

Histopathological Spectrum of Soft Tissue Tumours in Paediatric Age group in a Tertiary Care Hospital

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Abstract:

Background: 'Soft tissue' is a non-epithelial extra skeletal tissue of the body exclusive of the reticuloendothelial system, glia and supporting tissue of the various parenchymal organs.¹ It is represented by the voluntary muscles, adipose tissue and fibrous tissue along with the vessels serving these tissues. The objective of this study was to study the histopathological features of soft tissue tumors and to study the occurrence of soft tissue tumors in relation to age, sex and anatomical site.

Methods: The study comprise of 50 cases studied over period of two years. All soft tissue tumours, their gross features, microscopic findings were analysed in detail. Soft tissue tumors were divided into Benign and Malignant categories and further sub typing were done according to World Health Organization (WHO) classification. The distribution of soft tissue tumors according to age, sex and site of occurrence was studied.

Results: Out of 50 cases of soft tissue tumors 45 cases were benign 5 cases were malignant. The most common tumour was vascular tumour (24cases) followed by adipose tissue tumour (14cases) and skeletal muscle tumour (5cases). The benign tumours (90%) were more common than malignant tumour (10%).The malignant soft tissue tumors was seen more common in male than female.

Conclusion: The benign tumours were more common than malignant tumour. The most common benign tumour was Haemangioma followed by lymphangioma. Rhabdomyosarcoma (RMS) was common malignant tumour. Benign tumors were seen in male as compare to female. The most commonly involved site for the benign soft tissue tumour was head & neck. Again the most commonly involve site for the malignant soft tissue tumour was lower extremities.

Keywords: Soft tissue tumors, vascular tumors, Adipose tissue tumors.

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Introduction

'Soft tissue' is a non-epithelial extra skeletal tissue of the body exclusive of the reticuloendothelial system, glia and supporting tissue of the various parenchymal organs. [1] It is represented by the voluntary muscles, adipose tissue and fibrous tissue along with the vessels serving these tissues. Most of the soft tissue is derived embryonically from mesoderm, with a neuroectodermal contribution corresponding to the peripheral nerves. [2]

They arise nearly everywhere in the body, the most important locations being the extremities, trunk and abdominal cavity. [1] Soft tissue sarcomas constitute approximately 1% of all malignant tumours. Benign tumour is more common than malignant tumours in the paediatric age group. Among the benign tumours, vascular tumour mainly hemangioma and lipoma are more common.

Commonly involved sites for the benign soft tissue tumour is head & neck and lower extremities. The study of tumours has long been a very challenging task for the pathologist, oncologist and clinicians. Incidences of tumour are on the ascending order day by day and an ever increasing number of people are seen to be affected. The last century has seen the industrial, agricultural and medical revolution. Industrial, agricultural and innumerable known and unknown natural and artificial agents, the change in life style, personal habits can be attributed to development of tumours. A cautious and meaningful approach is needed for an early detection of such tumours.

Clinical diagnosis of soft tissue tumours is difficult. Biological activity of these tumours varies from benign localized tumours, to benign locally

aggressive, to malignant metastatic types. It also noted that the behaviour of some benign soft tissue lesions may mimic rapidly growing malignant tumours.

Histopathology remains the mainstay diagnosis of tumour. In addition to determining the malignant potential of the lesions, histopathology reveals its exact nature and structure. Histopathology is also very important for staging of the tumours, which required for the proper treatment of the patients. But sometimes it is very difficult to diagnose the tumour only by histopathological examination alone. In that case immunohistochemistry is a very helpful tool, which can demonstrate the tumour differentiation at its molecular level.

The soft tissue sarcomas of children and adolescents arise primarily from the connective tissues of the body, such as fibrous tissue, adipose tissue, and muscle tissue. In the US, 850-900 children and adolescents younger than 20 years of age are diagnosed with soft tissue sarcomas each year, of which approximately 350 are rhabdomyosarcomas. The incidence of soft tissue sarcomas for children and adolescents younger than 20 years of age was 11.0 per million representing 7.4% of cancer cases for this age group.

Rhabdomyosarcoma was the most common soft tissue sarcoma among children 0-14 years, representing nearly 50% of soft tissue sarcomas for this age range with an incidence rate of 4.6 per million. There are two major types of rhabdomyosarcoma: embryonal (about 75% of rhabdomyosarcoma cases) and alveolar. These two subtypes tended to occur at different body sites and had different age patterns. The incidence of embryonal rhabdomyosarcoma was higher among children 0-4 years, while the incidence of alveolar rhabdomyosarcoma was similar throughout childhood.

Other types of soft tissue sarcomas are rare and the incidence is higher in adolescents compared to younger children. Among these are the fibro sarcomas, malignant fibrous histiocytoma, synovial sarcoma, leiomyosarcoma, liposarcoma, and others. For infants the most common soft tissue sarcoma was embryonal rhabdomyosarcoma.

Aims and objective

The objectives of the study was to study the histopathological features of soft tissue tumors and to study the occurrence of soft tissue tumors in relation to age, sex and anatomical site. The recommended classification is World Health Organization (WHO) classification of soft tissue tumors and is used widely.

Methods

Study design: The present study is a retrospective study, carried out at histopathology section of pathology, Department of Pathology at Gauhati Medical College and Hospital, Gauhati a tertiary care centre in Kamrup district of Assam state, India during the period of June 2019 to May 2021.

Type of study: It was a retrospective type of study.

Data collection procedure: In present study, we analysed all 50 cases which were received for histopathology examination under the diagnosis of soft tissue tumours from surgical department.

Inclusion criteria: All the mesenchymal tumours arising from any soft tissue like fibrous tissue, adipose tissue, skeletal muscle, blood and lymph vessels and peripheral nervous system were included in this study.

Exclusion criteria: All the non-mesenchymal tumors, bone tumors and any known already diagnosed tumours were excluded from the study.

All relevant clinical details were obtained from patients or his relatives. Each received surgical specimen in histopathology section were examined grossly for its size, shape, weight, consistency and appearance. Tissue cut surface was also examined for the presence of hemorrhage, necrosis and cystic spaces. Presence or absence of any gross involvement of adjacent structure along with depth of the tumor was also noted. All these specimens were preserved in 10% neutral buffered formalin for fixation for 24 hours. For histopathological evaluation, numbers of sections were taken from different representative sites according to the biopsy specimen the whole specimen was processed. These representative sections were subjected for processing on automatic tissue processor. After processing the section were embedded in paraffin, cut with microtome at 5 micron thickness and stained with hematoxylin and eosin stain. Special staining procedure like periodic acid schiff (PAS) and reticulin stains were also done as and when required. Immunohistochemistry was also done few cases those were found difficult to diagnose by histopathological examination alone.

Samples were collected using stratified random sampling technique. All the data's were analyzed using Microsoft excel 2013 and figures were drawn using Microsoft word 2013.

An approval for this study was obtained from the institutional ethical committee.

Results

In our study, 50 soft tissue tumors were analyzed, out of which 45 (90%) cases were benign, and 5 (10%) malignant tumors. Vascular tumors formed the largest group constituting 24 cases (48%). Adi-

pose tissue tumors were the second commonest comprising 14 cases (28%) followed by skeletal muscle tumors constituting 5 cases (10%). Table 1 shows a male preponderance in STTs is observed in our study, (male: female – 1.4:1). Table 2 shows that out of total 50 cases, 45 cases (90%) were benign, 5 cases (10%) were malignant. Table 3 shows that vascular tumours formed the largest group consisting of 24 cases (48%) in this study. Adipose tissue tumours were the second commonest consisting of 14 cases (28%) followed by Skeletal muscle tumours constituting 5 cases (10%).

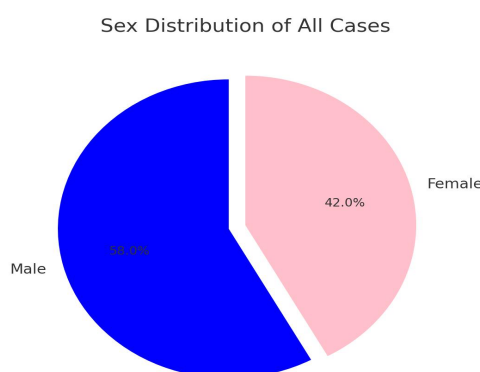
Most of the benign tumours were found to be superficial in location, i.e. dermis and subcutis. Although, we found out that malignant soft tissue tumours were deeper in location, which included tumours arising from muscle, deep to muscle. Table 4 shows that the most commonly involve site is

Head & Neck (34%) followed by lower Extremities (32%) and Upper Extremities (24%). Table 5 shows that the most commonly involve site for the Benign STT is Head & Neck (16 cases) followed by Lower Extremities (13 cases) & Upper Extremities (12 cases).

Again Malignant the most commonly involve site is Lower Extremities (3 cases) followed by Head & Neck (1 case) & Trunk (1 case). Table 6 Shows age distribution of Benign & malignant soft tissue tumour cases. The most common age group of all the soft tissue tumour was between age group 0-4 years (42%). Common age group for benign tumour is 10-14 yrs (18 cases). The most common age group for malignant tumour is 0-4 yrs (5 cases). In the present study the youngest patient in 3 month and the oldest patient is 13 yrs.

Table 1: Showing sex distribution of all cases

Sex	No of cases	Percentage %
Male	29	58%
Female	21	42%
Total	50	100%

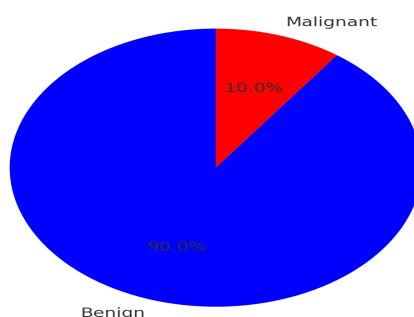


Graph 1: Sex distribution of all cases

Table-2: Showing histopathological nature soft tissue tumour.

Nature of tumour	No of cases	Percentage %
Benign	45	90%
Malignant	05	10%
Total	50	100%

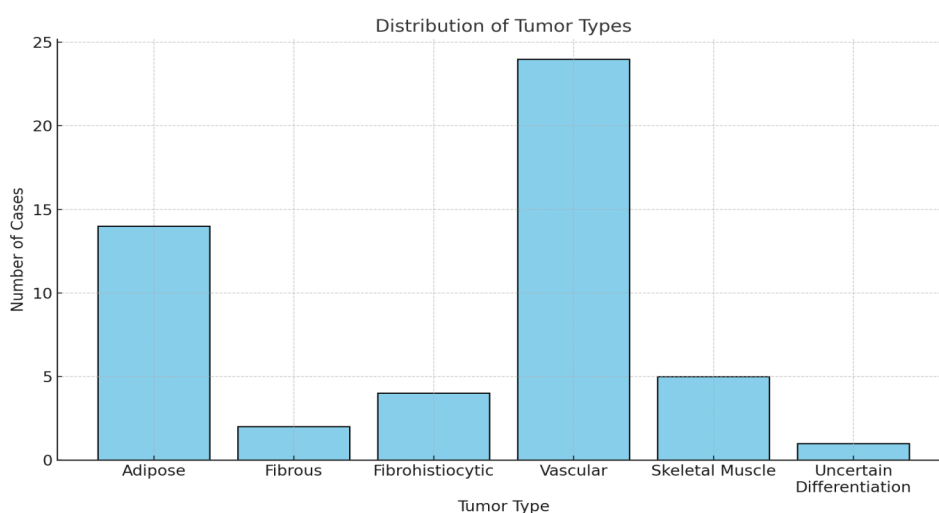
Histopathological Nature of Soft Tissue Tumour



Graph 2: Histopathological nature soft tissue tumour

Table 3: Showing Histopathological typing of soft tissue tumour

Sl no	Tumours	No of cases	Percentage %
1	Adipose	14	28%
2	Fibrous	02	04%
3	Fibrohistiocytic	04	08%
4	Vascular	24	48%
5	Skeletal muscle	05	10%
6	Tumours of uncertain differentiation	01	02%
	Total	50	100%

**Graph 3: Distribution of Tumor Types****Table 4: Showing site distribution of all soft tissue tumour cases.**

Site involved	No of cases	Percentage %
Upper Extremities	12	24%
Lower Extremities	16	32%
Trunk	05	10%
Head & Neck	17	34%
Total	50	100%

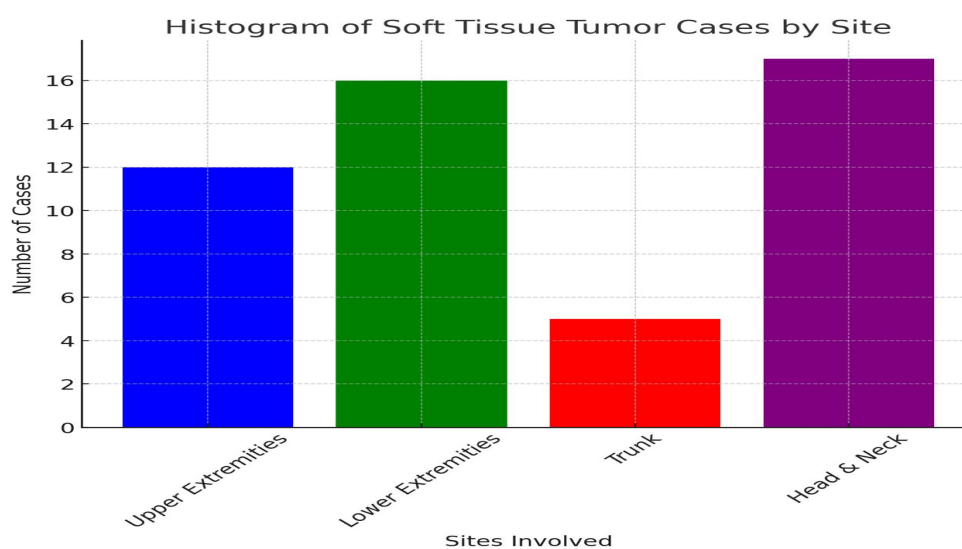
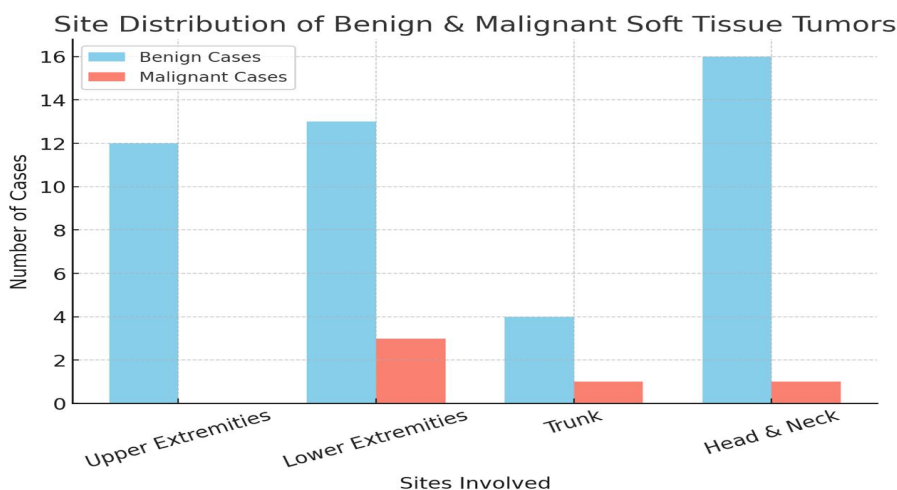
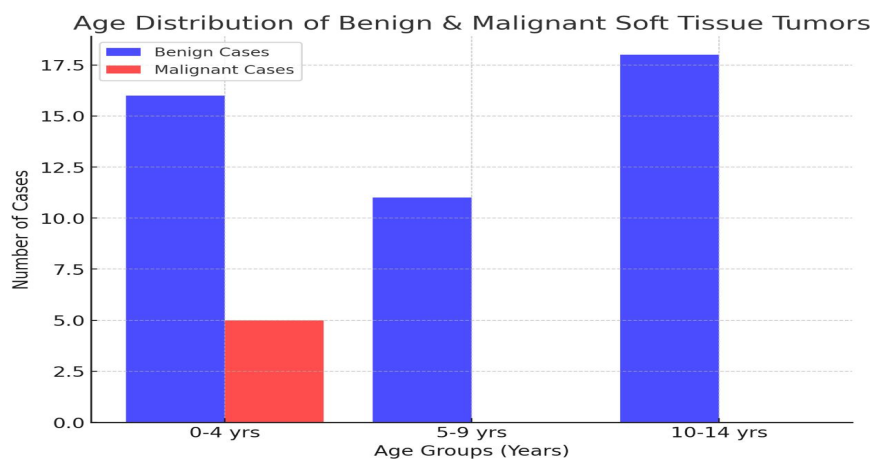
**Graph 4:Histogram of soft tissue tumor cases by site**

Table 5: Showing site distribution of Benign & malignant soft tissue tumour cases.

Sites involved	No of Benign cases	No of Malignant cases
Upper Extremities	12	00
Lower Extremities	13	03
Trunk	04	01
Head & Neck	16	01
Total	45	05

**Graph 5: site distribution of Benign & malignant soft tissue tumour****Table 6: Showing age distribution of Benign & malignant soft tissue tumour cases.**

Age group (yrs)	No of Benign cases	No of Malignant cases
0-4 yrs	16	05
5-9	11	00
10-14	18	00
Total	45	05

**Graph 6: Age distribution of Benign & malignant soft tissue tumours**

Discussion

From the study of soft tissue tumour in paediatric age group revealed that there are varieties of neoplasm that affect the soft tissue in paediatric age which are difficult to diagnose clinically. Sometimes clinically benign looking tumours are found to be malignant under microscope. So every suspected soft tissue mass should be sent for histopathological examination for confirmation of

their diagnosis. It is observed that soft tissue tumours varying according to age, sex, site distribution, histopathological nature & typing and their frequencies. In the present study, the most common benign soft tissue tumours was vascular tumours (48%) followed by adipose tissue tumour (28%) and skeletal muscle (10%). The observation are comparable to the reports of Rathna [3] Geetha dev [4,5], Myhre Jensen6, and Kransdorf [7,8]

where they constituted 56%, 38.3%, 48.1% and 20.6% of benign tumors respectively.

The second most common benign tumor group was the adipose tumors, which constituted 28%, which is comparable to the studies of Rathna. S, Geetha Dev [4,5] Myhre Jensen [6] and Kransdorf [7,8] where they formed 30%, 21.3% 13.6 and 16.1% respectively. Kapilakan et al [9] had observed that the most common benign soft tissue tumours were vascular tumors (50.6%), followed by lipoma (17.4%). Minard colin et al [10] studied Soft tissue tumours in neonates. He revealed that Soft tissue tumours in approximately 25% of neonatal tumours and was most often benign (more than 2/3 of cases). Vascular tumours are the most frequent benign tumours and infantile hemangioma accounts for 32% of these tumours, affecting 1 out of 200 children at birth. Makino et al [11] made a clinicopathological study on soft tissue tumors of the head and neck region. Involving 651 cases of soft tissue tumours originating in the head and neck area. Among these tumors 628 were benign (96%), while there were only 23 malignant cases (4%). In the benign group hemangiomas showed the highest incidence (47%) followed by tumors of adipose tissue (19%). In the present study, the most common malignant soft tissue tumours was skeletal muscle (10%). Similar observations were also made by Rathna, Myhre Jensen, and Kransdorf where they recorded 25%, 28% and 24.1% of malignant tumours respectively. Again, in the present study, benign tumour (90%) were more common than malignant tumours (10%) among all soft tissue tumour. Similar result were also obtained by Rathna had observed that out of their 138 cases, 20 cases were malignant and 118 cases were benign: Rathna, observed that malignant tumour were 20(14.5%) and benign were 118(85.5%). In this study also comparable to the Myhre Jensen, and Kransdorf where they constituted, 39.8% and 5.4% of malignant tumors and 68.2% and 94.6% of benign tumours respectively. Makino et al [11] had done a clinicopathological study on soft tissue tumors of the head and neck region. His study consists of 651 cases of soft tissue tumors originating in the head and neck area. Among these tumors 628 were benign (96%), while there were only 23 malignant cases (4%).

In this study, males (58%) were more commonly affected than female (42%) and male: female ratio was 1.4:1 kransdorf had observed that males (55.1%) were affected.

Minard colin et al [11] studied Soft tissue tumors in neonates. He found Soft tissue tumors males were more commonly affected than female.

In this study, the most common age group for all soft tissue tumours 0-4yrs (42%) followed by

second most common was 10-14 yrs (36%) and 5-9 yrs (22%) respectively. Again, common age group for benign tumours was 10-14 yrs (18 cases), followed by 0-4 yrs (16 cases) and 5-9 yrs (11 cases). In the present study youngest patient was 3 month and the oldest patient was 13 yrs respectively; which is comparable to the following studies: Rathna. S & Myhre Jensen observed that maximum number of cases belongs to benign tumours between the age group 12 and 10 yrs respectively. Again case of malignant tumours most common age group was 0-4 yrs which is comparable to Rathna & Myhre Jensen who observed that maximum number of cases belongs to malignant tumours at average age group of 4 yrs respectively.

Tarek et al [12] observed that the incidence of rhabdomyosarcoma between 0.1-16 years with a median age of 6 years and sixty percent were below the age of 10 years. S. Agarwala et al [13] had observed that almost two-thirds of cases of RMS were diagnosed in children <6 years of age. Coffin et al [14] had studied vascular tumors in children. The mean age at diagnosis was 12 years; 26 percent (58) of cases were diagnosed in the first year of life and 57 percent (127) in the first decade.

The present study showed that the most commonly involve site was head & neck (34%) followed by lower extremities (28%) and upper extremities (24%). the most commonly involve site for the benign soft tissue tumour is head & neck (16 cases) followed by lower extremities (13 cases) & upper extremities (12 cases). again malignant the most commonly involve site is lower extremities (3 cases) followed by head & neck (1 case) & trunk (1 case). the most commonly involve site for the benign soft tissue tumour is head & neck (34%). This was comparable to observation of the following studies:

Rathna, Geetha dev observed that most commonly involve site for the benign STT is head & neck where they constituted by 36% and 32% respectively and followed by lower extremities (28%). in contrast kransdorf recorded that 28.8% benign tumour in head & neck. In contrast malignant soft tissue tumours was commonly involve site is lower extremities (60%) was recorded in the present study, followed by head & neck (20%) & trunk (20%). This observation was comparable to Rathna, kransdorf studies they observed that maximum number of most commonly involve site for the malignant STT was lower extremities where they constituted 55% and 37.1% respectively.

Badr et al [15] had found that the most common sites rhabdomyosarcoma were the head and neck (40%), followed by genitourinary tract (29%), extremities (14%), trunk (12%).

Agarwala et al [13] had done a retrospective analysis of 1062 patients of rhabdomyosarcoma in childhood he observed 35% of RMS cases involve the head and neck region followed by genitourinary tract (26%) and lower extremities (19%). In the present study, the most commonly involve site for vascular tumours which was most common benign STTs in our studies. Haemangioma is the most common benign vascular tumour. The most commonly involve anatomical sites for vascular soft tissue tumours was head & neck (10 cases) followed by upper extremities (7 cases), lower extremities (5 cases) and trunk (2 cases which was comparable to the studies of Rathna, Geetha dev, Myhre Jensen, and Kransdorf where they observed most common benign vascular soft tissue tumours was the Haemangioma constituted 56%, 38.3%, 48.1%, and 16.1% respectively and their most commonly involve site was Head & Neck. Coffin et al had studied Vascular tumors in children in 222 patients, he observed commonly involve site was head and neck (80 cases, 35 percent), followed by extremities (79 cases, 35 percent), and trunk (65 cases, 28 percent). Adipose tissue tumours was the second most common benign soft tissue tumours in this study. Lipoma is the most common adipose tissue tumour. The most commonly involve anatomical sites for adipose soft tissue tumours was

lower extremities (5 cases) followed by upper extremities (4 cases) and head & neck (4 cases). This finding was comparable to the studies of Rathna Geetha dev, Myhre Jensen, and Kransdorf where lipoma constituted 30%, 21.3%, 11.8%, and 7.6% respectively and their most commonly involve site was Trunk.

In the present study, the most common malignant soft tissue tumour was RMS & their most common involve site was lower extremities. The most commonly involve anatomical sites for skeletal muscle soft tissue tumours was lower extremities (3 cases) followed by head & neck (1 case), and trunk (1 case) in respect of anatomical sites distribution of malignant soft tissue tumours, which was comparable to the studies of Rathna where the most common malignant soft tissue tumours was the RMS constituted 15% and the most commonly involve site was lower Extremities.

IHC examination was done for diagnosis of malignant skeletal muscle tumour. All the 5 cases of rhabdomyosarcoma was positive for desmin marker similar observation were also made by Tarek et al who had done a retrospective analysis of 190 patients of rhabdomyosarcoma in childhood, he recorded all the RMS cases were desmin positive.

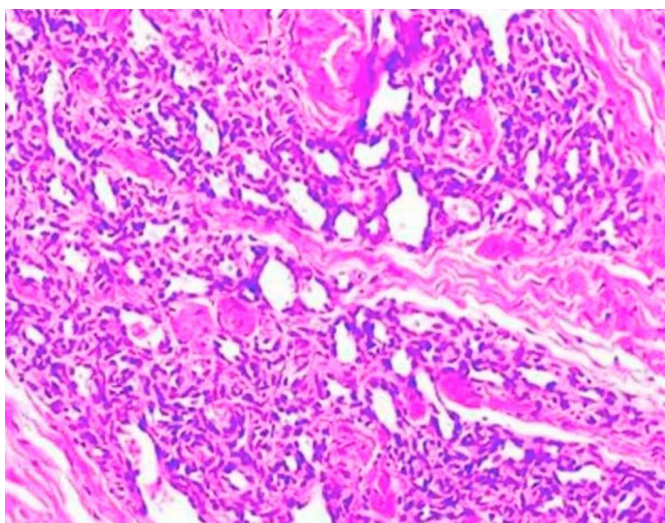


Figure 1: Photomicrograph of capillary hemangioma (H&E stain 40X).

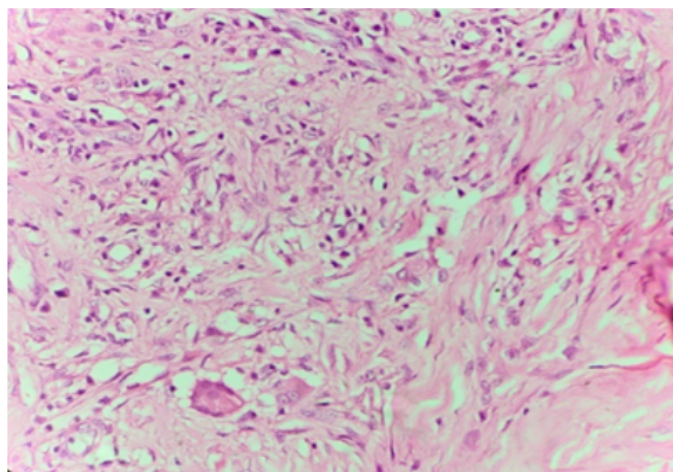


Figure 2: Benign Fibrous Histiocytoma (10x, H&E)

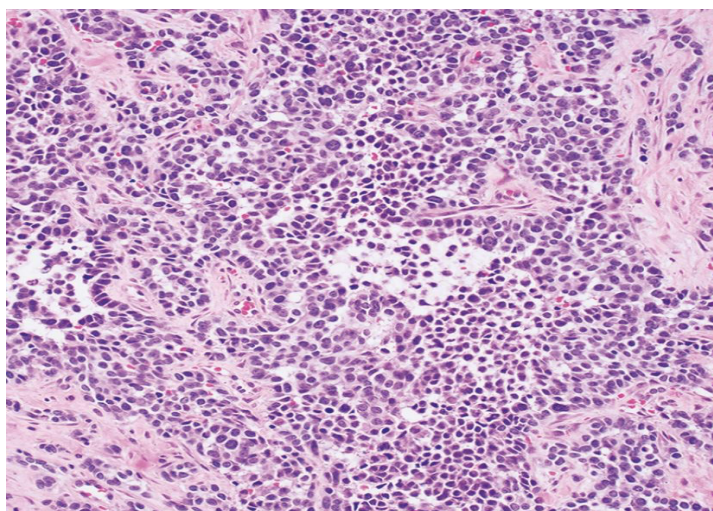


Figure 3: Photomicrograph of rhabdomyosarcoma (H&E stain 40X).

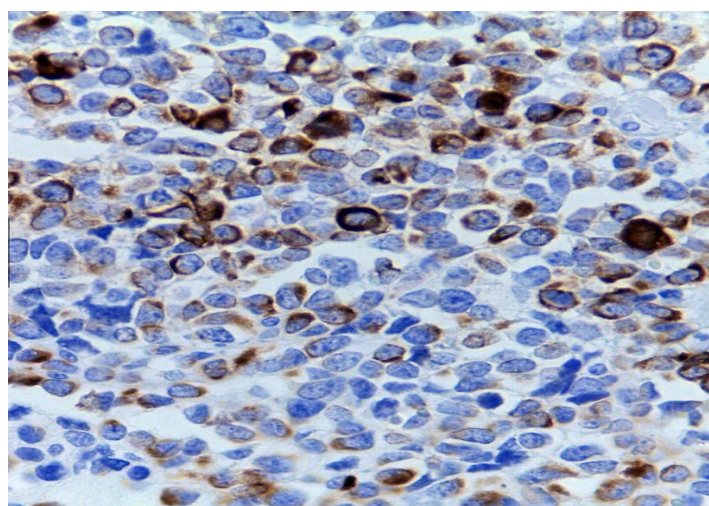


Figure 4: Photograph of Alveolar rhabdomyosarcoma showing immunoreactive for Desmin.

Conclusion

From the present study, it is concluded that most common soft tissue tumours was the vascular tumour. Benign tumour were more common than malignant tumours except in case of skeletal

muscle tumour; where malignant was more common.

The peak in the age distribution of malignant soft tissue tumour in paediatric age group was 0-4 years. Again males were more commonly affected

than females. The most commonly involved site for the benign soft tissue tumour was head & neck.

Again the most commonly involve site for the malignant soft tissue tumour was lower extremities. Haemangioma was the most common benign vascular tumour; again the most common malignant soft tissue tumour was rhabdomyosarcoma. Finally, immunohistochemistry is essential for the diagnosis of soft tissue tumours.

Even though soft tissue sarcomas were rare. Clinical diagnosis of soft tissue tumours is difficult, histopathology remains the mainstay diagnosis of tumour for early and better treatment.

References

1. Enzinger FM and Weiss SW. Soft tissue tumors. 5th edn. Missouri: Mosby Company; 1995; chapter-1: page no-1. Ch 8 page no 177,429,583,633.
2. Rosai J. Rosai and Ackerman's surgical pathology. 9th ed. Vol. 2, Elsevier, New Delhi, India, 2004. Chapter 25 page no 2238.
3. Rathna.s - Clinicopathological study of soft tissue tumour 138 cases in paediatric age Group 2006; page no 34-59.
4. G. Dev, Banerjee AK, Aikat BK. Soft tissue tumors. Part I: Benign tumors. Ind J Cancer 1974; 2: 336-343.
5. G. Dev, Banerjee AK, Aikat BK. Soft tissue tumors. Part II: Malignant tumors. Ind J Cancer 1974; 2: 344-8.
6. Jensen MO. A consecutive year series Of 1331 Soft tissue tumors - A clinicopathological data comparison with sarcomas. Acta orthop scand 1981; 52: 287-293.
7. Mark J Kransdorf. Benign soft tissue tumors in a large referral population: Distribution of specific diagnosis by age, sex and location. AJR 1995; 164: 395-402.
8. Mark J Kransdorf. Malignant soft tissue tumors in a large referral population: Distribution of specific diagnosis by age, sex and location. AJR 1995; 164: 129-134.
9. Kapilakan K, Sirikulchayanonta V Soft tissue tumors in Ramathibodi Hospital: study of 1,682 cases during 1977-1986. Department of Pathology, Songklanakarin Hospital, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 1992 Jan; 75 Suppl 1:140-6.
10. Minard colin V Soft tissue tumors in neonates Département de pédiatrie, institut Gustave-Roussy, 39, rue Camille-Desmoulins, 94805 Villejuif cedex, France 2009 Jul;16(7):1039-48. Epub 2009 Apr 23.
11. Makino Y a clinicopathological study on soft tissue tumors of the head and neck 1979 May; 29(3):389-408.
12. Tarek Shouman, M.D.; Ihab El-Kest, M.D.; Khalid Zaza, M.D.; Mohamad Ezzat, M.D.; Hany William, M.D. And Ibrahim Ezzat, M.D. Rhabdomyosarcoma in Childhood: A Retrospective Analysis 190 Patients Treated at a Single Institution The Department of Radiation Oncology, National Cancer Institute, Cairo University. Journal of the Egyptian Nat. Cancer Inst., Vol. 17, No. 2, June: 67-75, 2005.
13. S. Agarwala J Indian Assoc Pediatr Surg / Jan-Mar 2006 / Vol 11 / Issue 1 page 15.
14. Coffin CM, Dehner LP. Source 1993; 28 Pt 1: 97-120 Lauren Vascular tumors in children and adolescents: a clinicopathologic study of 228 tumors in 222 patients. V. Ackerman Division of Surgical Pathology, Washington University Medical Center, St. Louis, Missouri.
15. M. A. Badr, 1 Y. A. Al-Tonbary, 2 A. K. Mansour, 2 T. H. Hassan, 1 M. R. Beshir, 1 A. Darwish, 2 and R. A. El-Ashry International Scholarly Research Network ISRN Oncology Volume 2012, Article ID 674523, 8 pages .