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Original Research Article

Soft Tissue Tumors: Histopathological Spectrum and Clinicopathological Characteristics at a Tertiary Care Center

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Abstract

Background: Soft tissue tumors (STTs) are a rare and diverse group of neoplasms that arise from nonepithelial extra-skeletal tissues of the body. This study aimed to analyze the histopathological spectrum and clinicopathological characteristics of STTs diagnosed at the tertiary care center in Udaipur, Rajasthan, India.

Methods: This retrospective study was carried out in the Department of Pathology at Pacific Medical College & Hospital over a period of three years from January 2018 to December 2021. The data collected were entered into a Microsoft Excel spreadsheet and analyzed using SPSS version 25.

Results. A total of 100 cases of soft tissue tumor were included in this study. Of these, 83 cases (83%) were benign and 17 cases (17%) were malignant. The most common site for both benign and malignant tumors was the extremities (37% of all cases), followed by the head and neck (29%). Adipocytic tumors and tumors of the peripheral nerve sheath were the most common types of benign tumors, respectively.

Conclusion: Accurate histologic classification and additional ancillary studies such as immunohistochemistry, cytogenetics, and molecular genetics are needed for accurate diagnosis and prognostication of soft tissues tumors.

Keywords: Adipocytic Tumors, Fibrous Tumors, Fibrohistiocytic Tumors, Histologic Classification.

Introduction

Soft tissue tumors (STTs) are a rare and diverse group of neoplasms that arise from mesenchymal tissues, including adipose, muscle, fibrous, vascular, and nerve tissues [1]. The accurate diagnosis and classification of STTs are challenging due to their rarity and variable clinical presentation [2]. Despite their low incidence, STTs represent a significant burden on healthcare systems due to their complexity and the need for a multidisciplinary approach to treatment [3]. These tumors include a wide variety of benign and malignant entities with different histologic patterns, clinical behaviors, and treatment modalities [1]. Soft tissue tumors are relatively uncommon, accounting for less than 1% of all neoplasms, with an incidence of 15-20 cases per 100,000 people annually [4].

Previous studies conducted in different parts of the world have reported varying

frequencies and distributions of soft tissue tumors [5, 6]. Factors such as geographic location, ethnicity, and environmental factors may contribute to these differences. Therefore, data from different regions are essential for a better understanding of the epidemiology of these tumors.

In India, the incidence of STTs varies depending on the region and population studied [7]. Although some studies have reported a higher incidence of STTs in southern India, there is limited data on the prevalence and clinicopathological characteristics of STTs in northern India, particularly in the state of Rajasthan [8]. Udaipur is a major city of southern Rajasthan that is home to a tertiary care center that serves a large population in the region. However, Despite the high burden of cancer in India, there are few studies that have investigated the histopathological spectrum of STTs in this region [9].

A thorough understanding of the histopathological characteristics of these tumors is essential for accurate diagnosis and appropriate management. Retrospective histopathological analysis of soft tissue tumors provides valuable insights into the spectrum of these tumors, their clinicopathological features, and their distribution [4].

This study will add to the existing literature on the epidemiology of soft tissue tumors in India. The findings of this study will aid in the development of a comprehensive database of soft tissue tumors in India, which can be used to establish diagnostic and treatment protocols specific to the country's population. This will be particularly useful in resource-limited settings where access to advanced diagnostic and treatment facilities is limited.

Therefore, this retrospective study aimed to analyze the histopathological spectrum and clinicopathological characteristics of STTs diagnosed at the tertiary care center in Udaipur, Rajasthan. The study relied on histopathological examination of the specimens, which remains the gold standard for accurate diagnosis and classification of STTs [10].

Material and Methods

This retrospective study was carried out in the Department of Pathology at Pacific Medical College & Hospital, Udaipur, Rajasthan, India over a period of three years from January 2018 to December 2021.

The study included all cases of soft tissue tumors diagnosed during the study period. The cases were identified from the histopathology records section of the Department of Pathology.

Detailed clinical data including patient age, gender, presenting symptoms, radiological findings, and gross pathology were extracted from the medical records. The histopathological characteristics of the tumors were studied, including the type of tumor, its location, size, margin status, and grade.

The tissue specimens were processed through standard paraffin embedding technique. The blocks were recut into sections of approximately 5 microns thickness and stained with routine Hematoxylin and Eosin (H&E) stain. Special stains like PAS and reticulin, PTAH were also performed wherever necessary. The slides were examined microscopically by two experienced pathologists, and the histological type and grade of the tumors were assigned based on the WHO classification of soft tissue tumors [2].

The data collected were entered into a Microsoft Excel spreadsheet and analyzed using SPSS version 25. Descriptive statistics were used to summarize the data, including frequency and percentages for categorical variables and mean and standard deviation for continuous variables. Ethical clearance for the study was obtained from the institutional review

board of the tertiary care center. Informed consent was waived by the ethics committee as this was a retrospective study and no personal identifying information was used.

Results

A total of 100 cases of soft tissue tumors were covered in this retrospective study. Of these, 83 cases (83%) were benign and 17 cases (17%) were malignant soft tissue tumors. Benign soft tissue tumors were more common than malignant tumors, as shown in Table 1.

Table 1: Relative incidence of benign & malignant soft tissue tumours

Type	No. of soft tissue tumours	Percentage
Benign	83	83%
Malignant	17	17%
Total	100	100%

In terms of age incidence, the study found that soft tissue tumors were most commonly found in patients aged 50-60 and above 60, each comprising 22% and 23% of the cases, respectively (Table 2).

Table 2: Age incidence in soft tissue tumours

Age in years	Total	%
Below 10	5	5
10-20	18	18
20-30	6	6
30-40	11	11
40-50	15	15
50-60	22	22
above 60	23	23
Total	100	100

The male to female ratio in benign soft tissue tumors was 1.33:1 and in malignant soft tissue tumors was 1.27:1. The most common histological group was adipose tumors, with lipoma being The frequent benign tumor, accounting for 49% of all benign soft tissue tumors. Vascular tumors were the second most common benign tumors, accounting for 20% of all benign soft tissue tumors.

Peripheral nerve sheath tumors were the third most common benign tumors, accounting for 19% of all benign soft tissue tumors. Fibrous tumors were seen in 4% of cases, fibrohistiocytic tumors in 3%, smooth muscle tumors in 2%, and tumors of uncertain differentiation in 1%.(Table 3)

Table 3: Incidence of Benign & Malignant Soft Tissue Tumors

Type	Category of Soft tissue tumors		Total (%)
	Benign (%)	Malignant (%)	
Adipocytic	45 (45%)	4 (4%)	49 (49%)
Fibrous	4 (4%)	0	4 (4%)
Fibrohistiocytic	2 (2%)	1 (1%)	3 (3%)
Smooth Muscle	1 (1%)	1 (1%)	2 (2%)
Skeletal Muscle	0	2 (2%)	2 (2%)
Blood Vessels	18(18%)	2(2%)	20 (20%)
Peripheral nerve sheath tumors	18 (18%)	1(1%)	19(19%)
Tumors of uncertain differentiation	0	1(1%)	1(1%)
Total	88 (88%)	12 (12%)	100(100%)

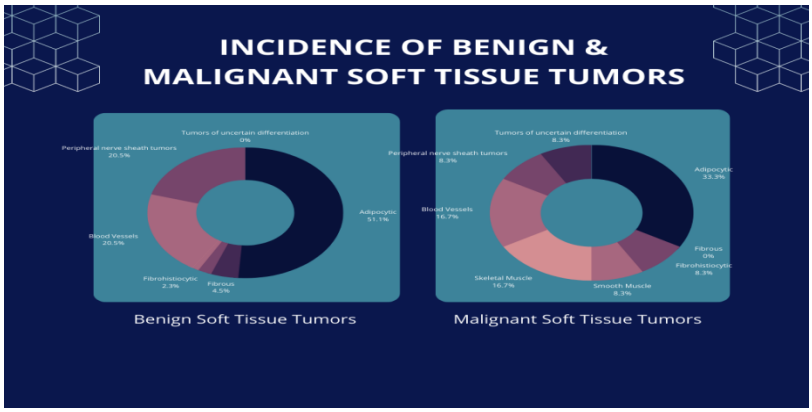
The incidence of benign and malignant soft tissue tumors varied according to the category of tumors. The majority of benign tumors were adipocytic tumors (45%), followed by vascular tumors and Peripheral nerve sheath tumors (18%). Benign tumors of smooth muscle 1 % and tumors of uncertain differentiation were not encountered. (Table 3)

Among malignant tumors, the incidence of malignant soft tissue tumors, categorized by type. The data shows that out of the 100 soft tissue tumors analyzed, 12 (12%) were malignant. The most common type of malignant soft tissue tumor was adipocytic tumor, accounting for 4% cases. Other malignant tumors included skeletal muscle tumor (2 %), fibrohistiocytic (1%), smooth muscle (1%), blood vessels (2%), peripheral nerve sheath tumors (1%), and tumors of uncertain differentiation (1%). Notably, no malignant fibrous tumors were found in the sample.These findings indicate that there is a possibility of malignant soft tissue tumors originating from different cell types.

Table 4: Site distribution of Benign and Malignant Soft Tissue tumours

S. No.	Site	Benign	Malignant	Total
1.	Extremities	29	8	37
2.	Head and Neck	25	4	29
3.	Back and Shoulder	20	1	21
4.	Trunk and Abdomen	7	3	10
5.	Others	03	00	3
Total		84	16	100

Table 4 displays the distribution of benign and malignant soft tissue tumors by site. The extremities were the most common site for both benign and malignant tumors (37% of all cases), followed by head and neck (29%).



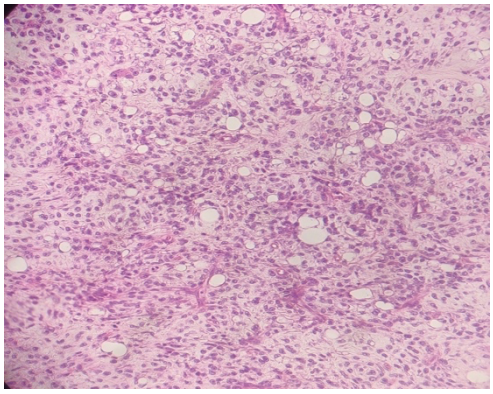


Figure 1: Liposarcoma High power magnification (40x) showing numerous lipoblasts with severe nuclear atypia/ bizarre cells and abnormal mitotic figures – Hematoxilin and Eosin stain (H&E)

Figure 2: Gross Specimen of Desmoid tumor: fibromatosis most commonly has a whirling, fibrous cut surface and may show focal hemorrhage but no necrosis.

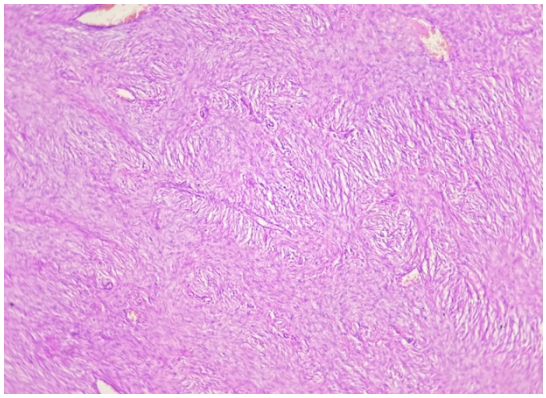


Figure 3: The conventional pattern of desmoid-type fibromatosis (H&E, 40x) consists of long sweeping fascicles of uniform spindle cells

Overall, this results shows that soft tissue tumors are more likely to be benign than malignant, and that they are typically observes in elderly patients. Adipocytic tumors and tumors of the peripheral nerve sheath were the most common types of benign and malignant tumors, respectively. The extremities were the most common site for both benign and malignant tumors.

Discussion

Soft tissue is a broad term used to describe extra-skeletal tissue that includes voluntary muscles, adipose tissue, fibrous tissue, and vessels serving these tissues, except reticuloendothelial system, glia, and supporting tissue of the various parenchymal organs. Soft tissue tumors are rare and complex, which makes them a

challenging area of study. The aim of the present study was to determine the frequency, age and sex distribution, and site of soft tissue tumors. The findings of this study were compared with the literature on this subject.

The results showed that benign tumors were more frequent than malignant tumors, with a ratio of 83:17. A study by M.J. Kransdorf et al. reported a ratio of 60.2:39.8 for benign to malignant soft tissue tumors, whereas in the study of Makino, 96% of tumors were benign and 45% were malignant. [11.12] The relative frequency of benign to malignant soft tissue tumors is difficult to estimate because many benign tumors cause no problems and patients do not report to clinicians, and most benign lesions are not removed. Thus, the actual ratio may be different from what was found in the present study.

In terms of age and sex distribution, the present study showed a male preponderance in soft tissue tumors, with a male to female ratio of 1.5:1, which was consistent with the findings of M.S. Kransdorf et al. and Beg. [11,13] The peak incidence was observed in the age group above 60 years, followed by the age group of 50-60 years. The findings of the present study were comparable to those of other studies, such as Lazim et al., Mandong et al., and Abudu et al. [14,15,16]

Adipocytic tumor was found to be the most common soft tissue tumor, followed by vascular tumors and peripheral nerve sheath tumors. A significant association was found between the type of tumor and the category of tumor. The benign adipocytic tumors accounted for the majority of benign soft tissue tumors (45%), followed by vascular tumors and Peripheral nerve sheath tumors (18%). The malignant tumors of adipose tissue accounted for the majority of malignant soft tissue tumors (4%), followed by tumors of skeletal muscle, blood vessels, and peripheral nerve. Myhre-Jensen reported that the most common benign soft tissue tumors were adipocytic, followed by benign fibrohistocytic tumors. [17]

Additionally, in the present study, the most common soft tissue tumor was adipocytic tumors, which accounted for 49% of all cases, followed by vascular tumors at 20% and peripheral nerve sheath tumors at 19%. This is consistent with the findings of Agravat et al. [18], who reported that the majority of benign soft tissue tumors were adipocytic tumors (47%) followed by vascular tumors (16%). On the other hand, malignant tumors of adipose tissue accounted for the majority of malignant soft tissue tumors (4%), followed by tumors of skeletal muscle, blood vessels, and peripheral nerve.

In terms of site, the present study found that the commonest site for benign soft tissue tumors was extremities, followed by head and neck. The studies by Beg et al ,Lazim et al and Zhi et al. state that the commonest site for malignant soft tissue tumors was the extremities, mainly the lower extremities, followed by the trunk and abdomen. [13,14,19] In the case of Mandong et al., the extremities followed by the head and neck were the commonest sites.[15] Meis-Kindblom et al. studied eighty cases of angiosarcoma and found the most common site was the extremities. [20] Kar et al. reported that extremities were the most common site followed by the chest wall and trunk, pelvis, and head and neck. [21]

The malignant soft tissue tumors had a strong predilection for extremities, specifically lower extremities, followed by the trunk and abdomen. The findings were consistent with the studies of Kransdorf, Gebhard et al., Olivera AM et al., and Weiss SW et al. [22,23,24,]

The accurate histologic classification of soft tissue tumors contributes significantly to establishing the prognosis of sarcoma. Important diagnostic features are cell

morphology and architectural arrangement. Often these features are not sufficient to distinguish one sarcoma from another, and additional ancillary studies such as immunohistochemistry, cytogenetics, and molecular genetics are needed for accurate diagnosis and prognostication. The prognostic factors that have been identified in soft tissue sarcomas include tumor size, grade, depth, and location, as well as the patient's age and overall health status [24].

However, there were limitations to the study that should be acknowledged. First, the study was retrospective in nature and relied on histopathological examination of specimens, which may limit the generalizability of the findings. [25] Second, the study was conducted in a single center, which may not be representative of the entire population in the region. Third, the study did not assess the impact of various treatment modalities on patient outcomes due to the limited follow-up data

Conclusion

In conclusion, soft tissue tumors are a diverse group of neoplasms that arise from nonepithelial extra-skeletal tissues of the body. The relative frequency of benign to malignant soft tissue tumors is difficult to estimate accurately, as many benign tumors cause few problems and are not reported by patients, and most benign lesions are not removed. In the present study, the frequency of benign tumors was 83% and malignant tumors was 17%. The most common soft tissue tumor was adipocytic tumors, accounting for 49% of cases, followed by vascular tumors at 20% and peripheral nerve sheath tumors at 19%. The most common site of benign soft tissue tumors was the extremities, accounting for 37% of cases, followed by the head and neck region at 29%. On the other hand, the most common site of malignant soft tissue tumors was the extremities, specifically the lower extremities, followed by the trunk and abdomen. Accurate histologic classification and additional ancillary studies such as immunohistochemistry, cytogenetics, and molecular genetics are needed for accurate diagnosis and prognostication of soft tissue tumors.

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