



## Original Research Article

## Clinico-pathological study of soft tissue tumors

Shameera Begum<sup>1</sup>, Shanmugasamy Kathirvelu<sup>1,\*</sup>, Anandraj Vaithy K<sup>1</sup>, Sowmya Srinivasan<sup>1</sup><sup>1</sup>Dept. of Pathology, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth University, Puducherry, India

## ARTICLE INFO

## Article history:

Received 28-03-2019

Accepted 11-11-2019

Available online 25-05-2020

## Keywords:

Benign soft tissue tumors

Histopathological study

Incidence

Lipoma

Soft tissue tumors

## ABSTRACT

**Background:** Soft tissue tumors (STT) are a diverse group of tumors. The prognosis of soft tissue tumors is unpredictable and aggressive if not diagnosed early. A vast majority of STT are benign, having a very high cure rate following surgical excision. Benign tumors vary widely in appearance and behavior. The sub-classification of these benign tumors is essential for prognosis as well as clinical management of patients. Histopathology is considered gold standard in the diagnosis of benign STT.

**Objective:** To study the clinicopathological profile of benign STT in terms of incidence, age, sex, site distribution, gross and histopathological features and their correlation with clinical diagnosis.

**Materials and Methods:** This descriptive study included 249 patients with benign STT whose excision specimens were analyzed in the Department of Pathology over five years from January 2013 to December 2017.

**Results:** Benign STT constituted 14.7% of all types of neoplasms in the present study. Among STT, benign tumors formed the majority (92.2%). Adipocytic tumors formed the most common histologic group. Benign STT showed a slight male preponderance with peak incidence in the fourth decade. The most common site of occurrence was the trunk followed by head and neck.

**Conclusion:** With this study, we were able to reassess the clinicopathological profile of benign soft tissue STT and their different types with respect to age, sex, and site distribution.

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## 1. Introduction

Soft tissue is a specialized form of tissue derived from the mesenchymal component of the embryo. It includes adipose tissue, fibrous tissue, skeletal muscles, blood vessels, lymphatic vessels and peripheral nervous system and is exclusive of skin, bone, lymphoreticular system, glia and soft tissues of various parenchymal organs.<sup>1</sup>

Soft tissue tumors (STT) are categorized into benign, intermediate and malignant. Intermediate tumors are further subclassified into locally aggressive and rarely metastasizing tumors based on the biological behaviour.<sup>2</sup> Benign tumors closely resemble normal tissue on histology and have a limited capacity for autonomous growth. They

exhibit little tendency to invade locally and are characterized by a low rate of local recurrence following conservative therapy.

The incidence of benign STT is higher when compared to malignant tumors.<sup>3</sup> The annual clinical incidence (number of new patients presenting to clinician) of benign STT is 3000/million population, worldwide.<sup>4</sup>

Soft tissue tumors are known to occur in any part of the body with a predilection for upper and lower extremities, trunk, retroperitoneum and head and neck.<sup>2</sup> Benign STT can occur at any site, both within and between muscles, ligaments, nerves, and blood vessels. Ninety-nine percent of benign tumors are superficial, and most of them measure less than 5 cm in size.<sup>2,3</sup>

Clinical history like age, duration, location, size, imaging studies, and histopathology are the most reliable parameters

\* Corresponding author.

E-mail address: [shanmugasamyk@mgmcri.ac.in](mailto:shanmugasamyk@mgmcri.ac.in) (S. Kathirvelu).

to make an accurate diagnosis, and to predict the clinical behavior of the tumor. FNAC, in addition, plays a vital role in diagnosis, especially in superficial masses.<sup>5</sup> CT guided FNAC is helpful in the diagnosis of intra-abdominal as well as retroperitoneal lesions. Again, the sensitivity and specificity of the role of FNAC is debatable due to its known limitations.<sup>5</sup> Hence, histopathology is considered the gold standard method for the diagnosis of soft tissue tumors. Different special stains like Masson's trichome, Verhoeff – Van Gieson and Periodic Acid Schiff stain and immunohistochemistry are applied to increase the diagnostic accuracy of soft tissue tumors.<sup>6</sup>

As it is evident that benign STT most often have an atypical clinical manifestation landing up with many differential diagnoses clinically, the histopathological diagnosis serves as the confirmatory diagnostic tool.<sup>3</sup> In many instances, clinicopathological analysis helps to enhance the efficacy in arriving at appropriate and early diagnosis, especially in conditions where many differential diagnoses are encountered.<sup>3</sup>

The purpose of this study was to evaluate the benign STT in relation to different age groups, sex and site distribution and to correlate clinical presentation and histopathological diagnoses, and to compare the obtained data with those obtained in other series by different authors. Thus the present study was conducted with a novel aim of analyzing the clinicopathological study of benign STT.

## 2. Materials and Methods

After obtaining approval of the Institute Human Ethics Committee, the present study was conducted on 249 cases of benign soft tissue tumor patients operated in our Institute and subsequent excisional biopsies sent for histopathological examination to the Department of Pathology, over a period of five years from 2013 to 2017. Patients of all ages and excisional biopsies of benign as well as intermediate soft tissue tumors were included for histologic analysis. Incisional biopsies and soft tissue neoplasms of systemic organs were excluded.

This descriptive study was prospective as well as retrospective. For prospective cases, after obtaining informed consent, detailed clinical data of the patient, including clinical history, radiological findings, and histopathological examination of the specimen were carried out. Specimens were fixed in 10% neutral formalin for 24 hours, and gross examination findings were noted. Specimens were processed through standard paraffin embedding technique. Routine hematoxylin and eosin sections were prepared, slides were examined, and histopathological findings were noted.

For retrospective cases, clinical data were obtained from histopathology records. Archived hematoxylin and eosin slides were retrieved, glass slides were made anonymous and were reviewed, and histopathological findings were

noted. Special stains were performed wherever necessary. The parameters included were the age, gender, anatomical location, size, clinical diagnosis and histopathological features.

The data was analyzed and compiled in the form of tables, pie chart and bar diagrams. Histological subtypes were classified according to the recent 2013 WHO classification of soft tissue tumors. The numerical variables were expressed in terms of percentage and quantitative variables were expressed in terms of standard deviation.

## 3. Results

The present study included a total of 270 soft tissue tumors among overall 1,696 tumor cases diagnosed during the five year period from January 2013 to December 2017. Benign soft tissue tumors constituted 14.7% of overall tumor incidence during the study period (Table 1). Among soft tissue tumors, benign soft tissue tumors accounted for 92.2% (Table 2).

The majority of benign STT belonged to the adipocytic group (64.3%), followed by nerve sheath tumors (19.7%) and fibroblastic tumors (6%) (Table 3). Benign tumors of skeletal muscle and chondro-osseous tumors were not observed in the study.

Benign soft tissue tumors showed a slight male preponderance with a male to female ratio of 1.04:1 (Table 4). The majority of them occurred between the third to fifth decades of life with peak incidence in the fourth decade (Table 5). The youngest patient was 2 years old, while the oldest was 77 years.

Benign STT occur all over the body as it is well known for its vast distribution. Most of the cases occurred in the trunk (39%) followed by head and neck region (22.9%) and upper extremity (20.9%). The dorsal aspect of truncal region was the most common site, especially for adipocytic tumors. Upper extremity was the common site for nerve sheath tumors. Majority of the benign tumors (73.5%) were well-circumscribed measuring less than 5 cm in size. Sixty-six percent of benign STT showed correlation with clinical diagnosis.

The various benign tumors encountered in the present study are shown in Table 6.

## 4. Discussion

Two hundred and forty-nine excisional biopsies of benign STT received in the histopathology department from January 2013 to December 2017, were analyzed. The primary aim of our study was to assess the benign STT with respect to incidence, age, gender, anatomical site distribution, gross and microscopic findings and to compare with prior similar studies and standard literature.

**Table 1:** Occurrence of benign soft tissue tumors

1	Total number of all types of tumors	1,696
2	Total number of benign soft tissue tumors	249
3	Percentage of benign soft tissue tumors	14.7%

**Table 2:** Occurrence of benign soft tissue tumors among all STT

1	Total number of soft tissue tumors	270
2	Total number of benign soft tissue tumors	249
3	Percentage of benign soft tissue tumors	92.2%

**Table 3:** Occurrence of various benign soft tissue tumor types

Tumor type	No. of cases (n=249)	Percentage
Adipocytic tumor	160	64.3%
Fibroblastic/myofibroblastic tumor	15	6.0%
Fibrohistiocytic tumor	6	2.4%
Smooth muscle tumor	0	0.0%
Pericytic tumor	3	1.2%
Skeletal muscle tumor	0	0.0%
Vascular tumor	10	4.0%
GIST	5	2.0%
Nerve sheath tumor	49	19.7%
Tumors of uncertain differentiation	1	0.4%

**Table 4:** Gender wise distribution of benign soft tissue tumor types

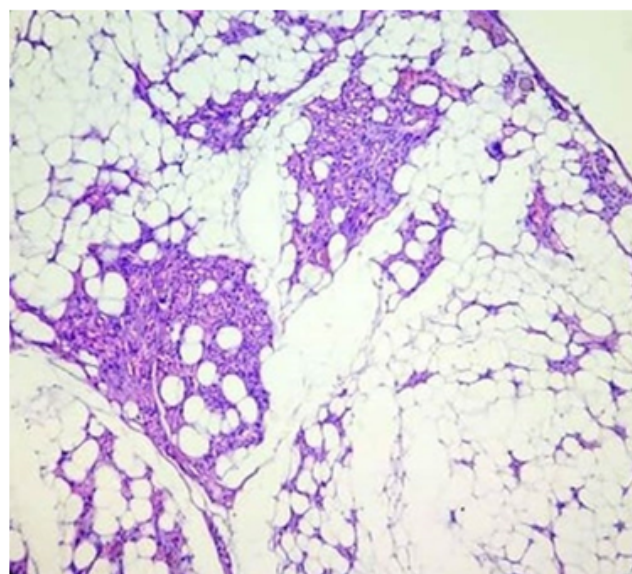
S. No.	Classification	Male	Percentage	Female	Percentage
1	Adipocytic tumor	85	34.1%	75	30.1%
2	Fibroblastic/myofibroblastic tumor	8	3.2%	7	2.8%
3	Fibrohistiocytic tumor	3	1.2%	3	1.2%
4	Pericytic tumor	1	0.4%	2	0.8%
5	Vascular tumor	4	1.6%	6	2.4%
6	GIST	3	1.2%	2	0.8%
7	Nerve sheath tumor	23	9.2%	26	10.4%
8	Tumors of uncertain differentiation	0	0.0%	1	0.4%
	<b>Total</b>	127		122	

**Table 5:** Age-wise distribution of benign soft tissue tumor types

S. No.	Type of Tumor	0 - 10 Years	11 - 20 Years	21- 30 Years	31 - 40 Years	41-50 Years	51 - 60 Years	61- 70 Years	71 - 80 Years
1	Adipocytic tumor	2	6	36	42	36	26	12	-
2	Fibroblastic/myofibroblastic tumor	-	6	4	2	3	-	-	-
3	Fibrohistiocytic tumor	-	1	1	2	1	-	-	1
4	Pericytic tumor	-	1	-	2	-	-	-	-
5	Vascular tumor	2	-	2	2	1	2	1	-
6	GIST	-	-	1	1	1	-	2	-
7	Nerve sheath tumor	1	7	6	14	10	7	3	1
8	Tumors of uncertain differentiation	-	-	-	1	-	-	-	-
	<b>Total</b>	5	21	50	66	52	35	18	2

**Table 6:** Distribution of various benign soft tissue tumors

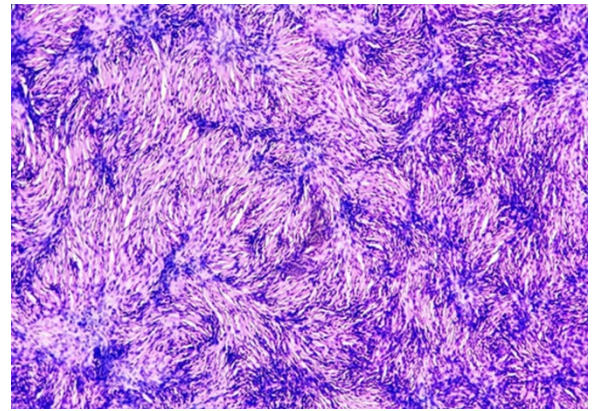
Histological Type	Tumor	No. of cases
Adipocytic (n=160)	Lipoma	139
	Fibrolipoma	12
	Intramuscular lipoma	2
	Spindle cell lipoma	2
	Angiolipoma	1
	Lipomatosis	1
	Myolipoma	1
	Atypical lipomatous tumor	2
	Angiofibroma	4
	Angiomyofibroblastoma	1
Fibroblastic / Myofibroblastic (n=15)	Myofibroblastoma - mammary type	1
	Myositis Ossificans	1
	Nodular fasciitis	1
	Dermatofibrosarcoma protuberans	3
	Desmoid fibromatosis	3
GIST (n=5)	Inflammatory myofibroblastic tumor	1
	GIST	5
Nerve Sheath Tumor (n=49)	Neurofibroma	36
	Schwannoma	11
	Neurofibromatosis	2
Pericytic Tumor (n=3)	Glomus tumor	1
	Myofibroma	1
	Glomangiopericytoma / Myopericytoma	1
Fibrohistiocytic tumors (n=6)	GCT of tendon sheath	3
	Pigmented villonodular synovitis	1
	Deep benign fibrous histiocytoma	2
	Arteriovenous malformation	3
Vascular Tumor (n=10)	Cystic lymphangioma	2
	Lymphangioma	4
	Kaposiform hemangioendothelioma	1
Uncertain differentiation (n=1)	Myoepithelioma	1

**Fig. 1:** Fibrolipoma in the foot with cut surface showing yellow greasy areas with grey-white areas**Fig. 2:** Fibrolipoma - Adipocytes admixed with fibrous tissue (H & E, 40X)

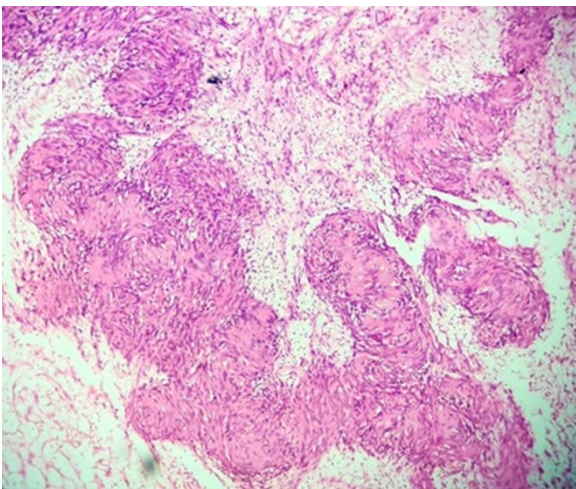




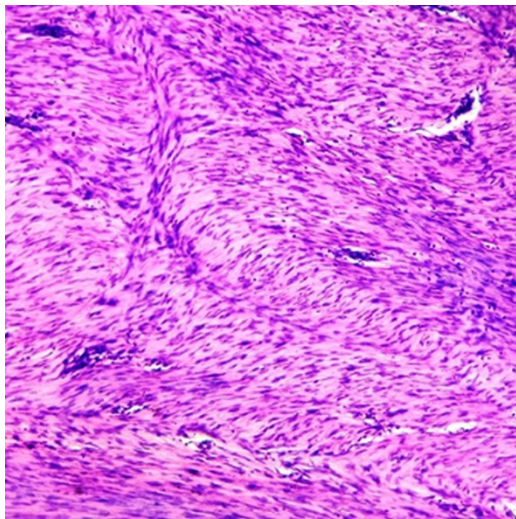
**Fig. 3:** Gross appearance of schwannoma showing grey white glistening cut surface



**Fig. 6:** Dermatofibrosarcoma protuberans showing tumor cells arranged in a storiform pattern (H & E, 40X)



**Fig. 4:** Schwannoma showing hypodense and hyperdense areas with Verocay bodies (H & E, 40X)



**Fig. 5:** Desmoid fibromatosis showing spindle-shaped cells of uniform appearance arranged in bundles and separated by abundant collagen (H & E, 100X)

#### 4.1. Incidence

During the study period of 5 years, 270 soft tissue tumors cases were received in the Department of Pathology constituting 15.9% of the overall incidence of tumor cases reported in the laboratory. Among the 270 soft tissue tumors, benign soft tissue tumors constituted 249 cases (92.2%).

The most frequent benign tumor type was adipocytic tumors accounting for 64.3% of benign STT followed by nerve sheath tumors (19.7%) which are similar to studies done by Batra et al<sup>7</sup> and Jain et al.<sup>8</sup>

The most typical presentation of adipocytic tumors is superficial masses seeking medical attention, and hence most of the patients reach the Out-Patient Department, thus leading to high incidence in number. Similar reasons were attributed to nerve sheath tumors as well. Painful lesion is another reason for increased incidence.<sup>9</sup>

From the observations, it is evident that lipoma is the commonest among soft tissue tumors with a peak occurrence in the third, fourth and fifth decade which is comparable with observations of Syam et al<sup>10</sup> and Ramnani et al.<sup>4</sup> There were 139 cases of lipoma followed by 12 cases of fibrolipoma occurring almost equally in both sexes. Almost all sites were involved in equal proportions. Two cases of atypical lipomatous tumors were observed.

In the present study, nerve sheath tumors were common next to adipocytic tumors which is concordant with prior studies in terms of age and site distribution. Among them, neurofibromas were the most common type as stated by other studies.<sup>7,8</sup>

In this study, five cases of benign GIST were encountered. Cases were reported in stomach, small intestine and rectum. Prior studies on soft tissue tumors had not included GIST except for study by Hassawi et al<sup>11</sup> in which one benign GIST was observed among 70 benign STT.

Vascular lesions were less in our study compared to prior studies as we have excluded capillary and cavernous hemangiomas due to their omission in the recent WHO classification of soft tissue tumors.<sup>12</sup>

#### 4.2. Gender

The present study revealed a slight male preponderance for the incidence of benign soft tissue tumors re-emphasizing the known facts among tropical population. Studies by Kransdorf et al,<sup>13</sup> Jain et al,<sup>8</sup> Ramnani et al<sup>4</sup> and Gudeli<sup>14</sup> also showed similar findings.

#### 4.3. Age

In the present study, the age incidence of benign STT ranged from 6 to 77 years, with peak occurrence in the fourth decade which is comparable to the study done by Vikas et al<sup>15</sup> where the age ranged from 4 to 80 years. The observations were concordant with other studies done by Prabhakar et al,<sup>16</sup> Syam et al<sup>10</sup> and Gudeli.<sup>14</sup>

#### 4.4. Site

In the present study, the most frequent site of benign tumors was trunk (48.3%) followed by upper extremity (30.5%) and head and neck (30%), with regard to site distribution. The observations are in concordance with analysis by Batra et al<sup>7</sup> and Vikas et al.<sup>15</sup>

The reason for high incidence of benign tumors in the truncal region is due to the pattern of presentation and distribution of cell of origin.

#### 4.5. Size

On gross examination, majority (71.9%) of benign soft tissue tumors were well – encapsulated and presented with a size less than 5 cm, which has been noted by Jensen et al<sup>17</sup> where the comparative figure was 95%.

#### 4.6. Clinicopathological correlation

Prior literature studies state that soft tissue tumors have good clinicopathological correlation provided the clinical presentation is in classical mode.<sup>6</sup> Similar findings were observed in our present study as well. Benign tumors had good clinical correlation with significant acceptance rate (68.2%) concurring with previous observations done by Ramnani et al.<sup>4</sup> The reasons attributed to good clinicopathological correlation are typical clinical presentation in terms of inspection, site, age and other clinical parameters which were reflected in the corresponding histomorphology.

#### 5. Conclusion

The incidence of soft tissue tumors is much higher than assumed in the eastern coastal region. In many instances,

atypical presentation is noted and hence, clinical profile, as well as histopathological study, should go hand in hand to make an effective and complete diagnosis of soft tissue tumors.

#### 6. Source of Funding

None.

#### 7. Conflict of Interest

None.

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## Author biography

**Sowmya Srinivasan** Professor and Head

**Shameera Begum** Tutor

**Shanmugasamy Kathirvelu** Associate Professor

**Anandraj Vaithy K** Associate Professor

**Cite this article:** Begum S, Kathirvelu S, Vaithy K A, Srinivasan S. Clinico-pathological study of soft tissue tumors. *Indian J Pathol Oncol* 2020;7(2):259-265.