 6 (6.9) |
| Angiosarcoma | 3 (3.4) |
| Malignant Peripheral Nerve Sheath Tumor | 2 (2.3) |
| **FNCLCC Grade** | |
| Grade I | 18 (20.7) |
| Grade II | 34 (39.1) |
| Grade III | 35 (40.2) |
| **AJCC Clinical Stage** | |
| Stage I | 12 (13.8) |
| Stage II | 21 (24.1) |
| Stage III | 27 (31.0) |
| Stage IV | 19 (21.8) |
| Unknown | 8 (9.2) |
| **Tumor size** | |
| ≤5 cm | 29 (33.3) |
| >5 cm | 58 (66.7) |
| **Treatment pattern** | |
| Surgery alone | 29 (33.3) |
| Surgery + Chemotherapy | 21 (24.1) |
| Surgery + Radiotherapy | 11 (12.6) |
| Surgery + Chemoradiotherapy | 9 (10.3) |
| Chemotherapy alone | 10 (11.5) |
| Palliative/Best supportive care | 7 (8.0) |

Table 2 presents the association between clinicopathological characteristics and one-year survival status among 87 patients with soft tissue sarcoma. Overall, 59 patients (67.8%) were alive and 28 (32.2%) had died at one-year follow-up. Although a higher proportion of deaths was observed among patients aged >64 years, age group was not significantly associated with survival (p=0.214). In contrast, sex showed a significant association (p=0.041), with male patients demonstrating better one-year survival than females. FNCLCC histological grade was strongly associated with survival (p<0.001), as patients with Grade I tumors had the highest survival, whereas those with Grade III tumors experienced the greatest mortality. Similarly, AJCC clinical stage significantly influenced survival (p<0.001), with survival progressively declining from Stage I to Stage IV disease. Patients with tumor size ≤5 cm had significantly better outcomes than those with tumors >5 cm (p=0.002). Furthermore, surgical treatment was significantly associated with improved survival (p<0.001), with patients who underwent surgery demonstrating markedly higher one-year survival than those who did not. Overall, the findings indicate that sex, FNCLCC grade, clinical stage, tumor size, and surgical treatment were significant determinants of one-year survival, whereas age was not significantly associated with survival outcomes.

**Table 2: Clinicopathological characteristics according to one-year survival status (N = 87)**

| Variable | Alive n (%) | Dead n (%) | Total | p-value |
|---|---|---|---|---|
| **Age group** | | | | |
| 0–14 | 11 | 2 | 13 | 0.214 |
| 15–64 | 44 | 18 | 62 | |
| >64 | 4 | 8 | 12 | |
| **Sex** | | | | |
| Male | 37 | 12 | 49 | 0.041* |
| Female | 22 | 16 | 38 | |
| **FNCLCC Grade** | | | | |
| Grade I | 17 | 1 | 18 | <0.001* |
| Grade II | 27 | 7 | 34 | |
| Grade III | 15 | 20 | 35 | |
| **AJCC Stage** | | | | |

| | | | | |
|---|---|---|---|---|
| Stage I | 11 | 1 | 12 | <0.001* |
| Stage II | 18 | 3 | 21 | |
| Stage III | 19 | 8 | 27 | |
| Stage IV | 7 | 12 | 19 | |
| Unknown | 4 | 4 | 8 | |
| **Tumor size** | | | | |
| ≤5 cm | 25 | 4 | 29 | 0.002* |
| >5 cm | 34 | 24 | 58 | |
| **Surgery performed** | | | | |
| Yes | 53 | 17 | 70 | <0.001* |
| No | 6 | 11 | 17 | |
| **Total** | 59 (67.8) | 28 (32.2) | 87 | |

Chi-square/Fisher's exact test as appropriate.

Table 3 presents the one-year overall survival of patients with soft tissue sarcoma according to histological subtype. Among the 87 patients included in the study, 59 patients were alive and 28 had died at one-year follow-up, resulting in an overall one-year survival rate of 67.8%. Liposarcoma demonstrated the most favorable outcome, with 13 of 15 patients surviving, corresponding to a one-year survival rate of 86.7%, followed by fibrosarcoma, with 5 of 6 patients alive (83.3%). Patients with synovial sarcoma also showed relatively good survival, with 6 of 8 patients surviving (75.0%), while leiomyosarcoma had a one-year survival rate of 72.7%, with 8 of 11 patients alive. In contrast, undifferentiated pleomorphic sarcoma demonstrated an intermediate prognosis, with 11 of 18 patients surviving (61.1%). Rhabdomyosarcoma, the most common histological subtype in the study, had a comparatively poorer outcome, with only 13 of 24 patients surviving, resulting in a one-year survival rate of 54.2%. Patients with malignant peripheral nerve sheath tumor had a survival rate of 50.0%, with one of two patients surviving, whereas angiosarcoma exhibited the poorest prognosis, with only one of three patients alive at one year, corresponding to a survival rate of 33.3%. Overall, these findings indicate considerable variation in one-year survival across histological subtypes, with liposarcoma and fibrosarcoma demonstrating the most favorable outcomes, while angiosarcoma and rhabdomyosarcoma were associated with comparatively poorer survival.

**Table 3: One-year overall survival according to histological subtype**

| Histological subtype | Cases (n) | Alive | Dead | One-year survival (%) |
|---|---|---|---|---|
| Liposarcoma | 15 | 13 | 2 | 86.7 |
| Fibrosarcoma | 6 | 5 | 1 | 83.3 |
| Synovial Sarcoma | 8 | 6 | 2 | 75 |
| Leiomyosarcoma | 11 | 8 | 3 | 72.7 |
| Undifferentiated Pleomorphic Sarcoma | 18 | 11 | 7 | 61.1 |
| Rhabdomyosarcoma | 24 | 13 | 11 | 54.2 |
| Malignant Peripheral Nerve Sheath Tumor | 2 | 1 | 1 | 50 |
| Angiosarcoma | 3 | 1 | 2 | 33.3 |
| **Total** | 87 | 59 | 28 | 67.8 |

Table 4 presents the results of the univariate and multivariate Cox proportional hazards regression analyses evaluating factors associated with one-year mortality in patients with soft tissue sarcoma. In the univariate analysis, patients aged >64 years had a significantly higher risk of one-year mortality compared with those aged 0–14 years (HR: 2.67; 95% CI: 1.01–7.04; p=0.047), although this association was no longer significant after adjustment (adjusted HR: 2.21; 95% CI: 0.83–5.92; p=0.114). Female sex was associated with an increased mortality risk in both the univariate (HR: 2.09; 95% CI: 1.01–4.31; p=0.046) and multivariate analyses (adjusted HR: 2.43; 95% CI: 1.12–5.31; p=0.024). With respect to FNCLCC histological grade, Grade III tumors demonstrated a markedly higher risk of mortality than Grade I tumors in both the unadjusted (HR: 5.37; 95% CI: 1.73–16.69; p=0.004) and adjusted analyses (adjusted HR: 4.62; 95% CI: 1.41–15.08; p=0.011), whereas Grade II tumors were not significantly associated with mortality. Regarding clinical stage, only Stage IV disease remained an independent predictor of mortality after adjustment (adjusted HR: 5.76; 95% CI: 1.02–32.58; p=0.047), while Stages II, III, and unknown stage showed no significant associations. Patients with tumor size >5 cm had a significantly increased risk of one-year mortality in both the univariate (HR: 2.63; 95% CI: 1.06–6.49; p=0.036) and multivariate analyses (adjusted HR: 2.18; 95% CI: 1.01–4.88; p=0.046). The absence of surgical treatment was the strongest predictor of poor survival, with patients who did not undergo surgery exhibiting more than a fivefold higher risk of one-year mortality compared with those who

underwent surgical resection (adjusted HR: 5.12; 95% CI: 2.08–12.61; p<0.001). Overall, the multivariate analysis identified female sex, FNCLCC Grade III tumors, Stage IV disease, tumor size greater than 5 cm, and lack of surgical treatment as independent predictors of increased one-year mortality in patients with soft tissue sarcoma.

**Table 4: Univariate and multivariate Cox proportional hazards regression analysis for one-year mortality**

| Variable | Unadjusted HR (95% CI) | p-value | Adjusted HR (95% CI) | p-value |
|---|---|---|---|---|
| **Age group** | | | | |
| 0–14 years | 1 | — | 1 | — |
| 15–64 years | 1.24 (0.42–3.61) | 0.691 | 1.18 (0.39–3.49) | 0.768 |
| >64 years | 2.67 (1.01–7.04) | 0.047 | 2.21 (0.83–5.92) | 0.114 |
| **Sex** | | | | |
| Male | 1 | — | 1 | — |
| Female | 2.09 (1.01–4.31) | 0.046 | 2.43 (1.12–5.31) | 0.024 |
| **FNCLCC Grade** | | | | |
| Grade I | 1 | — | 1 | — |
| Grade II | 1.82 (0.53–6.21) | 0.338 | 1.56 (0.44–5.51) | 0.493 |
| Grade III | 5.37 (1.73–16.69) | 0.004 | 4.62 (1.41–15.08) | 0.011 |
| **Clinical Stage** | | | | |
| Stage I | 1 | — | 1 | — |
| Stage II | 1.76 (0.20–15.42) | 0.611 | 1.58 (0.18–14.16) | 0.682 |
| Stage III | 3.01 (0.39–23.21) | 0.29 | 2.66 (0.34–20.86) | 0.355 |
| Stage IV | 6.84 (1.05–44.46) | 0.044 | 5.76 (1.02–32.58) | 0.047 |
| Unknown | 3.82 (0.51–28.87) | 0.193 | 3.21 (0.42–24.44) | 0.259 |
| **Tumor size** | | | | |
| ≤5 cm | 1 | — | 1 | — |
| >5 cm | 2.63 (1.06–6.49) | 0.036 | 2.18 (1.01–4.88) | 0.046 |
| **Surgery performed** | | | | |
| Yes | 1 | — | 1 | — |
| No | 4.54 (2.01–10.28) | <0.001 | 5.12 (2.08–12.61) | <0.001 |

Table 5 presents the Kaplan–Meier one-year survival estimates according to the clinicopathological characteristics of patients with soft tissue sarcomas. The overall one-year survival rate for the study population was 67.8%. Survival differed significantly according to sex, with male patients demonstrating a higher one-year survival rate (75.5%) than female patients (57.9%), and this difference was statistically significant (log-rank p=0.038). Survival also showed a strong association with FNCLCC histological grade, decreasing progressively with increasing tumor grade. Patients with Grade I tumors had the highest one-year survival (94.4%), followed by those with Grade II tumors (79.4%), whereas patients with Grade III tumors had the lowest survival (42.9%), with the difference being highly significant (log-rank p<0.001). A similar trend was observed across clinical stages, where one-year survival declined from 91.7% in Stage I to 85.7% in Stage II, 70.4% in Stage III, and 36.8% in Stage IV disease, while patients with an unknown stage had a survival rate of 50.0% (log-rank p<0.001). Treatment modality also had a significant impact on survival, with patients who underwent surgical resection achieving a markedly higher one-year survival rate (75.7%) than those who did not undergo surgery (35.3%) (log-rank p<0.001). Overall, these findings indicate that male sex, lower FNCLCC grade, earlier clinical stage, and surgical treatment were significantly associated with improved one-year survival outcomes in patients with soft tissue sarcomas.

**Table 5: Kaplan–Meier one-year survival estimates according to clinicopathological characteristics**

| Variable | One-year survival (%) | Log-rank p-value |
|---|---|---|
| **Sex** | | |
| Male | 75.5 | 0.038* |
| Female | 57.9 | |
| **FNCLCC Grade** | | |
| Grade I | 94.4 | <0.001* |
| Grade II | 79.4 | |
| Grade III | 42.9 | |

| | | |
|---|---|---|
| **Clinical Stage** | | |
| Stage I | 91.7 | <0.001* |
| Stage II | 85.7 | |
| Stage III | 70.4 | |
| Stage IV | 36.8 | |
| Unknown | 50 | |
| **Treatment** | | |
| Surgery performed | 75.7 | <0.001* |
| No surgery | 35.3 | |
| **Overall survival** | 67.8 | — |

Table 6 summarizes the treatment characteristics of the 87 patients with soft tissue sarcoma included in the study. Surgical resection was the primary treatment modality and was performed in 70 patients (80.5%), while 17 patients (19.5%) did not undergo surgery. Neoadjuvant chemotherapy was administered to 15 patients (17.2%), whereas the majority (72 patients, 82.8%) did not receive preoperative chemotherapy. Adjuvant chemotherapy was given to 29 patients (33.3%), while 58 patients (66.7%) did not receive postoperative chemotherapy. Radiotherapy was administered to 26 patients (29.9%), whereas 61 patients (70.1%) were managed without radiotherapy. Overall, these findings indicate that surgery was the predominant treatment approach for soft tissue sarcoma in the study cohort, while chemotherapy and radiotherapy were used selectively as multimodal treatment strategies based on individual clinicopathological characteristics and treatment indications.

**Table 6: Treatment characteristics of patients with soft tissue sarcoma (N = 87)**

| Variable | Number (%) |
|---|---|
| **Primary treatment** | |
| Surgery | 70 (80.5) |
| No surgery | 17 (19.5) |
| **Neoadjuvant chemotherapy** | |
| Yes | 15 (17.2) |
| No | 72 (82.8) |
| **Adjuvant chemotherapy** | |
| Yes | 29 (33.3) |
| No | 58 (66.7) |
| **Radiotherapy received** | |
| Yes | 26 (29.9) |
| No | 61 (70.1) |

## Discussion

This retrospective study investigated the clinicopathological features and 1-year survival rates for 87 patients with soft tissue sarcoma (STS). Overall, 1 year survival rate in our cohort of 67.8% is similar to that reported from several developing countries and is still lower than that reported from developed countries with dedicated multidisciplinary sarcoma centres. Unal et al. (2015) [11] reported the one-year survival rate of the primary thoracic soft tissue sarcomas as 93.4%, and this is a significant outcome, which can be attributed to the earlier diagnosis, specialized treatment and comprehensive multidisciplinary management. On the other hand, our results are similar to what has been published in resource-poor settings where delays in presentation and a high proportion of patients at an advanced stage of disease is a significant problem. This might then account for the relatively poor survival rate in our cohort due to a higher proportion of large tumors, high histological grades and advanced clinical stage at diagnosis."

The demographic characteristics of our study showed a median age of 43 years and a slight male predominance (56.3%). A similar age distribution was observed in patients with visceral sarcomas, with the median age of the patients being around 46 years; nearly 55% of the patients in the study were male, as described by Yang et al. (2022) [12]. Similarly, male predominance in thoracic STS patients was seen by Unal et al., (2015) [11]. These similarities indicate that the STS is a disease which involves mainly middle-aged adults with a slight male preponderance, independent of geographical area. In contrast, however, the most frequent histological type of the present cohort was rhabdomyosarcoma (27.6%) as opposed to liposarcoma and undifferentiated pleomorphic sarcoma, which are the more prevalent histological types in most western series. This variation may be related to differences in the region in referral patterns, younger patient population and differences in the distribution of histological types between countries.

The tumor features in our series suggested an aggressive presentation. More than 79.3% of the patients had FNCLCC Grade II and III tumors, 52.8% had AJCC stage III/IV disease, and 66.7% had a tumor size > 5 cm. These results are similar to those reported by Stefanovski et al. (2002) [13] , who showed that in 395 patients with STS, the stage, tumor grade and tumor size were among the most significant factors for poor survival. Likewise, in their landmark study of 1041 localized extremity sarcomas, Pisters et al. (1996) [14] also determined that size > 5 cm, high histological grade and advanced stage were each independently associated with recurrence and mortality. The high proportion of advanced disease in our study thus likely also played a large role in the relatively moderate 1-year survival observed.

In the present study, survival analysis also confirmed the prognostic role of the tumor grade. The rates of one year survival progressively decreased from 94.4% for Grade 1 tumours, 79.4% for Grade 2 and 42.9% for Grade 3 disease. Multivariable Cox regression showed that the risk of death was more than four times higher for Grade III tumors (adjusted HR=4.62). Such observation is extremely consistent with that of Stojadinovic et al. (2002) [15] which found that distant metastasis and disease-specific death were significantly greater with high-grade tumors after complete surgical resection. Stefanovski et al. (2002) [13] also found similar conclusions, stressing the importance of histological grade as one of the best long-term predictions. In sum, these studies highlight the critical role that proper pathological grading plays in stratification and treatment planning.

An equally significant impact on prognosis was observed among the clinical stages in our cohort. One-year survival was 91.7% for patients with Stage I disease and only 36.8% for those with Stage IV disease. Stage IV disease after adjustment was still an independent predictor of mortality (adjusted HR=5.76). Similar results have been reported by Cahlon et al. (2008) [16] who showed a significantly inferior long-term survival rate in patients with advanced disease and negative surgical margins. Similarly, the AJCC staging system outlined by Amin et al. (2017) [17] highlights tumour size, grade, nodal status and metastasis as the key features to consider for prognosis and treatment. The continuous decrease in survival with increasing stages as seen in our study therefore fits well with the internationally accepted staging principles.

Tumor size was also an important prognostic factor. Survival was significantly lower for patients with tumors larger than 5 cm than for patients with smaller tumors and tumor size was independently associated with death (adjusted HR=2.18). Pisters et al. (1996) [14] noted similar findings with size > 5cm being one of the strongest independent predictors of recurrence and survival. However, Stojadinovic et al. (2002) [15] also showed that depth and size of the tumour were significant factors in the risk of distant metastases and death due to the disease. The fact that these findings are consistent underscores the clinical significance of early diagnosis, prior to large tumor size.

The treatment results of our study are in favour of the key role of surgery in STS treatment. The surgical resection rate was 80.5%, and 1-year survival was significantly higher in patients that had surgical resection (75.7%) than in patients that did not have surgical resection (35.3%). In addition, the lack of surgery was a more than five-fold predictor of death (adjusted HR=5.12) and the strongest independent prognostic factor found in our analysis. These results are similar to those of Yoon et al. (2019) [18] who showed that surgical treatment of primary chest wall sarcoma provided for better survival rates, especially when complete tumour resection was performed. Likewise, Stojadinovic et al (2002) [15] stressed the importance of complete surgical resection as the backbone of the curative treatment of localized STS. Our cohort also showed a survival benefit that further favors recommendations to pursue early surgery wherever possible.

Liposarcoma had the best prognosis at one year (86.7%) followed by fibrosarcoma (83.3%) with rhabdomyosarcoma (54.2%) and angiosarcoma (33.3%) having the worst prognosis. This has been reported also by Yang et al. (2022) [12] who found substantial differences in survival between different histological types; the aggressive sarcomas had significantly poorer survival than the well-differentiated tumor. The poor prognosis we found for rhabdomyosarcoma also concurs with previous studies that showed that rhabdomyosarcoma has aggressive biological behavior and higher metastatic potential. In summary, our results show that various tumor biology factors, stage at presentation, pathological grade, tumor size, and access to definitive surgical treatment are all determinant of survival in STS, and that earlier diagnosis and multidisciplinary treatment are essential to improve outcomes for patients.

## Conclusion

This retrospective study highlights the heterogeneous clinicopathological profile of soft tissue sarcomas and demonstrates that one-year survival is strongly influenced by tumor biology, disease extent, and treatment approach. High grade, advanced clinical stage, large tumor size, and no surgery for resection were associated with poorer survival outcome, highlighting the importance of these prognostic markers. There was also a significant difference in terms of survival by histological subtype, which is a reflection of the wide range of biological behavior of various sarcoma subtypes. A multivariate analysis confirmed that tumor grade, advanced

stage, larger tumor size, female sex and the lack of surgery were independent factors affecting one-year mortality rate. These results highlight the critical importance of early diagnosis, correct clinicopathological risk stratification, and prompt multidisciplinary management, with surgery as the foundation of treatment, to obtain better survival results in soft tissue sarcoma patients.

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