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Soft Tissue Sarcoma: A Decade of Experience in a South Asian Tertiary Care Hospital with a Review of International Literature

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Abstract

Soft tissue sarcoma and its histomorphological sub types is an important for both prognosis and treatment. It deserves an extensive research, as there are good published literature's on the incidence of soft tissue sarcoma in the western population, but there is paucity of data from Asia, particularly on the epidemiology specifically to Southern Asia. We analyzed the Data, collected from the surgical pathology files. This Retrospective study included all the diagnosed cases of soft tissue sarcoma, including gastrointestinal tumor presented during the 10-year period, from July 2008 to March 2019 (10 years, 9 months) and include all age groups. Cases were then characterized according to their histomorphological sub types, age, sex, and the site involved by the sarcoma. The cases where diagnosis was not confirmed like differential diagnosis are not considered and not included in this study. The data was analyzed in SPSS version 26. Total 305 diagnosed cases of soft tissue sarcoma, met our selection criteria. The result shows that the soft tissue sarcoma are increased on yearly basis with eminent male predilection. The most common presented soft tissue sarcoma is GIST, followed by synovial sarcoma, undifferentiated pleomorphic sarcoma, and high-grade sarcoma NOS, in order of preference. The high female predilection is noted for leiomyosarcoma and chondrosarcoma. Most of the soft tissue sarcoma are associated with adult age (25 to 64 year) with total number of n: 206 cases (67.5%) and the most common site is the lower limb. It is also observed that the least common incidence of soft tissue sarcoma is noted in the toddler age group (2-3 years).This study concluded that the risk of soft tissue sarcoma exist throughout the lifespan (infants to elderly age) and continuously increasing in numbers. The adult age group followed by elderly age and male predominance are at high risk. However, the frequency of rhabdomyosarcoma is commonly seen in childhood.

Keywords Soft tissue sarcoma, Decade, Tertiary care hospital.

1. Introduction

Soft tissue tumors are highly heterogeneous group of tumors classified by their line of differentiation resembling to normal adult mesenchymal tissue. According to an analysis of the Surveillance, Epidemiology and End Results database, the incidence changes with age (1); for children younger than 10 years, the annual incidence was 0.9/100,000, it rose to 18.2/100,000 in adults over age 70 year (elderly age group). The most significantly increased soft tissue sarcoma was seen in the adult age group (30 to 70 years). Soft tissue sarcomas occur more frequently in males and the incidence of sarcoma changes with respect to age and

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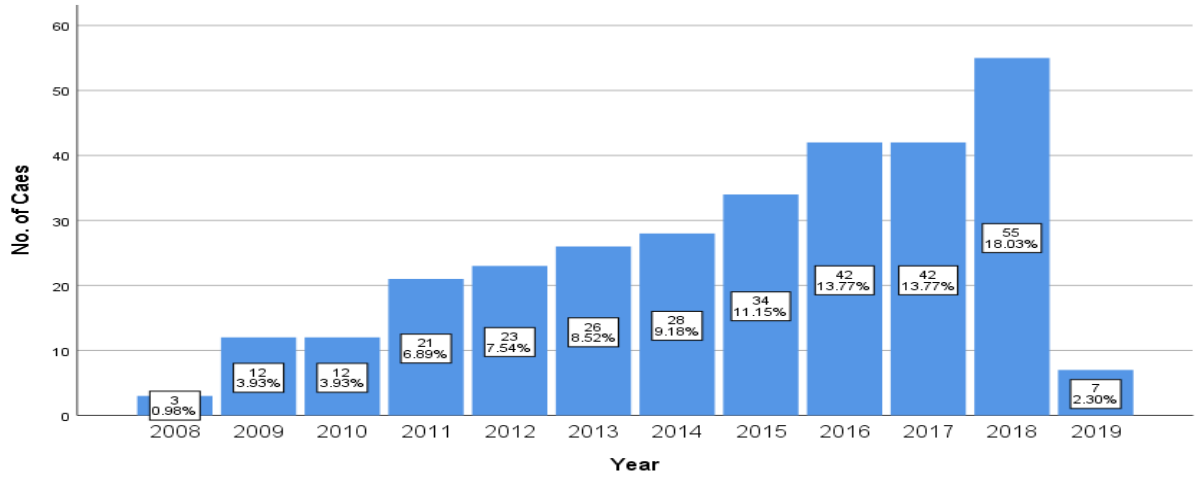

Figure 1: The bar chart clearly depicts a steady increase in the number of soft tissue sarcoma cases from July 2008 to 2019, with a peak in the year 2018. The magnitude of the increase and any notable fluctuations or trends within the time period shown in the chart could provide valuable insights into the epidemiology and management of this disease.

among the histological sub types. The soft tissue sarcoma are locally aggressive and can be invasive or destructive and may show distant metastasis. Appropriate ontological surgery is required to ensure the total removal of these tumors. Some sarcomas, such as dermatofibrosarcoma protuberans, rarely metastasize, whereas others do so with high frequency (1). Anatomically, the extremity is the most common site for soft tissue sarcoma, accounting for approximately half of all the cases involved. The extremities with undifferentiated pleomorphic sarcoma, liposarcoma, and synovial sarcoma are common. In contrast, in the retroperitoneum, synovial sarcoma and undifferentiated pleomorphic sarcoma are relatively uncommon; however, other histological sub types, particularly leiomyosarcoma and liposarcoma, predominate (2). Age-related incidences vary as embryonal rhabdomyosarcoma occurs almost exclusively in children, synovial sarcoma mostly in young adults. In contrast, undifferentiated pleomorphic sarcoma, liposarcoma, leiomyosarcoma and myxofibrosarcoma dominate in older people (3). Many studies have been performed in the West. However, relatively few have been carried out in Asia, particularly in southern Asia. The epidemiological data of soft tissue sarcoma in Pakistan showed variable results due to a few cases and some of the researches done in the late year (90's). However, this study is based on a 10 years, of updated data presented to one of the most busiest tertiary care hospitals in Karachi, Pakistan and may describe the incidence of soft tissue sarcoma with its histomorphological sub types about the age, sex and primary site of sarcoma.

2. Methodology

We analyzed the data, collected from the surgical pathology laboratory files. This study (Retrospective) included all the diagnosed cases of soft tissue sarcoma, including Gastrointestinal tumor (GIST) presented during the 10 years, from 2008 to 2019. It included all the age groups. Cases were then characterized according to their histomorphological sub types, age, sex, and the site involved. The data included all the confirmed cases of soft tissue sarcoma and was analyzed in SPSS version 26. Categorical variables like the site, histological sub types, age, and gender are summarized into percentages.

3. Results

Out of 305 diagnosed cases of soft tissue sarcoma that met the selection criteria, our analysis showed that the incidence of soft tissue sarcoma has gradually increased from July 2008 to 2019.

The highest incidence was observed in the year 2018. These findings suggest a rising incidence of soft tissue sarcoma in our population over the past decade (Fig.1).

3.1. Age groups and soft tissue Sarcoma incidence

Table 1 shows that the highest number of soft tissue sarcoma cases is observed in the adult age category (25 to 64 years), indicating a higher incidence of this disease in this age group. These findings suggest a need for further investigation into the risk factors and preventive measures for soft tissue sarcoma in this population.

Table 1: Summarizes the distribution of soft tissue sarcoma cases among different age groups, out of 305 cases. The most cases were observed in the adult age group, while the infant and toddler age groups showed the lowest number

Age Groups	No. of Cases	Percent
Infant, equal to or less than 1 year	3	1.0
Toddlers, two to three years	3	1.0
Childhood, 6 year to 14 years	10	3.3
Teenagers, 15 years to 17 years	9	3.0
Young Adults, 18 to 24 years	24	7.9
Adults, 25 year to 64 year	**206**	**67.5**
Elderly, greater than equal to or greater than 65 year	50	16.4
Total	**305**	100.0

3.2. Gender predilection

Figure 2 illustrates the correlation of soft tissue sarcoma with gender, indicating a higher incidence in males than females. However, there appears to be a female predilection for leiomyosarcoma and chondrosarcoma. These gender-specific trends in soft tissue sarcoma could have important implications for risk assessment, diagnosis, and treatment, and merit further investigation

3.3. Site

Table 2 indicates that the lower limb extremity is the most commonly affected site in soft tissue sarcoma, consistent with Western research findings. The second and third most commonly affected sites are the upper limb and abdomen. These results suggest that the anatomical location of soft tissue sarcoma could play a role in its incidence and management, and should be considered in diagnostic and therapeutic decision-making.

3.4. Distribution of histomorphological subtypes

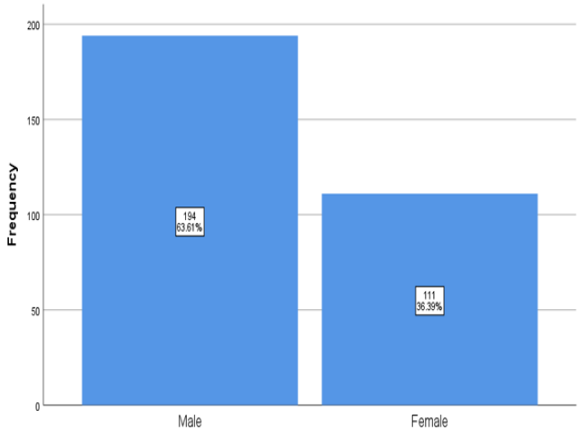

Figure 2: Presents a bar chart that clearly depicts a predilection of soft tissue sarcoma among the male population. This finding highlights the importance of considering gender-specific risk factors and screening strategies for this disease.

Figure 3 presents the most frequently diagnosed types of soft tissue sarcoma, with gastrointestinal stromal tumors (GIST) being the most common, followed by synovial sarcoma, undifferentiated pleomorphic sarcoma, and high-grade sarcoma NOS in descending order of prevalence. These findings are important for understanding the distribution and spectrum of soft tissue sarcoma subtypes in the population, and guiding clinical decision-making

4. Discussion

The incidence trends and the results from other countries are divergent. The data is insufficient from Southern Asia; hence we reported our 10 year incidence of soft tissue sarcoma. In viewing most of the researches done on this subject (epidemiology of soft tissue sarcoma), the results are somewhat extent varied among countries or researchers, this could be due to the inclusion criteria and in the variation of the number of cases studied. Like e.g., one of the study in Australia shows leiomyosarcoma (20.43%), malignant fibrous histiocytoma (16.14%), and soft tissue tumors (sarcoma) not otherwise specified (10.18%) are the most common sub type (4). Our findings highlight the need for more research on soft tissue sarcoma in different regions to better understand its epidemiology and inform clinical management. We followed the world Health Organization Classification of soft tissue sarcoma (4th edition), which includes GIST

Table 2: Shows that out of the 305 cases of soft tissue sarcoma, the lower limb was involved in 81 cases (26.6%). This finding is consistent with previous research from Western countries, where the lower limb is the most commonly affected site. However, it should be noted that gastrointestinal stromal tumors (GIST) are known to affect the stomach, rather than the limbs predominantly.

Site	No. of Cases	Percent
Head and Neck	25	8.2
Upper Limb	33	10.8
Lower Limb	**81**	**26.6**
Thorax	25	8.2
Abdomen/Retroperitoneum	47	15.4
Visceral (Lung)	10	3.3
Testis and Scrotal Region	3	1.0
Vagina	2	.7
Lumber Mass	3	1.0
Cervical mass	1	.3
Skin	1	.3
Unknown Site	11	3.6
Left Iliac Fossa Mass	1	.3
Visceral (Breast)	3	1.0
Pelvis	14	4.6
Vulva	1	.3
Lumbosacral region	1	.3
Visceral (Pancreas)	1	.3
Visceral (Small bowel)	10	3.3
Visceral (Stomach)	26	8.5
Visceral (Large bowel)	1	.3
Visceral (Rectum)	2	.7
Visceral (Duodenum)	2	.7
Visceral (Liver)	1	.3
Total	305	100.0

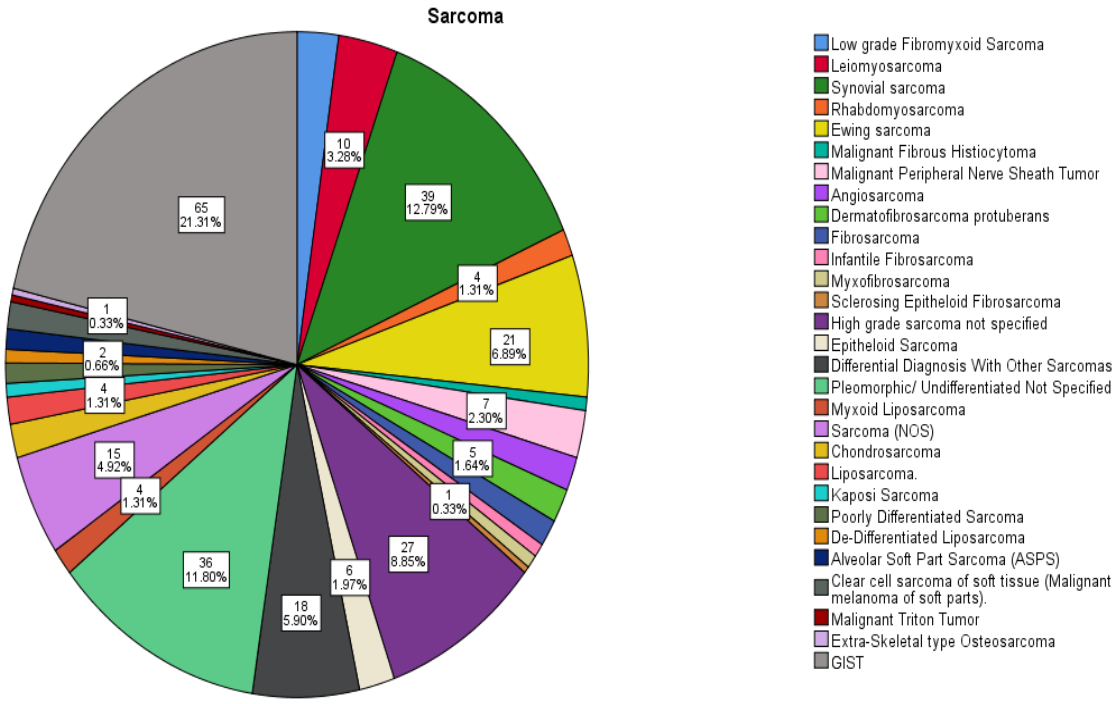

Figure 3: Presents a pie chart illustrating the distribution of soft tissue sarcoma subtypes, with gastrointestinal stromal tumors (GIST) being the most frequent subtype, accounting for 12.79% of cases. Synovial sarcoma, undifferentiated pleomorphic sarcoma, and high-grade sarcoma are also relatively common, representing 11.80%, 8.85%, and 6.89% of cases, respectively. These results provide insight into the diversity of soft tissue sarcoma subtypes and their relative frequencies, which could inform diagnostic and therapeutic strategies.

and exempts suspected metastatic visceral leiomyosarcoma and uterine sarcomas. In contrast to our study, which showed GIST as the most common visceral soft tissue sarcoma followed by synovial sarcoma and undifferentiated sarcoma, a study from France reported that the most frequent subtypes are undifferentiated or unclassified sarcomas (16%) and leiomyosarcoma (14%) (5).

A study conducted in 2012 at Tata Memorial Hospital, Mumbai, India showed that synovial sarcoma was the most common adult STS, with rhabdomyosarcoma being the most common in the pediatric age group (GIST was not included in this research) (6) .In contrast, a study conducted in China showed that undifferentiated pleomorphic sarcoma accounted for 23% and emerged as the most common subtype in males, followed by synovial sarcoma, liposarcoma, and fibrosarcoma accounting for 15%, 15%, and 11%, respectively (7) . The surveillance data from 27 European countries showed a predilection for the female gender (8). A study from Taiwan showed the first three pathological subtypes of STS as liposarcoma (23%), undifferentiated pleomorphic sarcoma (18.9%), and leiomyosarcoma (7.6%) (9). A study conducted in Ireland from 1994 to 2012 found that the elderly age group (70-84 years) was the most commonly affected (10). Embryonal and alveolar rhabdomyosarcoma of the STS were most commonly found in the pediatric population (0–14 years) while STS of the limbs and uterus were most commonly found in the older age groups. A recent study conducted in China in 2017 showed a female predilection for soft tissue sarcomas, with GIST being the most common subtype, followed by nerve sheath tumors, malignant peripheral nerve sheath tumors, leiomyosarcoma, liposarcoma, and fibrosarcoma (11). In Pakistan, there seems to be a scarcity of research on this topic. One study conducted at a hospital in Peshawar from January 2009 to December 2013 (which included benign soft tissue tumors, unlike our study) found that rhabdomyosarcoma (n=35, 13.1%) was the most common tumor, followed by angiosarcoma (5.2%).

Another study, conducted at AKUH from May 1991 to July 1997, showed that the five most common histomorphological subtypes were leiomyosarcoma, followed by malignant nerve sheath tumor, rhabdomyosarcoma, and synovial sarcoma. Another small study, based on 3-year data on the epidemiology of soft tissue sarcomas in Karachi, Pakistan, showed that fibrosarcoma, leiomyosarcomas, liposarcomas, malignant fibrous histiocytomas (MFHs), schwannomas were more commonly observed in the elderly population. A study from Austria showed the most common subtypes as sarcoma NOS, followed by leiomyosarcoma, liposarcoma, malignant fibrous histiocytoma and fibrosarcoma (11).

5. Limitation

The study had excluded cases with differential diagnoses, which may have caused variations in the exact number of sarcomas and potentially influenced the prevalence of specific sarcoma subtypes. In such cases, the importance of molecular and genetic testing cannot be overstated in making a definitive diagnosis in light of the increasing burden of sarcoma; there is a need for an extensive and updated study across the region or country to address the factors associated with their occurrence. In addition, molecular/genetic workup may shed light on the exact mechanisms and identify the genetic role in the progression of such sarcomas. This can lead to the development of new treatment modalities targeted at the defective focus in sarcomas.

6. Conclusion

To the best of our knowledge, this study is one of the few to provide comprehensive, population-based estimates of sarcoma cases, including gender, site, and histomorphological subtypes across all age groups. This study contributes to a refined understanding of the population burden of STS. It emphasizes the need for routinely using immunohistochemistry stains, which have significantly contributed to the diagnosis of soft tissue sarcomas.

The presence of non-confirmed cases of suspected soft tissue sarcoma with differential diagnosis underscores the importance of conducting "molecular studies" to accurately determine the true incidence of respective histomorphological subtypes of STS. These studies are crucial in cases where other ancillary methods cannot provide definitive diagnoses. By utilizing these methods and establishing high-quality sarcoma registry data, we can perform analyses of the burden and risk stratification of STS. Further quality research on STS will be productive and fruitful for patients, allowing for timely investigation, diagnosis, and management according to their needs.

A more in-depth investigation with international epidemiological data correlation is necessary to clarify the study results and to identify factors associated with the etiology of sarcomas in specific age groups. This may facilitate the study of histomorphological subtypes in conjunction with genetic and molecular mechanisms and associated factors, which could aid in treatment and targeting specific areas to manage the rapidly rising number of sarcoma cases effectively.

Conflict of Interest There is no conflict of interest.

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