



Histopathological Study of Soft Tissue Tumors in a Tertiary Care Hospital

Dr. Himali Makwana¹; Dr. Ashwini Shukla^{2*}; Dr. Niketa Roy³; Dr. Suchi Godhani⁴; Dr. Neha Pandya⁵

¹ 2nd year Resident, Pathology Department SMIMER (Surat Municipal Institute of Medical Education and Research), Opp. Bombay Market, Umarwada, Surat, Gujarat 395010

² Professor, Pathology Department SMIMER (Surat Municipal Institute of Medical Education and Research), Opp. Bombay Market, Umarwada, Surat, Gujarat 395010

³ Associate Professor, Surat Municipal Institute of Medical Education and Research

⁴ Assistant Professor, Surat Municipal Institute of Medical Education and Research

⁵ Tutor, Surat Municipal Institute of Medical Education and Research

OPEN ACCESS

Corresponding Author

Dr. Ashwini Shukla

Professor, Pathology Department SMIMER (Surat Municipal Institute of Medical Education and Research)

Received: 02-03-2024

Accepted: 14-03-2024

Available online: 05-04-2024



©Copyright: IJMPR Journal

ABSTRACT

Introduction: Soft tissue refers to non-epithelial tissue, 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. Soft tissue tumors (STT) are categorized into benign, intermediate and malignant. The incidence of benign STT is higher when compared to malignant tumors. Histopathology is considered the gold standard method for the diagnosis of soft tissue tumors. Different special stains along with Immunohistochemistry are applied to increase the diagnostic accuracy of soft tissue tumors.

Material and Method: The study was conducted on soft tissue tumors over the period from July 2022 to December 2023, with a total of 189 cases in the Department of Pathology.

Results: : A total of 189 soft tissue tumor biopsy specimens were received in the pathology department including the age range 1 to 60 years and gender (Male/Female). Most common age group is 20-40 years (40.74%). Among them most of tumors are Benign 169(89.41%), some are Malignant 20(10.58%). The most common benign soft tissue tumor were Leiomyoma, Lipoma, Hemangioma, Schwannoma and Lymphangioma, Angiomyolipoma, desmoid tumor, nodular fasciitis, glomangiopericytoma, benign fibrous histiocytoma. The most common benign soft tissue tumor was Leiomyoma 74(39.15%), followed by Lipoma 40(21.16%). Benign soft tissue tumors showed female preponderance with peak incidence in 3rd and 4th decade. Malignant tumor was Dermatofibrosarcoma protuberance, malignant fibrous histiocytoma, liposarcoma, fibrosarcoma, leiomyosarcoma, smooth muscle tumor of uncertain malignant potential, epithelioid sarcoma, primitive neuroectodermal tumor, solitary fibrous tumor, undifferentiated sarcoma.

Conclusion: Benign soft tissue tumors were relatively more common than the malignant tumors. Leiomyoma was the commonest benign soft tissue tumor followed by Lipoma. Histopathological diagnosis of soft tissue tumors is important for further management of patients. Histopathological study along with IHC wherever necessary, should go hand in hand to make an effective and complete diagnosis of soft tissue tumors.

Key Words: Soft tissue tumors, Benign, Malignant, Histopathological study, Immunohistochemistry.

INTRODUCTION

Soft tissue refers to non-epithelial tissue; it is supporting tissue which are extra skeletal excluding joints, central nervous system, skeleton, hematopoietic and lymphoid tissues. Soft tissue tumors can occur at any age⁽¹⁾. It has been

noted that the histological distribution of soft tissue tumors are rather specific for a particular age group at a particular anatomical site.^(2,3) Both benign and malignant soft tissue tumors commonly present as a painless mass. Examples of soft tissues are Adipose tissue, Fibrous tissue, Vascular tissue, skeletal muscle tissue, Smooth muscle and Nerve sheaths.

They arise nearly everywhere in the body, the most important location being the extremities, trunk, abdominal cavity and head and neck region.⁽⁴⁾

Soft tissue tumor are categorized into benign, intermediate, malignant. The incidence of benign soft tissue tumors is higher when compared to malignant tumors.⁽⁵⁾

The aetiology of most benign and malignant tumors of soft tissue is unknown. In rare cases genetic and environmental factors, irradiation, viral infection and immunodeficiency are associated with the development of usually malignant soft tissue tumors.⁽⁶⁾

Soft tissue tumors are diagnosed by light microscopy and with the aid of special stain. Soft tissue tumors need through clinical evaluation supported by radiological evaluation. FNAC in addition plays a vital role in diagnosis of superficial mass. Histopathology is considered the gold standard method of diagnosis of soft tissue tumors. Different special stains like, Periodic Acid Schiff Reagent (PAS) stain, Masson's trichrome, Van Gieson, Reticulin stain and Immunohistochemistry is applied to increase the diagnostic accuracy of soft tissue tumors.⁽²⁾

WHO Classification of soft tissue tumors⁽⁷⁾

- Adipocytic Tumors
- Fibroblastic/Myo fibroblastic Tumors
- Fibro histiocytic Tumors
- Smooth Muscle Tumors
- Pericytic(Perivascular) Tumors
- Skeletal Muscle Tumors
- Vascular Tumors
- Chondro-osseous Tumors
- Tumors of Uncertain Differentiation

- **Markers most commonly used to correlate with histogenesis⁽⁸⁾**

MATERIALS AND METHODS

Antibodies	Expressed by
Vimentin	Sarcomas, Melanoma
Desmin	Benign and Malignant smooth and skeletal muscle tumors
Neurofilaments	Neuroblastic tumors
Smooth muscle Actin	Benign and Malignant smooth muscle tumors, Myo fibroblastic tumors
Myogenin, Myo D1	Rhabdomyosarcoma
S-100 Protein	Benign and Malignant peripheral nerve sheath tumors, cartilaginous tumors, Melanoma
Epithelial membrane antigen	Carcinomas, Epithelioid sarcoma, Synovial sarcoma
CD34	Benign and malignant vascular tumors, solitary fibrous tumors, Dermatofibrosarcoma protuberans
CD99	Ewing sarcoma/primitive neuroectodermal tumor
CD68	Macrophage, Fibro histiocytic tumors

It is a Case series of soft tissue tumors over a period of July 2022 - December 2023(1.5 year) with total number of 189 cases in department of pathology, SMIMER hospital,Surat.10 % Formalin fixed paraffinembedded blocks were prepared. Samples in histopathological laboratory received from different departments with proper identification, labelling in the form. This form contains other basic information such as name, age, sex, histopathology examination number, specimen number, date of sample collected, location of tumor, clinical presentation and other investigations. Tissue fixed in 10% buffered formalin. Grossing was carried out after tissue fixation. At least 4-5 sections from tumor and one from each margins was given. These sections were processed in automated tissue processor machine, and sections of a thickness of tissue 4-5 microns were taken with rotatory microtome and prepared for routine stain with hematoxylin and eosin to examine under light microscope for histopathological diagnosis.

Special stains such as Periodic acid Schiff reagent(PAS), Masson's Trichrome, Van Gieson, Reticulin stain and Immunohistochemistry was performed wherever needed to aid the diagnosis.

Table (1): Markers most commonly used to correlate with histogenesis.

Histogenesis	Markers
1- Mesenchymal (general)	Vimentin
2- Epithelial	Cytokeratin, Epithelial Membrane Antigen (EMA)
3- Smooth muscle	Desmin, actin (smooth muscle actin)
4- Skeletal muscle	Myoglobin
5- Fibrohistiocytic	Vimentin, CD68, factor XIIIa
6- Melanocytes	HMB45. S – 100 protein
7- Neuronal	S – 100 protein, glial fibrillary acidic protein
8- Endothelial	Factor VIII, CD ₃₄ , factor XIIIa
9- Neuroendocrine	Neuron-specific enolase (NSE), chromogranin, synaptophysin CD ₉₉
Ewing's sarcoma / PNET	
PNET = primitive neuroectodermi tumor	

RESULTS

A total of 189 cases of Soft Tissue Tumors were studied.

Table:1 Gender wise distribution of patients in the study groups

Sex	No. of Cases	Percentage
Male	47	24.86%
Female	142	75.13%
Total	189	100%

Female 142(75.13%) predominance was seen compared to male 47(24.86%).

Table2: Age wise distribution of patients in the study groups

Age wise distribution	Number of patients	Percentage
< 20years	15	7.93%
21-40years	77	40.74%
41-60years	73	38.62%
> 60years	24	12.69%
Total	189	100%

In our study 40.74% of the patients were in the age group in 21-40 years. The second most common age group affected was 41-60 years, comprising of 38.62%.

The youngest patient in our study was 2 years of age and the oldest was 70 years of age.

Table:3 Tumors according to classification

Soft Tissue Tumors	No. of Cases	Percentage
Benign	169	89.41%
Malignant	20	10.58%
Total	189	100%

Table 4: Benign and Malignant soft tissue tumors- gender wise distribution

Soft tissue tumors	Male case	%	Female case	%
Benign	41	24.26	128	75.73
Malignant	06	30	14	70

Benign soft tissue tumor was slightly common in females 128(75.73%) than males41(24.26%).

Table 5: Tumors according to Histological type

Histological Type	No of cases	Percentage
Muscular tissue	70	37.03%
Adipose tissue	40	21.16%
Fibrous tissue	29	15.34%
Vascular tissue	27	14.28%
Nerve tissue	16	8.46%
Gastrointestinal stromal tumour	01	0.52%
Undifferentiated sarcoma	02	1.05%
Miscellaneous	04	2.11%
Total	189	100%

In our study most of benign soft tissue tumors are of Muscular tissue (37.03%) followed by adipose tissue (21.16%), Fibrous tissue (27%), Vascular tissue (14.28%) and Nerve tissue (8.46%).

Most common tumor was Leiomyoma followed by Lipoma, Fibroma, Haemangioma and Schwannoma.

In our study, 4 cases was reported with diagnosis as we could not give differentiated diagnosis because of limited immunohistochemistry.

Table 6: Correlation of age with histo-pathological lesion of soft tissue tumors

Histological type	Male cases	%	Female cases	%
Muscular tissue	00	00	70	100
Adipose tissue	15	37.50	25	62.50
Fibrous tissue	12	41.37	17	58.63
Vascular tissue	12	44.44	15	55.55
Nerve tissue	10	66.66	06	37.05
Gastrointestinal stromal tumor	01	100	00	00
Undifferentiated sarcoma	02	100	00	00
Miscellaneous	03	75	01	25

In our study Muscular (100%) and adipose tissue (62.50%) were commonly seen in Female. Nerve tissue were most commonly seen in Male (66.66%).

Table 7: No of cases of soft Tissue Tumors

Tumor	No. of Cases
Leiomyoma	70
Lipoma	40
Fibrolipoma	2
Schwannoma	9
Desmoid tumor	2
Neurofibroma	7
Hemangioma	15
Arteriovenous malformations	3
Lymphangioma	2
Nodular Fasciitis	2
Glomangiopericytoma	3
Angiomyolipoma	1
Angiolipoma	1
Benign Fibrous Histiocytoma	5
Fibroma of tendon sheath	3
Gastrointestinal stromal tumor	1
Dermatofibroma Sarcomatous Protuberance	4
Smooth Muscle Tumor of Uncertain Malignant potential	1
Primitive Neuroendodermal Tumor	4
Leiomyosarcoma	2
Liposarcoma	1
Fibrosarcoma	2
Malignant fibrous Histiocytoma	2
Undifferentiated Sarcoma	1
Uncertain differentiation of Epitheloid Sarcoma	1
Solitary fibrous Tumor	1
Miscellaneous	4

- **Gross images for soft tissue tumors**



Figure 1: Angioliipoma



Figure 2: Liposarcoma



Figure 3: STUMP



Figure 4: Epitheloid Sarcoma

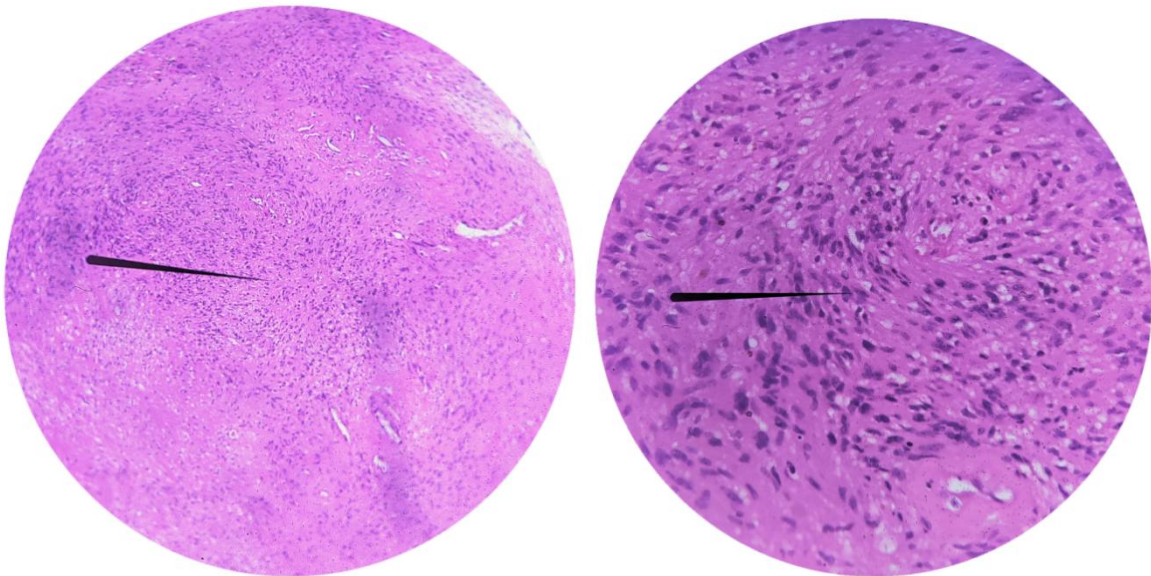


Figure 1 : Schwannoma (H&E 4X,40X)

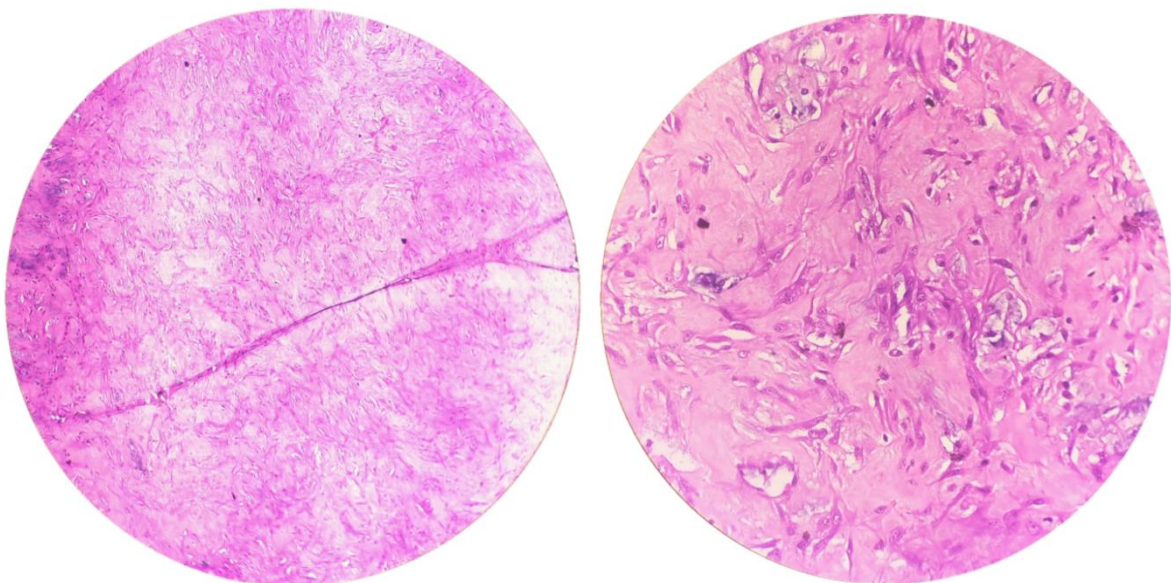


Figure 2 : Nodular Fasciitis (H&E 10X,40X)

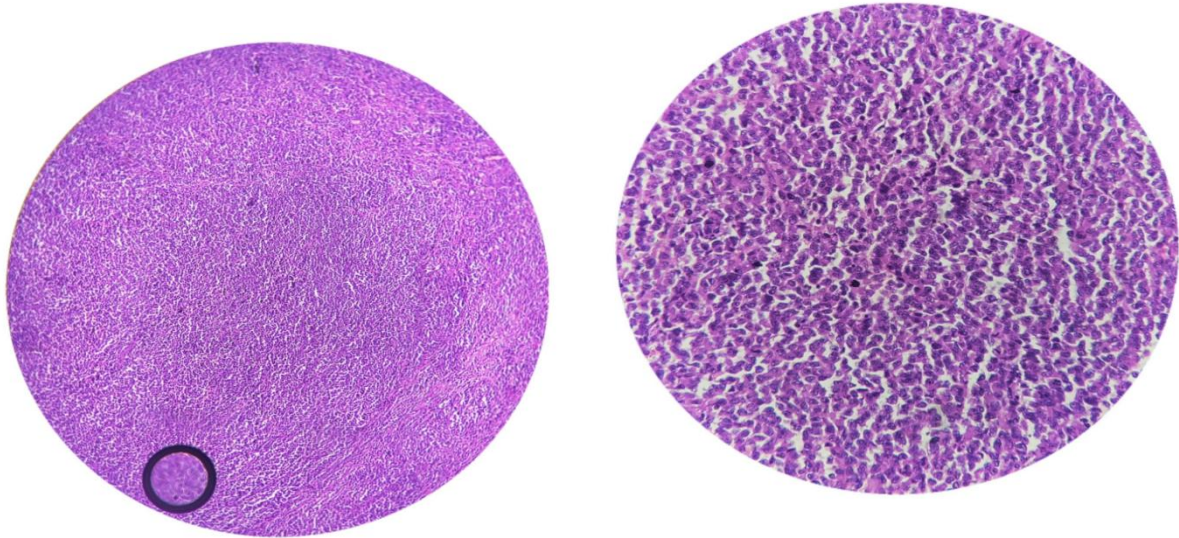


Figure 3: Primitive Neuroectodermal Tumor(H&E 4X,10X)

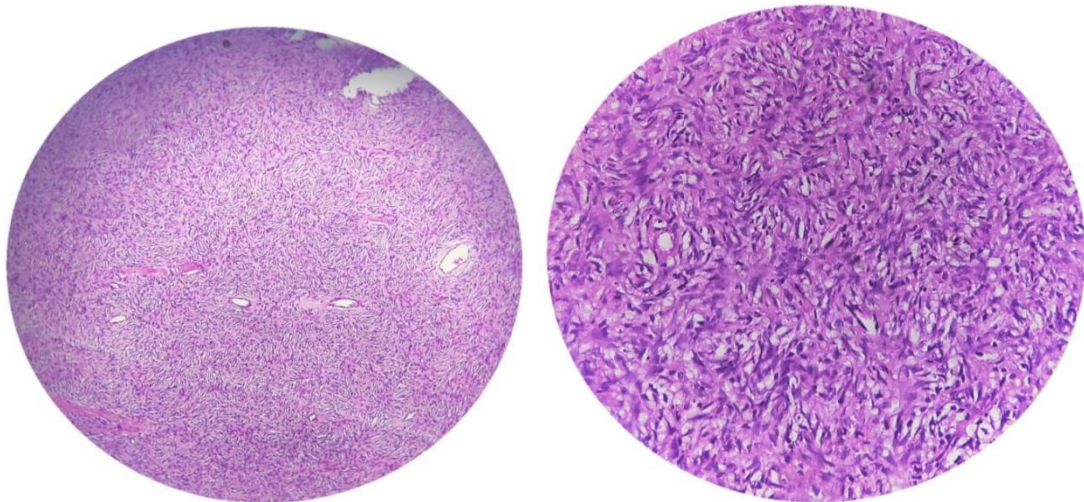


Figure 4: Dermatofibrosarcoma Protuberance (H&E 4X,10X)

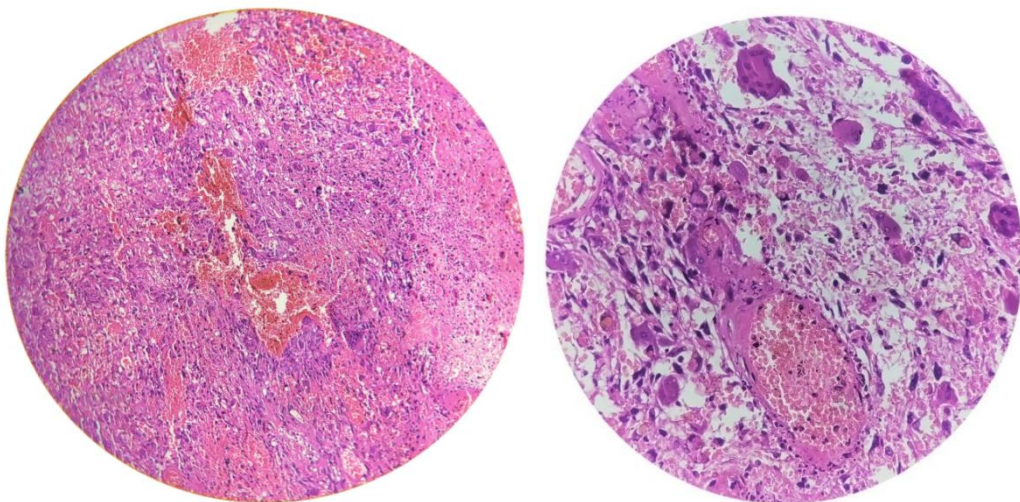


Figure 5: Malignant Fibrous Histiocytoma (H&E 4X,40X)

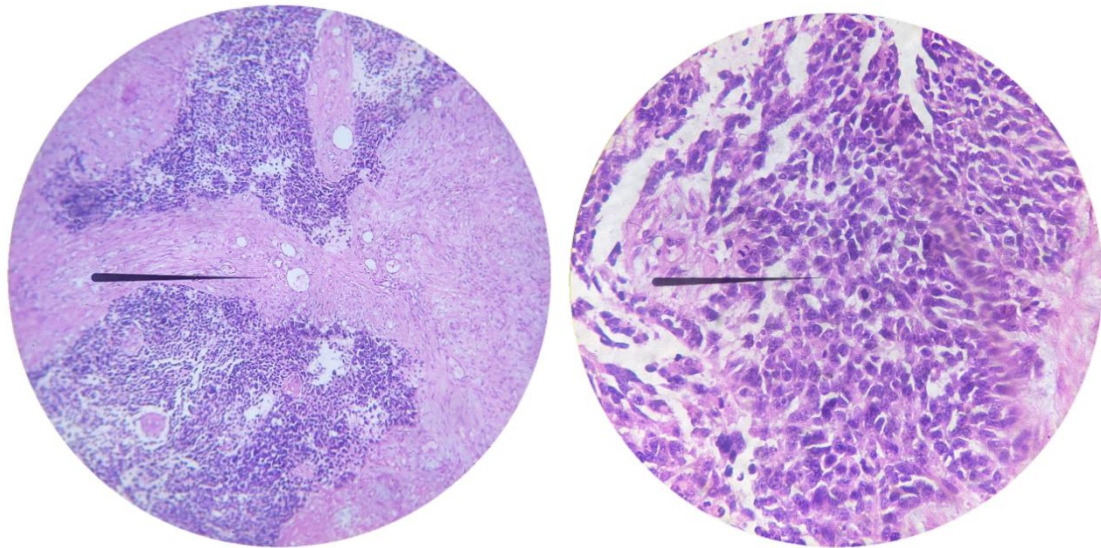


Figure 6: Undifferentiated Sarcoma (H&E 4X,40X)

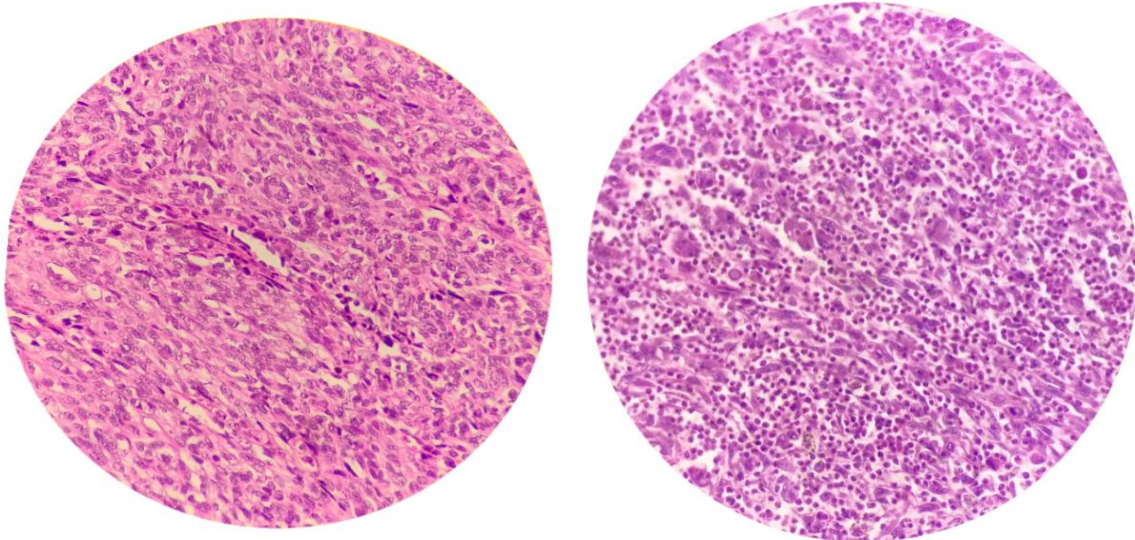
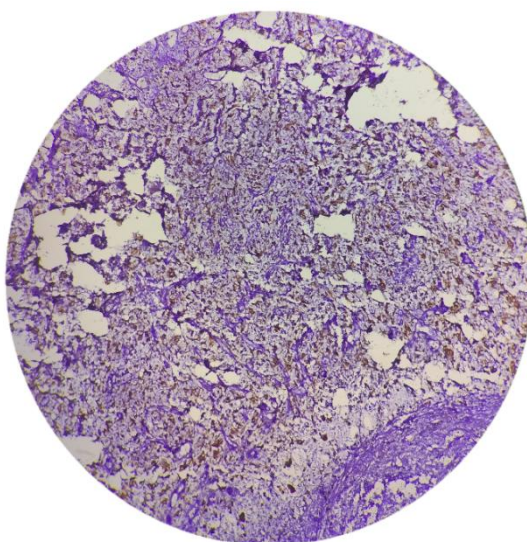


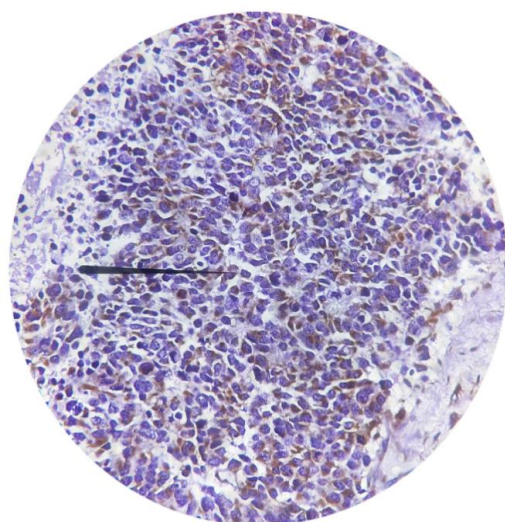
Figure 7: STUMP(H&E 40X)

Figure 7: Epithelioid Sarcoma(H&E 40X)

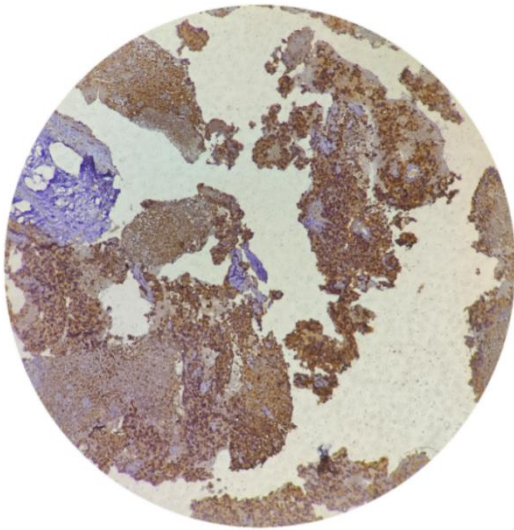
IMMUNOHISTOCHEMISTRY



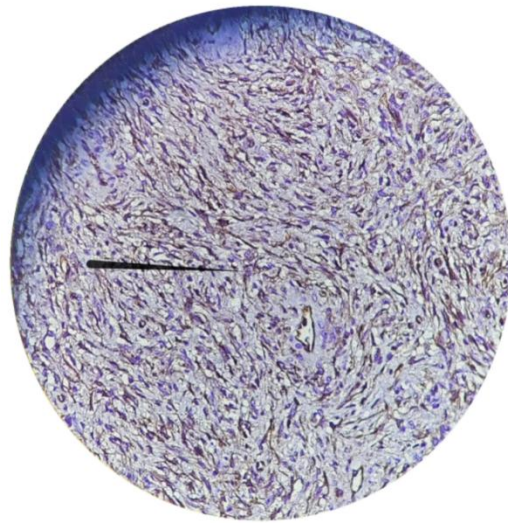
Malignant Fibrous Histiocytoma (CD 68 positivity)
(Cytoplasmic Positivity)



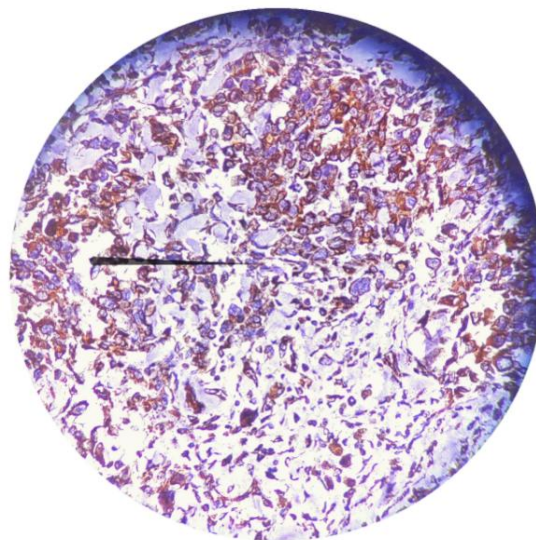
Undifferentiated Sarcoma (Vimentin positivity)
(Membranous Positivity)



PNET (CD99 positivity)
(Membranous Positivity)



DFSP (CD34 positivity)
(Membranous Postivity)



Epithelioid sarcoma (Vimentin positivity)
(Membranous Positivity)

DISCUSSION

Enzinger F.M &W.W Weiss, Myhre Jenson et al.⁽¹¹⁾ Reported an incidence of soft tissue tumors as <2% respectively.

Soft tissue tumors are diagnosed in excisional biopsy of tumor mass and it is most appropriate method of diagnosis of soft tissue tumors. The histological diagnosis and grading is mandatory as it has therapeutic and prognostic relevance.⁽¹²⁾

Soft tissue tumors constitute a large and heterogeneous group of neoplasm that involves muscles, fat, fibrous tissue with their supplying vessels and peripheral nerves.

Soft tissue tumor is a disease of the adult occurring most commonly in person between 20-60(40.74%) years of age except few types occur in young children.

However the study was restricted to documentation the information about incidence, sex, age, and site distribution of soft tissue tumors and confirming the morphological diagnosis with special stains and Immunohistochemistry.

Soft tissue tumors vary from most common Benign soft tissue (89.41%) Leiomyoma followed by Lipoma, Haemangioma, Schwannoma.

Among benign tumors leiomyoma was most commonly seen in females and very common in uterus followed by hemangioma and Lipoma while in male most common was Lipoma followed by schwannoma.

In neural origin soft tissue tumor schwannoma most common then neurofibroma.
Thus the incident of Benign soft tissue tumors are more common than Malignant soft tissue tumors.

In our study cases of fibrohistiocytic tumor were reported. In 4 cases of dermatofibrosarcoma protuberance, 2 cases of malignant fibrous histiocytoma , 1 case of fibrosarcoma.

In our study In malignant soft tissue tumors 2 cases of Leiomyosarcoma and 2 cases of STUMP(Uterine Smooth Muscle Tumor Of Uncertain Malignant Potential) ,liposarcoma , Malignant fibrous histiocytoma, Epithelioid sarcoma, Solitary fibrous tumor and Dermatofibrosarcoma protuberance, primitive neuroectodermal tumor.

In our study, 4 cases was a non s diagnosis because of limited immunohistochemistry available.

Age/Sex	Site	Differential Diagnosis	Immunohistochemistry	Advice for confirmation
48Yr/Male	Umbilical Swelling	1) Solitary fibrous tumor 2) Neurofibroma 3) Inflammatory Myofibroblastic Tumor	S-100 -ve CD34 -ve	Vimentin Smooth Muscle Actin
35Yr/Female	Right thigh swelling	1) Intraepidermal nevus-Spitz nevus 2) Benign fibrous histiocytoma	CD34 +ve	Factor IIIa
56Yr/Male	Right thigh mass	1) Epithelioid Sarcoma 2) Malignant peripheral Nerve Sheath Tumor	CK-focal positive EMA-focal positive S100-Inconclusive	CD99 CA125
60Yr/Male	Swelling over nape of neck	1) Inflammatory Myofibroblastic Tumor 2) Rhabdomyoma		Smooth muscle actin Myoglobin ALK

Tumors	Marker Positivity
Dermatofibroma sarcomatous Protuberance(DFSP)	CD34+
Malignant fibrous histiocytoma	CD68 + , Vimentin + , Actin +
Epithelioid Sarcoma	vimentin + , CD 34 +
Fibrosarcoma	vimentin + ,CD34+
Schwannoma ,	S-100+(diffuse staining)
Undifferentiated Sarcoma	Vimentin + , CD 68 +
Dedifferentiated Liposarcoma	S-100+ ,SMA +
Primitive neuroendodermal tumor	CD99 +
Benign fibrous Tumor	Vimentin+
Leiomyoma	SMA+ , Vmentin+,S100-
Hemangiopericytoma	CD34 + , SMA+

Various Immunohistochemistry used for Various Dagnosis

Soft tissue tumors are diagnosed in excisional biopsy of tumor mass and it is most appropriate method of diagnosis of soft tissue tumors. The histological diagnosis and grading is mandatory as it has therapeutic and prognostic relevance.
IHC was required mostly in diagnosis of soft tissue tumors as adjacent to histology.

Rate of Benign Soft Tissue Tumors

The rate of benign soft tissue tumors is 89.41% in the present study which is in close accordance to Gayatri Gogoi et al.⁽¹⁾ (2017) whose study showed92.80% and Begum et al. ⁽⁵⁾shows (2020) 92.2%.There is a variation from Simon Mulugeta Teferi et al.⁽⁶⁾(2022) which showed 38.90%.

Frequency of age distribution in Soft tissue tumors

In the present study, majority of the soft tissue tumors were found in the age group of 21-40 years which resembles closely to the study conducted by Simon Mulugeta Teferi et al.⁽⁶⁾ (2022) and Begum et al.⁽⁵⁾ (2020)

Table 1: Frequency of Benign and Malignant Soft Tissue Tumors:

Author and year of study	Benign	Malignant
Gayatri Gogoi et al. ⁽¹⁾ (2017)	92.80%	7.60%
Simon Mulugeta Teferi et al. ⁽⁶⁾ (2022)	61.10%	38.90%
Begum et al. ⁽⁵⁾ (2020)	92.2%	7.8%
Present study	89.41%	10.58%

Table 2: Frequency of Genderwise Soft Tissue Tumors:

Author and year of study	Male	Female
Gayatri Gogoi et al. ⁽¹⁾ (2017)	21% (183)	79% (611)
Simon Mulugeta Teferi et al. ⁽⁶⁾ (2022)	50.60% (121)	49.40% (118)
Begum et al. ⁽⁵⁾ (2020)	51.00% (127)	48.99% (122)
Present study	24.86% (47)	75.13% (142)

Table 3: Comparison of Most common age group of Soft Tissue Tumors

Author and year of study	Age group
Gayatri Gogoi et al. ⁽¹⁾ (2017)	-
Simon Mulugeta Teferi et al. ⁽⁶⁾ (2022)	21 to 30 (28.00%)
Begum et al. ⁽⁵⁾ (2020)	21 to 40 (46.58%)
Present study	21 to 40 (40.74%)

Table 4: Comparison of histological types of Soft Tissue Tumors

Histological type	Gayatri Gogoi et al. ⁽¹⁾ (2017)	Simon Mulugeta Teferi et al. ⁽⁶⁾ (2022)	Begum et al. ⁽⁵⁾ (2020)	Present study
Muscular tissue	55.70%	3.40%	00%	39.15%
Lipomatous tissue	10.40%	22.60%	64.30%	21.16%
Fibrous tissue	6.90%	17.01%	8.40%	14.28%
Vascular tissue	19.80%	29.40%	5.20%	13.75%
Nerve tissue	6.70%	19.20%	19.70%	7.93%
Miscellaneous	0.50%	3.40	0.40%	3.70%

CONCLUSION

Benign soft tissue tumors were relatively more common than the malignant tumors. Leiomyoma was the commonest benign soft tissue tumor followed by Lipoma.

Most of soft tissue tumors can be diagnosed by H&E stain. In some cases atypical presentation is seen, hence along with help of clinical history and histopathological study, we can make effective diagnosis, which helps us to decide the immunohistochemistry marker panel for the complete diagnosis of soft tissue tumor.

REFERENCES

1. Histomorphological study of soft tissue tumors and review of literature of rarer types. *Int clin pathol* J.2017;4(6):151-161 DOI:10.15406/ICPJL.2017.04.00113
2. Kransdorf MJ Benign soft tissue tumors in large referral population: Distribution of specific diagnosis by age, sex and location. *AJR Am J Roentgenol*. 1995;164(2):395-402

3. Kransdorf MJ Malignant soft tissue tumors in large referral population: Distribution of specific diagnosis by age, sex and location. *AJR Am J Roentgenol.* 1995;164(2):129-134
4. Soft tissue tumors - Histopathological study of 93 cases Bashar A. Hassawi*, Abdulkarem Y. Suliman*, Intisar S. Hasan** *Annals of the College of Medicine Vol. 36 No. 1 & 2 2010*
5. *Indian Journal of Pathology and Oncology* 2020;7(2):Page No: 259–265, Clinico-pathological study Study of soft tissue tumors. Shameera Begum1, Shanmugasamy Kathirvelu1,*, AnandrajVaithy K1 Sowmya Srinivasan1.
6. Histopathologic Patterns of Soft Tissue Tumors in Hawassa University Comprehensive Specialized Hospital, Sidama Ethiopia: A 5 Year Retrospective Study.Simon Mulugeta Teferi, Abraham Kassahun Tadele, Selamawit Abebe Ayele, Abebaw Amare Wodajo and Tesfalem Israel Korga ISSN : 24741663 Vol 07/ Artical 1951/-2022
7. World Health Organization Classification of Tumors,pathology and genetics of tumors of soft Tissue and BoneS
8. Histopathological Study Of Soft Tissue Tumors In Correlation With Immunohistochemistryand / Or Histochemistry Findingsp. Vijaya Praveen Kumar1, K.D.H. Prasanna Kumar2, P. Srilatha3, P.V. Ramana4 ISSN : 0975- 3583,0976-2833 Vol 13 Issue 05-2022
9. *Indian Journal of Pathology and Oncology* 2015; 2(3); page no. 141-149 Histopathological study of soft tissue tumors:A three year experience in tertiary care center. preetirihalchakrbarati, suvadipchakrbarati, ajita pandit, purti Agrawal, shilpidoshi, mukul raj jain .
10. Soft tissue tumors - Histopathological study of 93 cases Bashar A. Hassawi*, Abdulkarem Y. Suliman*, Intisar S. Hasan** *Annals of the College of Medicine Vol. 36 No. 1 & 2 2010*
11. Myhre, Jenson O.Histopathological staging soft tissue tumors in relation to in 261 surgically treated patients,Actapathol,Microbial Immunol Seana(A).91:145
12. Stout AP Lattes R.Tumors of soft tissue. In atlas of tumor pathology series 2 fascicle1.Washington DC,USA:AFIP,1967