

# Cytomorphological Analysis of Soft Tissue Tumors

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## ABSTRACT

**Background:** Soft tissue is represented by the voluntary muscles, fat and fibrous tissue along with the vessels serving these tissues. The incidence of benign soft tissue tumors is ten times that of malignant soft tissue tumors. Fine Needle Aspiration Cytology (FNAC) often considered as the initial mode of investigation in evaluation of soft tissue tumors. Morphology still forms the cornerstone in determining the prognosis in addition to grading and staging. Aims and objectives: To evaluate cytological features of various soft tissue tumors with histopathological correlation wherever available. **Materials and Methods:** A Retrospective study was done over a period of 3 years taking all cytologically diagnosed cases of soft tissue tumours. All the FNAC smears of soft tissue tumors were examined under light microscopy and cytological features were studied. Corresponding histopathology slides were retrieved and histopathological evaluation was done wherever available. Results obtained were tabulated and analyzed. **Results:** A total of 406 cases of soft tissue tumors were diagnosed by FNAC. Commonest age group of presentation was 30-39 years (26.6%). In the present study female predominance was noted (57.3%). Out of 406 cases, 398 were benign tumour (98%) and 8 cases were malignant (2%). Most common site of occurrence of soft tissue tumors was back (14.7%) followed by thigh (7.3%). Majority of benign tumors were lipoma and its variants (89.6%). 8.5% of all the benign tumors were of spindle cell origin. Histopathological diagnoses were available for 360 cases only(88.6%). Out of them 335 were lipomas (93%), 11 were benign neural tumors (3%) and 6 malignant soft tissue tumors(1.6%). **Conclusion:** Cytological diagnoses correlated with histopathology in majority of cases.

**Keywords:** Soft tissue tumors, Sarcoma, Cytology, Histopathology.

## INTRODUCTION

Soft tissue, defined as nonepithelial extra skeletal tissue of body exclusive of reticuloendothelial system, supporting tissue of glia and various parenchymal organs. It is represented by the voluntary muscles, fat and fibrous tissue along with the vessels serving these tissues.<sup>[1]</sup> Non neoplastic lesions involving soft tissue are seldom seen, and hence soft tissue pathology is invariably restricted to neoplasms.<sup>[2]</sup> The incidence of benign tumors is ten times that of malignant tumors. Fine Needle Aspiration Cytology (FNAC) often considered as the initial mode of investigation in evaluation of soft tissue tumors. Histomorphology still forms the cornerstone in determining the prognosis in addition to grading and staging.

### Aims and objectives

To evaluate cytological features of various soft tissue tumors and to correlate with histopathology wherever available.

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## MATERIALS AND METHODS

A retrospective study is done in the department of Pathology, Shimoga Institute of Medical Sciences, Shimoga. All cytologically diagnosed cases of primary soft tissue tumors, over a period of 3 years from 2016-2018 were taken up for the study. Complete clinical details including demographic details and radiological findings of all the cases were collected from records. Metastatic soft tissue tumours, haemangiomas, lymphangiomas and all inadequate, and unsatisfactory samples were excluded from the study.

The FNAC smears of cases diagnosed as soft tissue tumors were collected. Both dry and wet fixed smears (satinated with Leishman stain and Haematoxylin & Eosin stain respectively) of soft tissue tumors were examined under light microscopy, evaluated and categorized as benign and malignant soft tissue tumours. All the corresponding histopathological slides of available cases which were cytologically diagnosed as soft tissue tumors were retrieved from the department and studied. Results obtained were tabulated and statistically analyzed.

## RESULTS

**Table 1: Age Distribution of soft tissue tumours.**

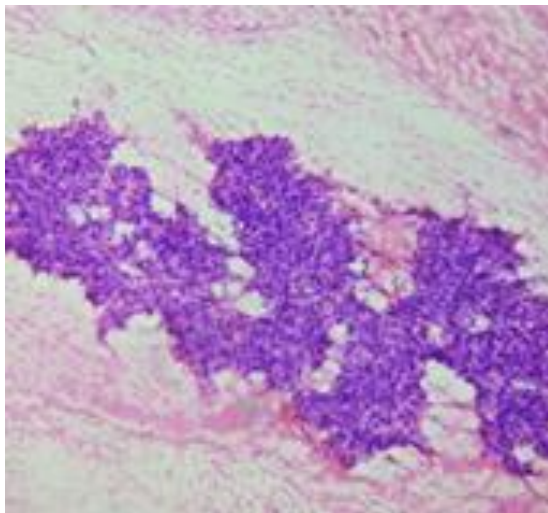
Sl no	Age group	No of cases
1	0-9	5(0.9%)
2	10-19	11(2.7%)
3	20-29	89(21.9%)
4	30-39	108(26.6%)
5	40-49	91(22.4%)
6	50-59	55(13.5%)
7	60-69	40(9.8%)
8	70-79	11(10.4%)
9	80-89	01(0.2%)

**Table 2: Distribution of various sites of soft tissue tumours**

Sl no	Sites	No. of cases
1	Trunk	240(59.1%)
2	Upper extremity	67(16.5%)
3	Lower extremity	57(14.0%)
4	Head and neck	42(10.3%)

**Table 3: Distribution of soft tissue tumours on FNAC**

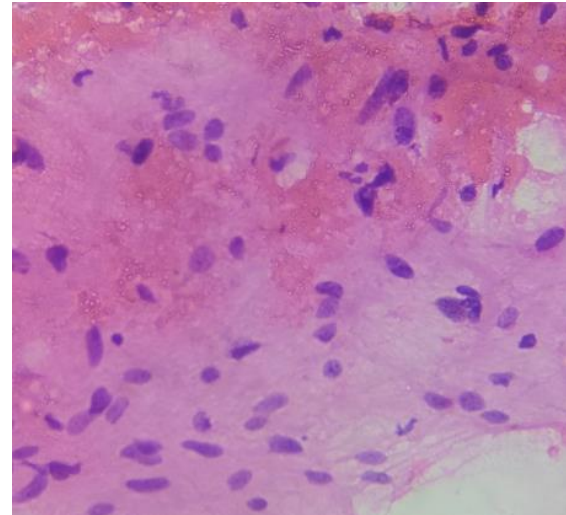
Sl no	Cytology	Number of cases
1	Lipoma	375(92.3%)
2	Neurofibroma/schwannoma	8(1.9%)
3	Benign spindle cell tumour	17(4.2%)
4	Soft tissue sarcoma	6(1.5%)



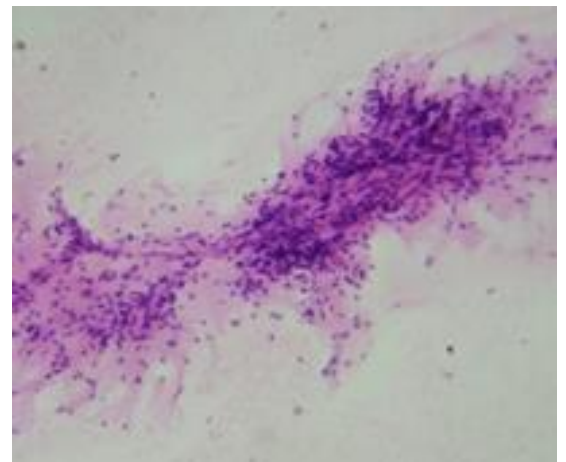
**Figure 1: Cytology of benign spindle cell tumors (H&E, X 40)**

A total of 406 cases of soft tissue tumors were diagnosed by FNAC. Commonest age group of presentation was 30-39yrs (26.6%) (Table 1). In the present study female predominance was noted (57.3%). Most common site of occurrence of soft tissue tumors was back region (14.7%) followed by thigh region (7.3%) (Table 2). On FNAC, majority of benign tumors were lipoma and its variants followed by benign tumors of spindle cell origin (Table 3). Of 406 cases, 375 were lipomas (92.3%), 17 were benign spindle cell tumors (4.2%), 8 benign neural tumors (1.9%) and 6 cases were malignant soft tissue sarcomas (1.5%). Histopathological diagnoses were available for 360 out of 406 cases (88.6%). Out of these, 335 lesions were lipomas comprising of 93% of overall histology of soft tissue

tumors. There were totally 11 cases of benign peripheral nerve sheath tumors (3%) and 6 malignant soft tissue sarcomas comprised of 1.6% of total soft tissue tumors. Cytological diagnoses correlated with histopathology diagnoses in majority of the cases. In our study diagnostic accuracy, sensitivity, specificity, predictive value was 98.6 %, 99.4%, 99.1%, 96.9% respectively.



**Figure 2: Cytology of benign neural tumors (H&E, X 40)**



**Figure 3: Cytology of malignant soft tissue tumors (H&E, X 40)**

## DISCUSSION

Soft tissue tumours are rare and form a wide range of tumours which are classified based on histogenesis.<sup>[3]</sup> FNAC has gained utmost importance as it is a safe, cost effective, easy to perform, noninvasive and a simple diagnostic tool in initial diagnosis of soft tissue tumours.<sup>[3]</sup> FNAC is a valuable tool as cytologists can differentiate primary malignant soft tissue tumours from benign lesions and from other malignancies like metastatic tumours or malignant lymphomas or tumours of dermal appendages.<sup>[4]</sup>

In our study, maximum number of cases was in the age group of 30 -39 years. This was in comparison with a study done by Rekhi B et al,<sup>[5]</sup> and Soni PB et.al.<sup>[4]</sup> In the present study, female preponderance was noted (57.3%).

In the current study commonest site of involvement was trunk (59.1 %) followed by upper extremity (16.5%). This is in accordance with study done by Jain v et.al<sup>6</sup> and Arul P et al.<sup>[7]</sup>

In the present study, majority of the tumours on cytology were benign (98.5 %) and remaining 1.5 % were malignant tumours. This was consistent with the study done by Soni PB et al.<sup>[4]</sup>

Of these benign tumours, lipomas were the commonest (92.3%). Majority of these lipomas were located in the back region. This was in accordance with study done by Bezabih et. al.<sup>[8]</sup> and Jain v et.al<sup>6</sup>. All the cases of lipoma in our study yielded a greasy aspirate which on microscopy showed fragments of mature fibrofatty tissue against background of fat droplets. This was confirmed on histopathology as lipoma and its variants.

Benign spindle cell tumors (4.2%) and benign neural tumors (1.9%) were the next category among the benign soft tissue tumors in our cytology study. These cases of benign spindle lesions showed mild to moderate cellularity comprising of bland spindle shaped cells without atypia, lying singly and in loose clusters against a myxoid and haemorrhagic background [Figure 1]; while benign neural tumours showed mainly cohesive spindle cell clusters with long, slender, buckled nuclei having pointed ends and indistinct cytoplasm with focal pallasading arrangement [Figure 2]. Soni PB et.al<sup>4</sup> also observed the same findings in their study.

Out of 17 cases of benign spindle cell lesions on FNAC, 8 cases correlated with histopathology findings and showed features of Benign Fibrohistiocytoma, Desmoid tumour, hamartoma and Glomus tumour; 3 cases were diagnosed as benign peripheral nerve sheath tumours and 6 cases were lost for follow up.

All the cases of Neurofibroma/ Schannoma on cytology were confirmed by histopathology.

In the present study, all the malignant tumours on cytology yielded a bloody aspirate and showed high cellularity consisting of clusters of atypical spindle cells with high N/C ratio, oval to spindled, irregular nuclei and scant cytoplasm admixed with bizarre cells, increased atypical mitoses and multinucleated tumour giant cells against a haemorrhagic and necrotic background. This was consistent with study done by Sengupta S et al.<sup>[9]</sup> and Arul P et al.<sup>[7]</sup>

In the present study, all the cases of malignant soft tissue sarcomas correlated well on histopathology being diagnosed as various types of soft tissue sarcomas like malignant fibrous histiocytoma, malignant peripheral nerve sheath tumours, Rhabdomyosarcoma and Liposarcoma except one

case which was diagnosed as soft tissue tumour of unknown malignant potential (STUMP).

In our study, cytodiagnoses and histopathological diagnoses showed accurate correlation in 97.2% cases. This was in accordance with the study done by Rekhi B et al.<sup>[5]</sup>

In our study diagnostic accuracy, sensitivity, specificity and predictive value was 98.6 %, 99.4%, 99.1% and 96.9% respectively and this is comparable to the study done by Jain V et al.<sup>[6]</sup> and Dey et al.<sup>[10]</sup>

## CONCLUSION

FNA plays an important role in the early diagnosis of soft tissue tumours. We would like to emphasize the fact that there is a good correlation of FNA with histopathology in the diagnosis of soft tissue tumours. Cytological evaluation when used along with radiology and clinical findings can be a powerful tool in the multidisciplinary approach of management of soft tissue tumours.

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