



**St. Paul Hospital Millennium Medical College
Graduate Study Program.**

**Histopathologic Patterns of Soft Tissue Tumors in St. Paul Hospital
Millennium Medical College From first of January, 2014- December, 31, 2020
G.C.**

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Abstract

Background: Soft tissue tumors are a complex group of neoplasms with differentiation towards mesenchymal tissue occurring in all age groups. Although pathologically diverse, they frequently exhibit similar clinical presentations and radiological features. Therefore, correct histopathologic diagnosis is crucial [1, 2]. Despite histopathologic diagnosis is widely practiced in study area, no study was found on histopathologic pattern of soft tissue tumors. Therefore, this study was aimed to describe histopathology pattern of soft tissue tumors in Saint Paul hospital millennium medical college.

Materials and methods: A cross sectional study design was employed on six years patient's biopsy record of Saint Paul hospital millennium medical college from first of January, 2014- 31, December, 2020. Structured check lists was used to collect data. Data were entered into MS-Excel and exported to SPSS V.28 for analyses. Data was described using frequency, proportions and median. Finally result was presented using tables, figures and narrative form.

Results: A total of 449 patients were diagnosed with soft tissue tumor over the last six years with malignant to benign ratio of 1:4.7 and sex ratio of Male to Female 1.03:1. The age group at which soft tissue tumors commonly occur was from 21-30 (21.6%) years of age. The most favored site of occurrence (30.1%) was the lower limb. From the different histologic subtypes of sarcoma, the top three were Liposarcoma 18(24.3%), followed by undifferentiated pleomorphic sarcoma 15 (20.3%), which are common in adults and Rhabdomyosarcoma 9 (12.2%) which is common in youngsters.

Conclusion: Benign tumors are five times more common than malignant. The most common soft tissue sarcoma in children is Rhabdomyosarcoma and in adults Liposarcoma and larger scale study needs to be planned to look at more aspects that could possibly contribute to the causes of soft tissue tumors.

Keywords: Histopathology; Patterns; Soft tissue tumor; Sarcoma.

Introduction

Background

Soft-tissue tumors are a heterogeneous group of tumors which resemble mesenchymal tissues in the body. They follow different lines of differentiation and may resemble voluntary muscle, adipose tissue, blood vessels, and fibrous tissue [21]. It differs by various inherent features, which includes histology, molecular genetics profiles, site predilection, and outcomes of care. Although pathologically diverse, they frequently exhibit similar clinical presentations and radiological features. Therefore, correct histopathologic diagnosis is crucial [1, 2].

According to the WHO 2020 on soft tissue tumors, the annual clinical incidence of benign tumours of soft tissue has been estimated to be as high as 3000 cases per 1 million population, whereas the annual incidence of soft tissue sarcoma is about 50 cases per 1 million population i.e. < 1% of all malignant tumours (but more frequent in children) [6]. Soft tissue sarcoma includes approximately 40 malignant histological subtypes, and around 50% is most prominent in the extremities followed by trunk, retroperitoneal and head and neck [4, 5].

There is a limited study in Africa about soft tissue tumors including Ethiopia. Therefore, in the absence of well-established cancer registry system and studies, such record analysis provides useful information for understanding the changing trend and pattern. It can also help in undertaking further studies to identify the associated factors which are highly important for developing appropriate strategies and prioritizing control measures [9]. Therefore, the objective of this study was to describe the histopathologic patterns of soft tissue tumors in Saint Paul Hospital Millennium Medical College, from January, 2014 to December, 2020 G.C.

Methodology

Study area

St Paul's Hospital millennium medical college is one of the biggest hospitals in Ethiopia, found in the capital Addis Ababa in the sub-city of Gulele near 1271 Swaziland Street. St. Paul hospital was built in 1969 (was named St. Paul's general specialized hospital until 2008) by Emperor Haile Selassie in collaboration with the German evangelical church, as a source of medical care for underserved populations. It currently has 392 beds, with an annual average of 200,000 patients and a catchment population of more than 5 million. Approximately 75% of the patients receive medical services free of charge. There are over 1300 clinical and non-clinical staffs in over 13 departments, most recently launched its new hemodialysis unit and renal transplantation center. The pathology service is also one of the few centers in the country providing fine needle aspiration cytology (FNAC) service for more than 7,000 patients and biopsy services for more than 5,000 patients annually so far since its establishment as medical specialty in the college in 2014 G.C (Pathology department record file).

Study period

January, 2014 to December, 2020 G.C.

Study design

Descriptive cross-sectional study design was used.

Source population

All patients who presented to or had their biopsies sent to SPHMMC; it represented patients from Addis Ababa or regional states during the study period.

Study population

Patients of all age groups who had soft tissue biopsy done and samples sent to SPHMMC, Anatomic pathology department during the study period.

Sample size: All soft tissue tumors biopsy samples in the study period were included.

Selection criteria

A, Inclusion criteria: All soft tissue tumor biopsies during the study period was included.

B, Exclusion criteria: All cases of soft tissue tumor biopsy received during the study period were cross checked against the standard recent WHO categories and excluded when not mentioned in the category (eg. Organ specific tumors), uncertainly diagnosed cases, cases with descriptive sign out and without important demographic data (Age, Sex, Size, Site) were also excluded.

Data collection tools: Data was collected from anatomic pathology database using structured, self-prepared questionnaire designed to include all the necessary variables.

Data collector

Data was collected by principal investigator who is a final year pathology resident with the aid of the IT expert in the department.

Study variables

Independent variables

Age, Sex, Site of the tumor, Size of the tumor.

Dependent variable

Histomorphologic pattern of soft tissue tumor

Data analysis, interpretation and dissemination

After checking completeness of the checklist, data was entered into MS-Excel and exported to SPSS V.28 for analysis. Before analysis, data cleaning and grouping was done to make the data ready for analysis. Then descriptive statistics like frequency, percentage, mean was calculated to summarize the data. Finally, the obtained results were presented using tables, figures and narrative.

Data Quality

The principal investigator was the one responsible for collecting data for which the quality was checked by using a checklist at the end of each data collection dates.

Ethical consideration

Permission to conduct the study was given from the ethical clearance committee of the SPHMMC.

Results

General Category

A total of 493 biopsies of soft tissue were reviewed in SPHMMC, pathology department over the last six years and 44 were excluded from the study because of incomplete patient profile and other missed variables (e.g. specific diagnosis). From the included 449 soft tissue biopsies, 74 were malignant tumors, 26 were intermediate category and 349 were benign with malignant to benign ratio of 1:4.7.

The most common site of soft tissue tumor was in the lower extremity 135 (30.1%) followed by head and neck 107(23.8%) and upper extremity 100(22.3%).

Concerning the size of soft tissue tumor, 240 (53.5%) was <5 cm in their diameter and the largest tumor size was in the retroperitoneum 61cm (0.2%).

Age and Gender distribution

The age at which soft tissue tumors commonly occur was between 21-30 years 97(21.6%) with a median age of 37.00 year. Regarding sex distribution there was a slight male predilection with M: F ratio of 1.03:1. Benign soft tissue tumor is more common in female 177 (50.7%), but, the reverse is true in cases of intermediate category and soft tissue malignancy, which were more common in male, 14(53.8%) and 42 (56.8%) respectively. There was no significant association between sex of the patient and soft tissue tumor (p value=0.48).

Table 1: Soft tissue tumor related age distribution of the patients from 2014 to 2020 G.C, SPHMMC.N=449.

Variables		Biologic behavior of tumor			$\chi^2=4.97$, p value=0.76
Age	Category	Malignant frequency (%)	Benign frequency (%)	Intermediate frequency (%)	
	0-10	2(2.7%)	18(5.2%)	0(0%)	
	11-20	12(16.2%)	39(11.2%)	2(7.7%)	
	21-30	15(20.3%)	78(22.3%)	4(15.4%)	
	31-40	15(20.3%)	70(20.1%)	6(23.1%)	
	>40	30(40.5%)	144(41.3%)	14(53.8%)	
	Total	74(100%)	349(100%)	26(100%)	

Table 2: Soft tissue tumor related gender distribution of the patients from 2014 to 2020
G.C, SPHMMC.N=449.

Variable	Category	Malignant frequency (%)	Benign frequency (%)	Intermediate frequency (%)	$\chi^2=1.468$, p value=0.48
Sex	Female	32(43.2%)	177(50.7%)	12(46.2%)	
	Male	42(56.8%)	172(49.3%)	14(53.8%)	
	Total	74(100%)	349(100%)	26(100%)	

Site distribution and Size of the tumors

The most common site for malignant soft tissue was lower limb 32 (43.2%) in which thigh accounts for 20(27%) followed by trunk and retroperitoneum, 17(23%) and 11(14.9%) respectively. Similarly lower extremity is the most common site for benign soft tissue tumor 98(28.1%). Trunk is the favored site for soft tissue tumor with intermediate malignancy 11 (42.3%).The anatomic site was found to be statistically, highly significantly associated with soft tissue tumor (p value<0.001). 61.9% and 34.6% of soft tissue with benign and intermediate category were less than 5cm.From all malignant tumors 20.3% was less than 5 cm.There was also highly significant association between soft tissue tumor and size of the tumor (p value<0.001).

Table 3: Soft tissue tumors characteristics in terms of site and size, 2014 to 2020 G.C, SPHMMC.N=449.

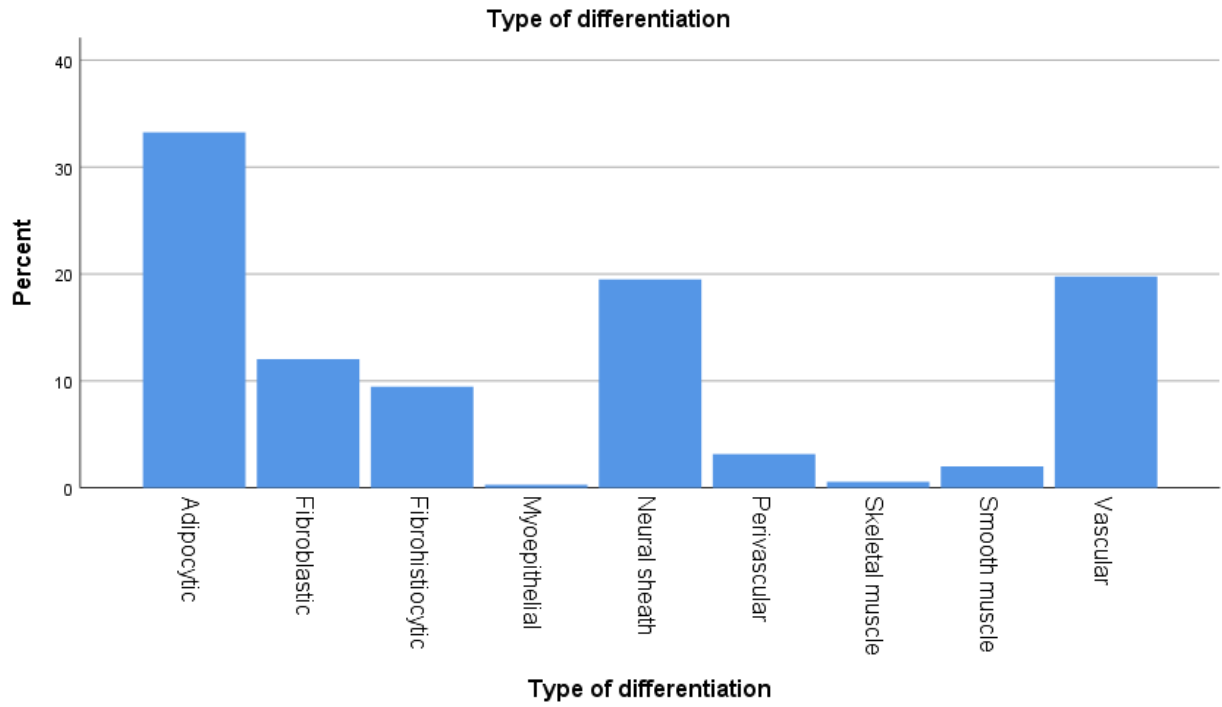
Variable	Category	Malignant frequency (%)	Benign frequency (%)	Intermediate frequency (%)	Chi-square
Site	Lower extremity	32(43.2%)	98(28.1%)	6(23.1%)	$\chi^2=71.09$, p value<0.001
	Head and neck	6(8.1%)	97(27.8%)	4(15.4%)	
	Upper extremity	8(10.8%)	87(24.9%)	5(19.2%)	
	Retroperitoneum	11(14.9%)	4(1.1%)	0(0%)	
	Trunk	17(23%)	63(18.1%)	11(42.3%)	
	Total	74(100%)	349(100%)	26(100%)	
Size	<5 cm	15(20.3%)	216(61.9%)	9(34.6%)	$\chi^2=45.74$, p value<0.001

Biologic behavior/Category

Benign Category

As it is explained above from the total biopsies reviewed benign tumor was diagnosed in 349 cases. The most frequent benign condition was lipoma, followed by hemangioma and schwannoma. There were 62 cases of Adipocytes tumors in males which constituted 36% of male benign tumors and 17.7% of all the benign tumors and 13.8% of all soft-tissue tumors. Similarly, there were 52 lipoma cases in females observed making up 29.4% of female benign tumors and 14.8% of benign and 11.6% of all the soft-tissue tumors, respectively. This also represented a male: female ratio of 1.2:1. Thus, lipoma cases made up 32.7% of benign soft-tissue tumors and 25.4% of all soft-tissue tumors. The frequency of lipoma peaked during the fourth and sixth decades. There were 35 cases of hemangioma in males making up 19.8% of male benign tumors and 10% and 7.8% of benign and all soft tissue tumors respectively. Similarly, there were 34 cases of hemangioma in females constituted for 19.8%, 9.7% and 7.6% of female benign, benign and all soft tissue tumors respectively. From a total 40 cases of schwannoma, 21(52.5%) cases were in female and 19(47.5%) cases were in male. The remaining category of benign tumors were presented in Figure.1.

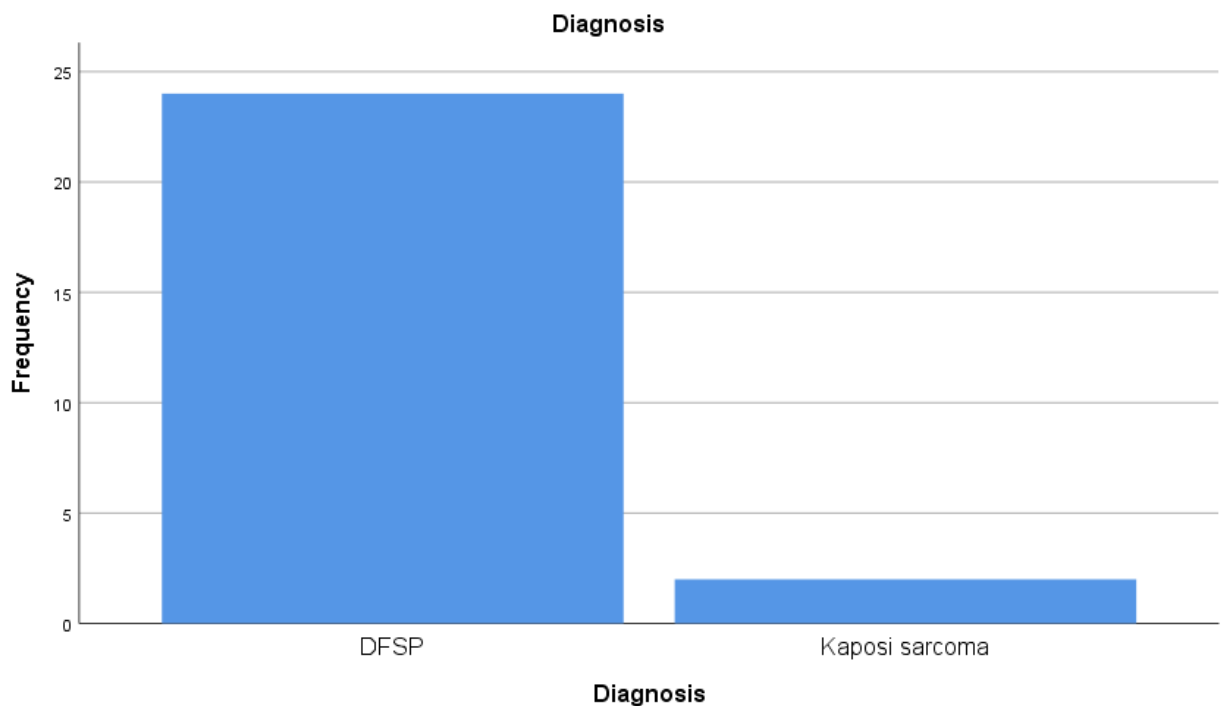
Figure 1: Different types of benign soft tissue tumor category diagnosed during 2014 to 2020, SPHMMC. N=349.



Intermediate Category

From the total biopsies reviewed intermediate category tumors were diagnosed in 26(5.8%) cases. Dermatofibrosarcoma protuberance (DFSP) was the commonest tumor in this category 24(92.3%) and two cases of Kaposi sarcoma has been found in this study. 14 (53.8%) of cases in this category diagnosed in males. The favored site for these category of tumors were, trunk 11 (42.3%) followed by lower extremity 6(23.1%) and Upper extremity 5 (19.2%).

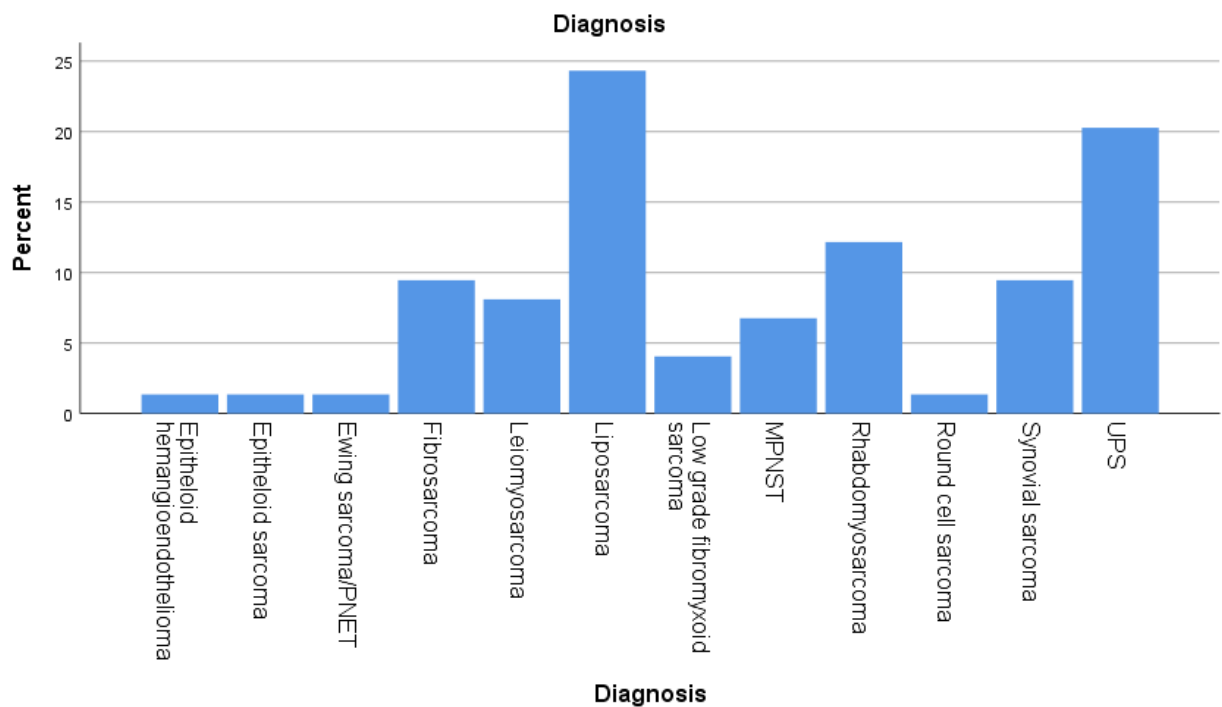
Figure 2: Types of soft tissue tumor/Intermediate category diagnosed during 2014 to 2020, SPHMMC. N=26.



Malignant Category

Concerning soft tissue sarcoma/ malignancy from the total 74 cases diagnosed the commonest type was Liposarcoma 18 (24.3%) followed by undifferentiated pleomorphic sarcoma (UPS) 15(20.3%) and Rhabdomyosarcoma 9(12.2%).The remaining histomorphologic type of malignant tumors were presented in Figure.3.

Figure 3: Histomorphologic type of malignant soft tissue tumors in SPHMMC, 2014-2020, N=74.



Regarding sex distribution of soft tissue sarcoma type, Liposarcoma 7(21.9%) was the commonest among females followed by Rhabdomyosarcoma 6(18.8%). In males the commonest one was Liposarcoma 11(26.1%) and Undifferentiated pleomorphic sarcoma 11(26.1%) followed by Synovial sarcoma 4(9.5%).

**Table 4: Soft tissue sarcoma patterns with respect to sex in SPHMMC from 2014 to 2020
G.C N=74.**

Diagnosis	Sex Category		
	Male	Female	Total
Liposarcoma	11	7	18(24.3%)
Undifferentiated pleomorphic sarcoma	11	4	15(20.3%)
Rhabdomyosarcoma	3	6	9(12.2%)
Synovial Sarcoma	4	3	7(9.5%)
Fibrosarcoma	3	4	7(9.5%)
Leiomyosarcoma	3	3	6(8.1%)
Malignant peripheral nerve sheath tumor	5	0	5(6.8%)
Ewing sarcoma/PNET(Soft tissue)	1	0	1(1.4%)
Low grade fibromyxoid sarcoma	0	3	3(4.1%)
Epithelioid hemangioendothelioma	0	1	1(1.4%)
Epithelioid Sarcoma	0	1	1(1.4%)
Round cell sarcoma	1	0	1(1.4%)
Total	42	32	74(100%)

From the total soft tissue sarcoma diagnosed (74), the most common top three types Liposarcoma 18 (24.3%), Undifferentiated pleomorphic sarcoma 15 (20.3%), and Rhabdomyosarcoma 9 (12.2%) and the least or uncommon type identified were Epithelioid sarcoma 1 (1.4%), Round cell sarcoma 1 (1.4%), Epithelioid hemangioendothelioma 1 (1.4%) and soft tissue Ewing sarcoma/PNET 1 (1.4%). Malignant soft tissue tumors commonly affects people in the third 15 (20.3%) and fourth decades 15 (20.3%). In youngsters below the age of 10, the commonest type of sarcoma was found to be RMS followed by Fibrosarcoma but, in adult Liposarcoma was the commonest.

Liposarcoma accounts for 18 (24.3%) of all sarcoma cases and 10 of them arise from retroperitoneum, 6 of them from lower extremity, and 2 of them arise from the upper extremity. Concerning their variant 10 of them were myxoid liposarcoma, 7 well-differentiated liposarcoma (1 case with dedifferentiation) and 1 of the cases was pleomorphic liposarcoma. Myxoid liposarcoma was commonly found in the third and fourth decades. The commonest age for well-differentiated liposarcoma is above 50 years. RMS accounts for 9 (12.2%) of all sarcoma cases and 4 of them arise from lower extremity, 2 of them arise from the trunk and head and neck respectively and 1 of them arises from upper extremity. Regarding their variant, 5 of them are alveolar, 2 embryonal and 2 of them are pleomorphic variant. The most common anatomic site was retroperitoneum for liposarcoma and lower extremity for undifferentiated pleomorphic sarcoma and RMS.

Table 5: Distribution of the commonest soft tissue sarcoma with respect to age and anatomic sites in SPHMMC from 2014 to 2020 G.C. N=74.

Age	Top three sarcoma type		
	Liposarcoma	Undifferentiated pleomorphic sarcoma	RMS
1-10	-	-	2
11-20	-	1	3
21-30	4	3	-
31-40	4	3	2
41-50	1	1	-
>50	9	7	2
Total	18	15	9
Site			
Lower extremity	6	8	3
Head and neck	-	-	2
Upper extremity	2	4	1
Retroperitoneum	10	-	-
Trunk	-	3	3
Total	18	15	9

Table 6: Distribution of different types of Liposarcoma variants with respect to age and anatomic sites in SPHMMC from 2014 to 2020 G.C. N=18.

Age	Liposarcoma Variant		
	Well-differentiated liposarcoma	Myxoid liposarcoma	Pleomorphic liposarcoma
1-10	-	-	-
11-20	-	-	-
21-30	2	2	-
31-40	-	3	-
41-50	-	1	-
>50	5	4	1
Total	7	10	1
Site			
Lower extremity	1	4	1
Head and neck	-	-	-
Upper extremity	1	1	-
Retroperitoneum	5	5	-
Trunk	-	-	1
Total	7	10	1

Discussion

In the current study the age range was 2 to 89 years with median age of 37. The third decades is the commonest year for soft tissue tumors. There was only slight male predilection with M: F- 1.03:1, but this was not statistically significant.

In this study from the total patients diagnosed with soft tissue tumor over the last Six years the majority was benign tumor which is predominantly Lipoma and Hemangioma. Malignant tumor accounts for one six of the soft tissue tumor. This finding was comparable to studies done in Jimma university medical college in which benign tumor was much more common than malignant, 72% and Lipoma accounts 35.1% [9] and three study done in India and Mosul college of medicine [11,12,13 &19]. However according to WHO 2020, the ratio of benign to malignant was by far higher than this study finding [6]. The reason for this variation can be explained that the clinicians at study area might fail to send the clear cut benign cases for histopathology and less health seeking behavior of the community for benign tumor which may be uncovered by future study. But, there is a concordance between the current study and WHO 2020 on soft tissue tumor, with regard to site and size of soft tissue tumor and the frequency of distribution of particularly benign morphologic type [6].

Table 7: Comparison of the current study with various other studies.

S.no	Study	Total cases	Benign (%)	Intermediate (%)	Malignant (%)
1.	Mosul college of medicine(2010)	93	75.2%	-	24.8%
2.	Baig MA, India(2015)	137	82%	-	17.52
3.	Sing H,Richika,Kundal R, India(2016)	200	84.5%	5.5%	10%
4.	Sajjad,M,Ahmed,F, Pakistan(2016)	267	65.9%%	-	34.1%
5.	PagaroM,Gambhar AS, India(2019)	100	90%	2%	8%
6.	VhritherhireR,Ngbea J,akpor, Nigeria(2020)	188	67%	8.5	24.5%
7.	Nigussie M, Ethiopia/Jimma(2020)	268	72.4%	-	27.6%
8.	Current Study	449	77.7%	5.8%	16.5%

In the present study Soft tissue sarcoma was more common in male and histologically Liposarcoma was the most common soft tissue sarcoma type as whole and in both male and females. This finding was comparable with the study done in Nigeria in which the adipocytic tumors were the commonest [21]. Dermatofibrosarcoma protuberance was the commonest soft tissue tumor in the intermediate category in the current study and other study done in India in 2019[14].

Malignant soft tissue tumors were commonly found in third and fourth decades in this study. Anatomically, 43.2% of malignant soft tissue tumors are found in the lower limb majorly on thigh followed by trunk. This finding was in concordance with WHO 2020 soft tissue tumor and other literatures worldwide in which most of the soft tissue sarcoma were occurring in the Lower extremity(most commonly in thigh) [6, 9]. In addition, this finding was also comparable with the other study done in Germany in 2018 which shows, extremity as the most common site for soft tissue sarcoma [18].

Rhabdomyosarcoma was the most common sarcoma in youngsters and the most common sarcoma in adult was Liposarcoma.

Table 8: Comparison of the patterns of current study with various other studies.

Country	Author	Year	No.of cases	M:F	Age range	Site	Benign	Intermediate	Malignant
India	Meghasharma, Arvind khajuria	2015	170	1.4:1	3-73	Upper extremity	Lipoma	-	UPS
India	Singh h, Richika, kundal R	2016	200	1.2:1	6/12-98	Head and Neck	Lipoma	-	Smooth muscle tumor
Pakistan	Sajjad,M,Ahmed,F,	2016	267	1.13:1	1-75	Lower extremity	Hemangioma	-	Rhabdomyosarcoma
India	PagaroM,Gambhar AS	2019	100	1.3:1	-	Extremity	Lipoma	DFSP	Liposarcoma
Nigeria	VhritherhireR,Ngbea J,akpor	2020	188	1:1.2	10/12-76	-	Lipoma	Kaposisarcoma	Rhabdomyosarcoma
Ethiopia	Nigussie M	2020	268	1:1.01	-	Lower extremity	Lipoma	-	UPS
Current Study	-	2021	449	1.03:1		Lower extremity	Lipoma	DFSP	Liposarcoma

Conclusion

Benign soft tissue tumors were more common than malignant. From benign soft tissue tumor groups Adipocytic (Lipoma) was the commonest. Liposarcoma was the predominant histological malignant soft tissue subtype, commonly affecting adults and RMS affects youngsters. The most common anatomic site affected by sarcoma was lower extremity especially thigh. All patients operated for soft tissue tumor needs to be histologically confirmed and Immunohistochemistry has been invaluable in categorization of some of these tumors and contributed to ensuring prompt and more accurate diagnosis.

Limitations of the study

About 20 uncertainly diagnosed soft tissue sarcoma were excluded.

Incomplete record of data.

Lack of standardized report (Appropriate stage).

Limited research references conducted in Africa including Ethiopia.

Recommendations

Adopt standardized reporting system.

Basic Immunohistochemistry for soft tissue tumor diagnosis.

Adding soft tissue sub-speciality to the department.

Further community and hospital based study.

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