International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Histomorphological Profile and Clinicopathological Correlation of Soft Tissue Tumours- A Study at a Tertiary Care Teaching Hospital

Dr. Vaidehee Naik[1], Dr. Hoogar M.B[2], Dr. Shilpi Sahu[3], Dr. Ruchi Khadayate[4]

[1]Senior Post-Graduate Resident, [2]Associate Professor, [3]Professor and Head, [4]Junior Post-Graduate Resident, Department of Pathology, MGM's Medical College, Navi Mumbai

Corresponding Author: Dr. Vaidehee Naik

ABSTRACT

Introduction: Soft tissue is defined as nonepithelial extraskeletal tissue of the body exclusive of the reticuloendothelial system, glia and supporting tissue of various parenchymal organs. Soft tissue tumours (STS) are a heterogeneous group of soft tumours classified according to the line of differentiation of adult soft tissues and the pathogenesis most of which is not known.
Objectives: The main objectives of the present prospective study are to determine the overall incidence of soft tissue tumours and their frequency of distribution in relation to age, sex and various sites in the body, and to study the histomorphological features which would help in classification and subclassification of soft tissue tumours.
Methods: The present prospective study was conducted between July 2016 and December 2017 for a period of 18 months in a tertiary care teaching hospital.
Results: Out of 113 soft tissue tumours analysed in the present study, 95.5% are benign in nature and 4.5% are malignant with benign lipomatous tumours (55.7%) being most common soft tissue tumours, followed by benign vascular tumours (19.46%). Incidence of soft tissue tumours is found to be higher in males; the incidence being highest in the age group of 31-40 years.
Conclusion: Soft tumours pose diagnostic challenges because of confounding morphological characteristics, which might need utmost diligence and advanced ancillary studies such as immunohistochemistry and molecular studies for accurate diagnosis and clinicopathological correlation. In the present study, the incidence of benign tumours (95.5%) is higher than malignant tumours with benign lipomatous tumours (55.7%) being most commonly occurring tumours with maximum age incidence being 31-40 year-age group in a total cases analysed being 113. The incidence of soft tissue tumours is higher in males having with the male to female ratio being 1.13:1 with commonest site of occurrence being upper extremities.

Key Words: Soft tissue tumours, round cell tumours, benign and malignant soft tissue tumours, lipomatous tumours, spindle cell lesions, fibrohistiocytic tumours

INTRODUCTION

Soft tissue is defined as nonepithelial extraskeletal tissue of the body exclusive of the reticuloendothelial system, glia and supporting tissue of various parenchymal organs. Soft tissue tumours (STS) are a heterogeneous group of tumours classified according to the line of differentiation of adult soft tissues, and the pathogenesis most of which is not known. [1] These are usually classified as benign, intermediate or malignant lesions which can occur in any age group, and which usually present as a painless mass. [2] The overall

incidence of soft tissue tumours is relatively high in case of benign soft tissue tumours with the annual incidence being 3000 per million populations while the incidence of malignant soft tissue tumours is 30 per million populations. [3,4] Many risk factors such as genetic factors, environmental factors, irradiation, viral infections and immune deficiency have been found to be associated with malignant soft tissue tumours and some reports of certain soft tissue sarcomas arising at the site of surgical procedures or fracture sites and in the vicinity of plastic or metal prosthetic or implants as also due to thermal or acid burns after a latent period of several years are found in literature. [5]

Depending on the biological behaviour, soft tissue tumours are classified into benign and malignant tumours, which arise nearly everywhere in the body. Benign tumours, which closely resemble normal tissues from which they arise, have limited capacity for autonomous growth. Benign soft tissue tumours are usually slow growing, superficial, well-defined, well-encapsulated, painless and any soft tissue tumour is considered malignant if they increase in size with size>5cm, are deep to deep fascia and painful. [6,7]

The mainstay of diagnosis of soft tissue tumour depends on the use of characteristic diagnostic techniques employed in diagnosis of soft tissue tumours with various sampling techniques being excisional, incisional and core biopsy with preferred technique for diagnosing the soft tissue masses over the extremities persistently remaining open biopsy which is considered as gold standard. [8-10] Fine needle aspiration cytology (FNAC) plays an important role in diagnosing the soft tissue lesions and CT-guided FNAC can be of particular help in diagnosis of intraabdominal and retroperitoneal lesions. [11]

Biopsy of soft tissue tumours, particularly of suspicious malignant soft tissue lesion, is quintessential part of preoperative investigations, which helps in diagnosing the biological behaviour and outcome of tumours including poorly differentiated high grade tumours, which is complimented by latest diagnostic techniques such as immunohistochemistry, cytogenetic and molecular methods. This has led to a more logical histogenetic classification and standard nomenclature which has enhanced better chances of clinico-pathological correlation. [12]

OBJECTIVES

The present study is carried out with main objectives of determining the overall incidence of soft tissue tumours and their frequency of distribution in terms of age, sex and their predilection for various sites in the body, and to study the histomorphological features, a study which thereby would aid in nosological spectrum of diagnosis, classification and subclassification of entire range of complex, often perplexing and yet interesting soft tissue tumours in a prominent tertiary care teaching hospital in Navi Mumbai.

MATERIALS AND METHODS

The present prospective study was conducted from July 1, 2016 to December 31, 2017 at the Department of Pathology, MGM's Medical College, Kamothe, Navi Mumbai, a unique region in western Indian state of Maharashtra with its cosmopolitan yet a mix of urban and semi-urban populace of remarkable socio-economic and ethnic diversities. A total of 113 specimens of soft tissue neoplasms, which included biopsy specimens as well as completely surgically excised specimens, were received in the department of Pathology during the study period of 18 months. Detailed clinical data including the age, sex, site of the lesion and clinical features were collected from histopathology request forms and out-patient and In-patient files of the patients. The gross examination of the specimens received was carried out and paraffin blocks were prepared from the tissue blocks submitted for tissue processing, which were sectioned and stained with routine Haematoxylin and Eosin (H and E) stains.

Wherever necessary, immunohistochemical staining was used as an aid in the diagnosis of poorly differentiated lesions and lesions with difficult diagnostic problems.

Inclusion Criteria: Both benign and malignant tumours of various soft tissues were included.

Exclusion Criteria: The following were excluded from the study:

Tumour like lesions of soft tissues

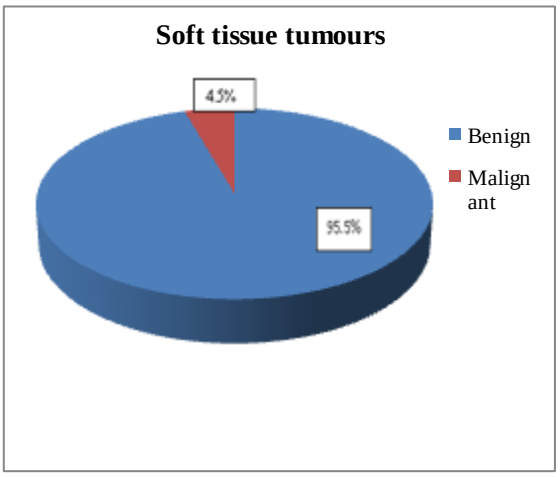
Tumours arising from supporting tissue of various parenchymal organs such as uterine and gastrointestinal parenchyma

RESULTS

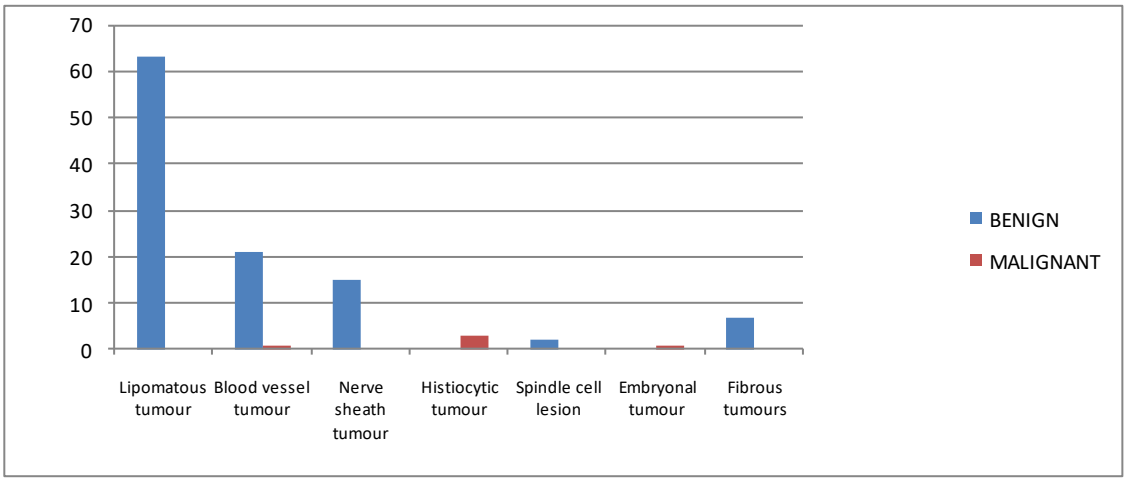
Out of the total 113 cases of soft tissue tumours in the study, 108 (95.5%) are benign in nature and 5 (4.5%) are malignant (Table 1). Among these 113 cases, 63 (55.7%) are lipomas (Figure 1A) which consist 58 (92.1%) of pure or classical lipomatous tumours, while 5(5.9%) are fibrolipomas (Figure 1B). The highest number of lipomas, 21(33.3%), are reported in the fourth decade of life with upper extremity being the most common site occurrence for maximum of 27(42.85%) out of 63 cases (Table 2,3,4).

TABLE1: TOTAL 113 CASES WERE DIVIDED IN FOLLOWING CATEGORY

TYPE OF TUMOUR	BENIGN	MALIGNANT
Lipomatous tumour	63	0
Blood vessel tumour	21	01
Nerve sheath tumour	15	0
Histiocytic tumour	0	03
Spindle cell lesion	02	0
Embryonal tumour	0	01
Fibrous tumours	07	0



GRAPH 1: TOTAL 113 CASES DIVIDED AS BENIGN AND MALIGNANT LESIONS



GRAPH 2: REPRESENTS CLASSIFICATION OF 113 CASES IN TO BENIGN AND MALIGNANT

TABLE 2: AGE-WISE DISTRIBUTION OF ALL SOFT TISSUE TUMOURS

Age group (Years)	Lipomatous tumour	Vascular tumour	Nerve sheath tumours		Histiocytic tumour	Spindle cell lesion	Embryonal tumour	Fibrous Tumours
			Neurofibroma	Schwannoma				
1-10	04	02	0	0	0	0	0	01
11-20	07	06	01	01	0	0	0	01
21-30	06	02	01	01	0	0	0	02
31-40	21	03	02	0	01	0	0	0
41-50	16	06	02	0	0	0	0	01
51-60	04	01	02	0	02	0	02	01
61-70	03	01	03	01	0	01	0	01
71-80	01	01	01	0	0	0	0	0
81-90	0	0	0	0	0	0	0	0
91-100	01	0	0	0	0	0	0	0

TABLE 3: SITE-WISE DISTRIBUTION OF ALL SOFT TISSUE NEOPLASMS

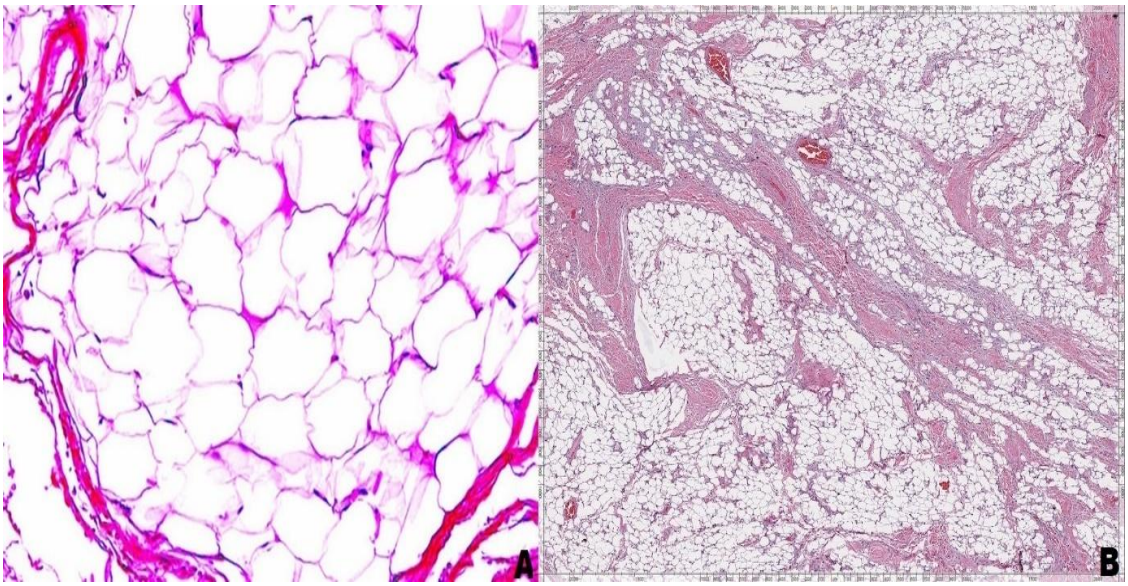
DISTRIBUTION OF TUMOURS	HEAD, NECK AND FACE	TRUNK	UPPER EXTREMITY	LOWER EXTREMITY	OTHERS
Lipomatous tumour	09	16	27	04	07
Blood vessel tumour	07	03	04	03	05
Nerve sheath tumour	04	01	02	02	06
Histiocytic/fibrohistiocytic tumours	0	0	0	0	03
Spindle cell lesion	01	0	0	0	01
Embryonal tumour	0	0	0	0	01
Fibrous tumour	0	0	02	01	04

TABLE 4: SEX INCIDENCE OF ALL SOFT TISSUE TUMOURS

TYPE OF TUMOR	MALE	FEMALE
Lipomatous tumour	29	34
Blood vessel tumour	16	06
Nerve sheath tumour	06	09
Histiocytic tumour	02	01
Spindle cell lesion	01	01
Embryonal tumour	01	0
Fibrous tumours	05	02

Blood vessel tumours are the second most common soft tissue tumours accounting for 22 (19.46%) cases with maximum number of cases being reported in second and fifth decades of life. Among these 22 cases, 21(95.45%) cases are reported as hemangioma with maximum 6(28.5%) cases each noted in the age group of 11-20 years and 41-50 years with a male predominance with a total of 16 out of 21(76.19%) cases seen in males. The regions of Head, neck and face are found to be the most common site for hemangiomas, 7(33.3%) out of 21 cases. One (4.5%) case of blood vessel tumour is reported as angiosarcoma, which occurred in the trunk region in a male in fifth decade of his life.

Benign peripheral nerve sheath tumours accounted for 15(13.27%) cases, amongst which 12(80%) are reported as neurofibromas; neurofibromas occurred mainly in males (60%) in the seventh decade of life, though specific site of occurrence is not found in the clinical history received. Schwannomas (Figure 2) account for 3(20%) cases, each occurring in second, third and seventh decades of life, which are preponderantly noted in females (66.6%) with head and neck being the most common site of predilection.



1A. Photomicrograph showing lipoma composed of mature adipose surrounded by a distinct fibrous capsule, low power (H and E); B. Photomicrograph showing fibrolipoma composed of an admixture of mature adipose tissue and fibrous tissue, Low power (H and E).

Out of a total of 113 soft tissue tumours, 7(6.19%) cases belong to the category of fibrous tumours. Two (28.5%) cases of fibromyxoma are reported in males in first and third decades of their lives, each one of them located in the upper extremity

and inguinal region respectively. Fibromas, one case each (71.4%) occurring in second, third, fifth, sixth and seventh decades of life found situated mainly over the foot and forearm. Benign spindle cell lesion included 2 cases with male to female ratio being 1:1 and both presented in the seventh decade of life.

Histiocytic tumours or fibrohistiocytic tumours comprised 2.65% cases, which included two cases of dermatofibrosarcomaprotuberans (DFSP) (Figure 3) and one case of malignant fibrous histiocytoma (MFH). Both these tumours are reported in sixth decade of two males and one female patient. Benign tumours under the category of skeletal muscle tumour are not reported; however one case (0.88%) of embryonal tumour categorised as primitive neuroectodermal tumour (PNET) (Figure 4) is reported in a male in sixth decade of his life.

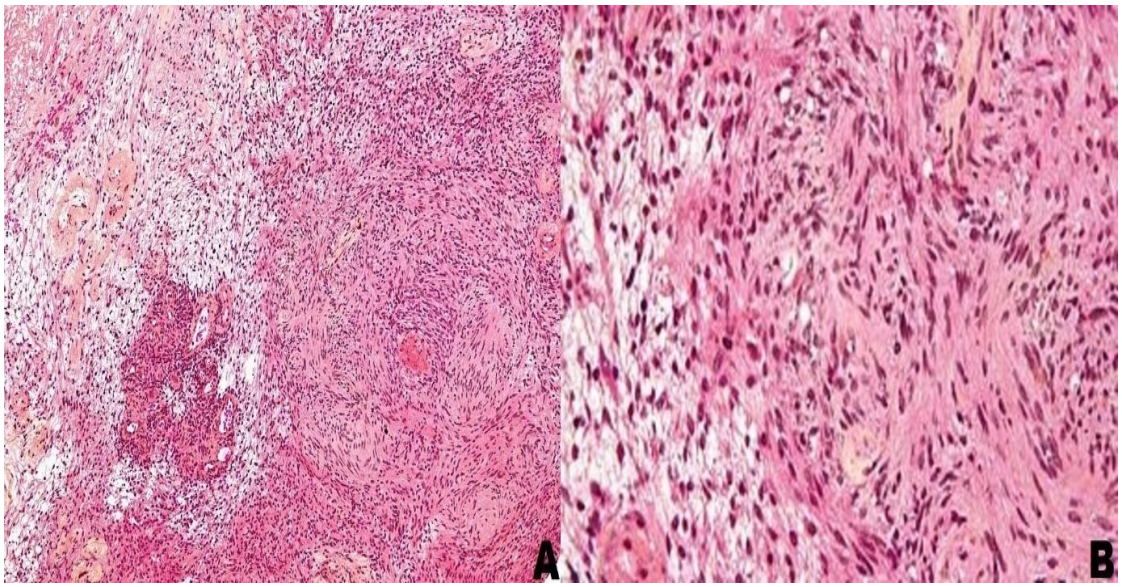


Figure 2. A. Photomicrograph of Schwannoma displaying hypocellular and hypercellular areas composed of spindled cells with delicate elongated wavy nuclei, low power (H and E); B. Schwannoma composed of spindled cells with nuclear palisading and hypocellular myxoid areas. High power (H and E).

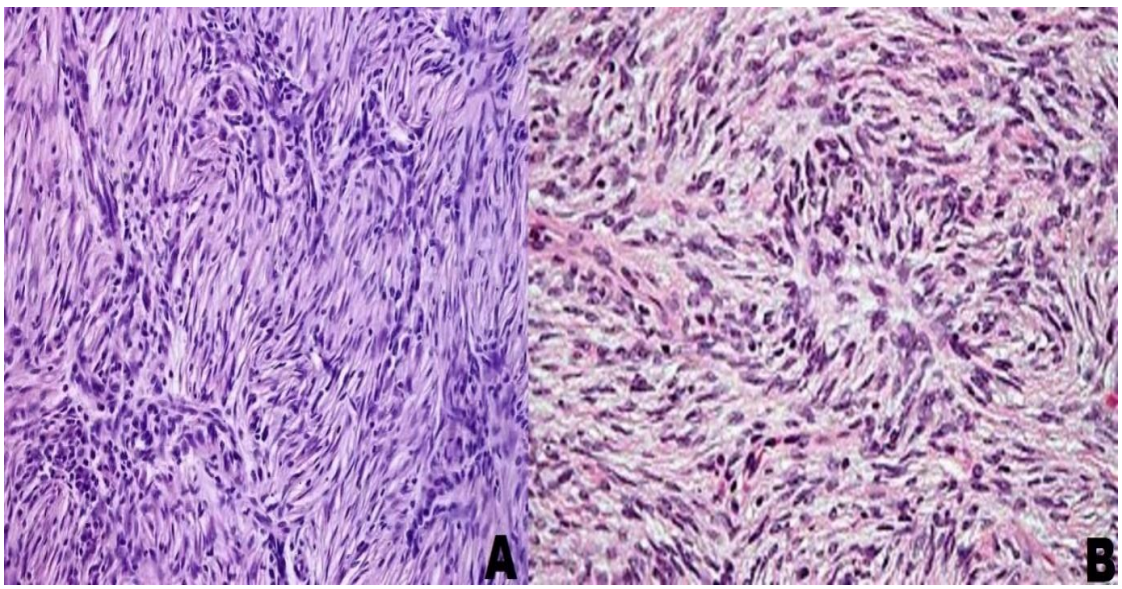


Figure 3. A. Photomicrograph of Dermatofibrosarcoma protuberans composed of swirling fascicles of spindled cells admixed with histiocytes, low power (H and E); B. Dermatofibrosarcoma protuberans showing swirling fascicles of spindled cells and scattered giant cells, High power (H and E).

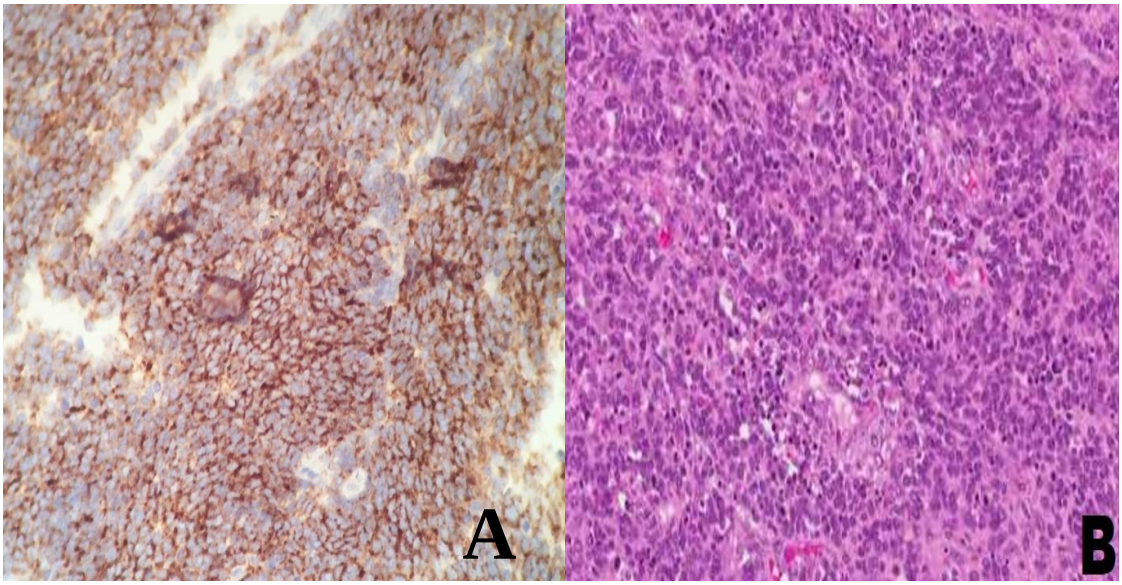


Figure 4. A. S-100 positivity. B. Photomicrograph of Primitive neuroectodermal tumour composed of round cells with scant cytoplasm arranged in irregular lobules, low power (H and E).

DISCUSSION

Soft tissue tumours (STS) are a heterogeneous group of soft tumours classified according to the line of differentiation of adult soft tissues and the pathogenesis most of which is not known. The main purpose of this study was to assess the hospital based study data of benign and malignant soft tissue tumours with respect to age, sex and site of distribution and to compare it with other similar studies (Table 5). Various causes are known to be associated with soft tissue tumours like physical and chemical factors, exposure to ionizing radiation, inherited or acquired immunological defects. The exact cause for their occurrence cannot be ascertained due to the long latent period. [7]

In the present study the frequency of benign tumours is 95.57% and malignant tumours is 4.42% which is similar in overall incidence of benign and malignant tumours as found in the studies of Dr. Kinjal Bera et al, [2] Jain P et al, [3] GoGi AM et al. [4] Chakrabarti PR. et al [5] conducted a 3 year retrospective study and found an incidence of 93.3% benign, 0.6% intermediate and 6% malignant soft tissue tumours.

In the current study, soft tissue tumours show mild male preponderance which is also noted uniquely in all categories of soft tissue tumours. Soft tissue tumours affected 60 (53.09%) males and 53 (46.90%) females in a total of 113 cases of soft tissue tumours with male to female ratio of 1.13:1 which is similar to the study conducted by Jain P et al [3] and which also compares favourably with the studies of Dr.KinjalBera et al [2] and GoGi AM et al [4] with male to female ratio in their studies being 1.1:1 and 1:1 respectively.

TABLE 5: COMPARISON OF PRESENT STUDY WITH OTHER SIMILAR STUDIES

Points to be compared	Present study	Dr.KinjalBera et al	Jain P et al	Bharti G. Ramnani et al
Common age group (benign)	31-40 years	30-50 years	51-60years	31-40years
Common age group (malignant)	41-50 years	>50years	>50years	-
Sex distribution (benign)	Male>Female	Male>Female	Male>Female	Male>Female
Benign/Malignant	Benign>Malignant	Benign>Malignant	Benign>Malignant	Benign>Malignant
Common site for benign tumours	Upper extremities	Trunk	Extremities, head and neck	Trunk
Most common tumour	Lipoma	Lipoma	Lipoma	Lipoma
Lipoma incidence (%)	55.7	56.48	50.27	50.8

In the present study, the peak age of incidence of soft tissue tumours is in the age group of 31-40 years followed by age-groups of 41-50 years and 11-20 years, which is almost similar to the age incidence found in the studies of by Bharati G.

Ramnani et al, [6] though the age incidence of soft tissue tumours is found to be much higher in the studies of Jain P. et al. [3]

In the current study, benign lipomatous tumours (55.7%) are most common soft tissue tumours followed by vascular tumours (19.46%) and peripheral nerve sheath tumours (13.27%). These findings are similar to the studies conducted by Dr.KinjalBera et al. [2] The most common site of occurrence of lipoma was upper extremities which was similar to the study conducted by Dr.KinjalBera et al, [2] BharatiG.Ramnani et al [6] and ChakrabartiPR et al. [5] Lipoma was most common in the fourth decade of life while BharatiG.Ramnani et al [6] reported them to be most common in the third decade and Dr.KinjalBera et al reported them to be more common in the age group of 30-50 years.

Blood vessel tumours or vascular tumours are second most common category of soft tissue tumours in the present study, accounting for 22(19.46%) cases. They are most common in the second and fifth decades of life and are found to be more common in males with head, neck and face being the most common sites of their occurrence. These findings were similar to the studies conducted by Jain P. et al (20%) [3] and Bharati G.Ramnani et al (23.3%). [6] Out of 22 cases of hemangiomas, one case was categorized as angiosarcoma which occurred in the trunk region in a male in fifth decade of his life.

Benign peripheral nerve sheath tumours account for 13.27% of all the soft tissue tumours, a finding which is similar to the findings reported by Chakrabarti PR et al [5] the incidence of which is 14.6%. These findings differed with other studies of Dr B. Syam Sundar et al [7] who reported the incidence of peripheral nerve sheath tumours to be 21.9%, while Dr.KinjalBera et al and Pramila Jain et al reported an incidence of 20.2% and 19.72% respectively. In the present study neurofibromas constitutes 80% of the benign peripheral nerve sheath tumours, seen more commonly in males in their seventh decade of life and Schwannomas accounted for 3 (20%) cases, each occurring in the second, third and seventh decade of life with a female preponderance and occurring most commonly in head and neck region of the body.

Two out of 7 (28.5%) cases from the category of fibrous tumours are reported as fibromyxomas which occurred in upper extremity and inguinal region in first and third decades respectively, in males. Fibromas, one case each (71.4%) occurring in the second, third, fifth, sixth and seventh decades of life, which occurred on the foot and fore arm. Benign spindle cell lesion included two cases (1.76%) with male to female ratio being 1:1 and both presented in the seventh decade of life.

Histocytic tumours or fibrohistiocytic tumours comprised 2.65% of soft tissue tumours, which included two cases (66.7%) dermatofibrosarcoma protuberans (DFSP) and one case (33.3%) of malignant fibrous histiocytoma (MFH). Both these tumours are reported in the sixth decade of two males and one female. The incidence of histiocytic tumours differs from the findings of Dr B. Syam Sundar et al [7] who also reported one case (12.5%) of dermatofibrosarcoma protuberans in a male in the age group of 40-50 years, which occurred over one of the extremities. Chakrabarti PR et al [5] reported one case of DFSP occurring over the abdomen in a 45 year old male patient.

Benign tumours under the category of skeletal muscle tumours are not reported; however one case (0.88%) of embryonal tumour categorised as primitive neuroectodermal tumour (PNET) is reported in a male in his sixth decade of life.

CONCLUSION

Soft tissue tumours, being commonly encountered in surgical pathology, form an interesting category of tumours arising from variety of soft tissues, which sometimes pose diagnostic challenges because of similarities in routine

morphological features while displaying characteristic delicate submicroscopic or ultrastructural differences which need to be detected by immunohistochemistry, electron microscopy or other cytogenetic and molecular methods for a definitive diagnosis and logical clinicopathological correlation.

Salient findings observed in the present study are as follows:

1. Benign soft tissue tumours are more common than malignant soft tissue tumours.
2. Benign lipomatous tumours are the most common soft tumours followed by benign vascular tumours.
3. Soft tissue tumours are more common in the age group of 31-40 years.
4. Males are more commonly affected by soft tissue tumours than females.
5. Upper extremity is the commonest site of occurrence of soft tissue tumours followed by others sites including head and neck region.

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How to cite this article: Naik V, Hoogar MB, Sahu S et.al. Histomorphological profile and clinicopathological correlation of soft tissue tumours- a study at a tertiary care teaching hospital. Int J Health Sci Res. 2018; 8(9):35-42.

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