Original Article

The Pattern of Musculoskeletal Cancers in Pakistan

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ABSTRACT

OBJECTIVE: The study aimed to assess the pattern of musculoskeletal cancers in the Pakistani population who visited NIMRA hospital situated at Jamshoro.

METHODOLOGY: It was an observational retrospective study conducted at the Nuclear Institute of Medicine and Radiotherapy (NIMRA) and LUMHS, Jamshoro, from August 2019 to December 2020. A total of 626 patients were selected for this study. The data regarding patients were sourced from NIMRA, LUMHS Jamshoro. All the patients of both genders and ages diagnosed at NIMRA with any cancer were included in the study. Patients who did not return for follow-up after their metastatic and laboratory tests were excluded from the study. A Chi-square test was conducted to assess the association between diagnosed cancers versus gender and age groups. The confidence interval was set at 95%, and the probability value ≤0.05 was statistically significant.

RESULTS: A total of 626 patients were selected for this study. Of them, 362 (57.8%) were males and 264 (42.2%) were females, with a mean age of 34.67 years and a standard deviation of 18.998. The most prevalent cancer is soft-tissue sarcoma (STS) 129 (20.6%), followed by chondrosarcoma 119 (19%), and osteosarcoma 91 (14.5%). Forty percent of the cancers were diagnosed as stage II, followed by stage III (22%), stage IV (22%) and stage-I (16%), respectively. A significant association between diagnosed cancers were found with gender (p=0.001) and age group (p=<0.001).

CONCLUSION: Soft-tissue sarcoma, chondrosarcoma, and osteosarcoma are the most common musculoskeletal cancers in the Pakistani population.

Key Words: Chondrosarcoma, Ewing sarcoma, Musculoskeletal Cancers, Osteosarcoma, Rhabdomyosarcoma, Soft-tissue sarcoma.

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INTRODUCTION

Musculoskeletal tumors may develop in bone or soft tissues, including muscles and cartilage.[1] They are called sarcomas when transformed into malignant, for instance, chondrosarcoma and osteosarcoma.[2] While musculoskeletal tumors are rare, the development of pathologic fractures is a significant concern with bone tumors. The most common malignant musculoskeletal tumors in children and adolescents are rhabdomyosarcoma, Ewing sarcoma and osteosarcoma.[3]

Over the last few decades, several factors have led to better patient outcomes. Patients are enrolled in clinical trials and receive multidisciplinary treatment from oncologists, radiation oncologists, physicians, pathologists, and radiologists. Studies using molecular targets and conventional chemotherapeutic agents have resulted in a greater understanding of molecular disease mechanisms, which could lead to better outcomes in the future.[4] Furthermore, modern orthopaedic procedures, instruments, and new radiation oncology tools promise improved local management of primary tumors and reduced late side effects.[5]

Despite this improvement, patients must be monitored for the rest of their lives for the long-term effects of intensive chemotherapy and radiation therapy.[6] A patient with a suspected soft tissue or bone tumour should be treated at a hospital where they can receive multidisciplinary care.[7] Radiography, MRI, and/or CT are used to assess the primary tumor.[8] When treating a child or adolescent who has recently been diagnosed with one of these cancers, it's essential to assemble a multidisciplinary team of surgeons and radiation oncologists as soon as possible so that treatment plans can move forward smoothly and local control schedule can be organized so that chemotherapy can begin as quickly as possible.[9] The study's objective was to assess the pattern of musculoskeletal cancers in the Pakistani population who visited NIMRA hospital situated at Jamshoro.

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METHODOLOGY

It was an observational retrospective study conducted

at the Nuclear Institute of Medicine and Radiotherapy (NIMRA) and LUMHS, Jamshoro, from August 2019 to December 2020. A total of 626 patients were selected for this study. The data regarding patients were sourced from NIMRA, a leading referral and cancer treatment public hospital that offers financial assistance for diagnosis and treatment to patients from all over Pakistan on a need-basis. All the patients of both genders and ages diagnosed at NIMRA with any cancer were included in the study. Patients who did not return for follow-up after their metastatic and laboratory tests were excluded from the study.

Demographic characteristics such as gender, patient religion, profession, language, district, name of cancer diagnosed, site of cancer, stage of cancer, and age group were among the study variables obtained by the principal investigator in this study.

The data was entered and analyzed using SPSS (Statistical Package for Social Sciences) version 22.0. Frequency and percentage were calculated for qualitative variables such as the patient's occupation, language, district of patients, site of cancer, and type of MSK cancer diagnosed. In contrast, gender, the religion of the patient, stage of cancer and age group were presented as Pie charts or Bar charts. Quantitative data like age at diagnosis of cancer were presented as a histogram. The statistical test was Chi-square to assess the association between cancer diagnoses versus gender and age groups. The confidence interval was set at 95%, and the probability value ≤0.05 was statistically significant.

RESULTS

A total of 626 patients were selected for this study. Of them, 362 (57.8%) were males, and 264 (42.2) were females, with the mean age at the cancer diagnosis was 34.67 years with a Standard deviation of 18.998. Regarding the patients' occupations, most were housewives 149 (23.8%), followed by 112 (17.9%), labourers and others. At the same time, occupational data regarding 113 patients (18.1%) was not available.

The data regarding cancers diagnosed in the patients is presented in **Figure I**. The most prevalent cancer is Soft-tissue sarcoma (STS) 129 (20.6%), followed by Chondrosarcoma 119 (19%), and Osteosarcoma 91 (14.5%). Forty percent of the cancers were diagnosed as stage II, followed by stage III (22%), stage IV (22%) and stage-I (16%), respectively (**Figure II**).

According to the obtained data, most of the cancer patients were aged between 21 to 40 years, 219 (35%), 188 (30%) below the age of 20 years, 152 (24.3%), 41 to 60 years, 63 (10.1%) were 61 to 80 years, and only four patients (0.6%) were above 80 years of age (**Figure III**). **Table I** shows a significant association (p=0.001) between the gender of patients and cancer diagnosis. The association between age groups and the diagnosed cancers was also found statistically to be highly significant (p= <0.001).

FIGURE I: DISTRIBUTION OF THE CANCERS/ CARCINOMAS DIAGNOSED AMONG PATIENTS

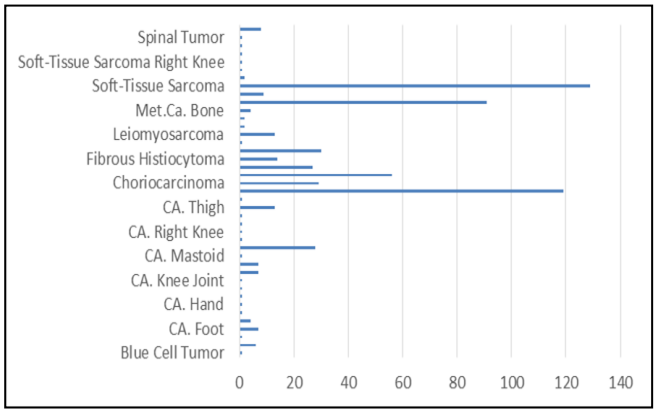

FIGURE II: DISTRIBUTION OF THE STAGES OF CANCER (n=626)

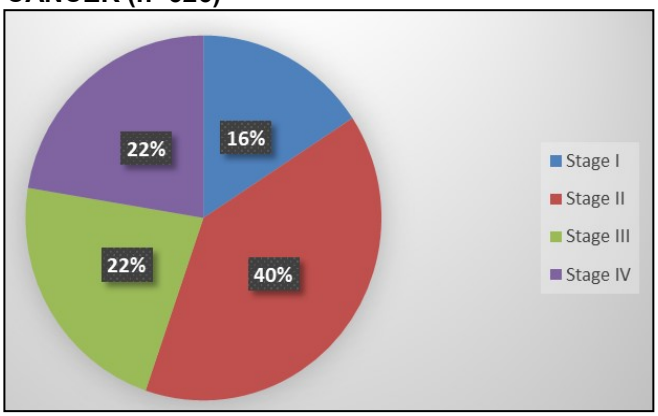

FIGURE III: DISTRIBUTION OF THE AGE GROUPS (n=626)

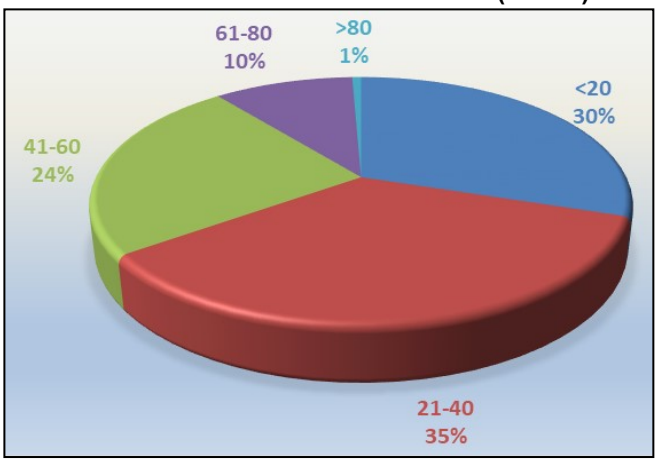

TABLE I:
ASSOCIATION BETWEEN THE DIAGNOSED CANCERS AND THE GENDER (n=626)

Cancer Diagnosed	Gender of Patient		P-value
	Female	Male	
Blue Cell Tumor	0	1	
Bone Tumor	2	4	
CA. Arm	1	0	
CA. Foot	2	5	
CA. Forearm	0	4	
CA. Forehead	1	0	
CA. Hand	0	1	
CA. Heel	0	1	
CA. HIP	0	1	
CA. Knee Joint	0	1	
CA. Leg	3	4	
CA. Mandible	5	2	
CA. Mastoid	1	0	
CA. MAXILLA	13	15	
CA. Popliteal Fossa	0	1	
CA. Right Knee	0	1	
CA. Sacrum	0	1	
CA. Shoulder	0	1	
CA. Thigh	7	6	
CA. Tibia	1	0	
Chondrosarcoma	45	74	**0.001**
Choriocarcinoma	29	0	
Ewing Sarcoma	20	36	
Fibrosarcoma	14	13	
Fibrous Histiocytoma	4	10	
Giant Cell Tumor	11	19	
Kaposi's Sarcoma	1	0	
Leiomyosarcoma	7	6	
Liposarcoma	0	2	
Malignant Fibrous Histiolymfoma	1	1	
Met.Ca. Bone	1	3	
Osteosarcoma	38	53	
Rhabdomyosarcoma	3	6	
Soft-Tissue Sarcoma	49	80	
Soft-Tissue Sarcoma Chest Wall	1	1	
Soft-Tissue Sarcoma Forearm	0	1	
Soft-Tissue Sarcoma RIGHT KNEE	1	0	
Soft-Tissue Sarcoma THIGH	1	0	
Spinal Sarcoma	0	1	
Spinal Tumor	0	1	
Synovial Sarcoma	2	6	

DISCUSSION

This study was designed to assess the pattern of musculoskeletal cancers in Pakistan. Our study found that the most common musculoskeletal cancer is STS. According to this study's incidence (1995-7), Karachi is a high-risk area for STS, ranking 4th for males and 10th for females among the 230 current registries.[10] The incidence of STS in the Kaposi sarcoma population was equivalent to that of contemporary European and US people.[11] Males with Kaposi sarcoma had the highest incidence in Asian registries, while females with STS had the third highest incidence after registries in Israel and Manila. The South Asian population has one of the lowest rates of STS in the world.[12] In contrast to other epidemiological studies, which display a slight male predominance, the current research shows a higher male-to-female ratio. At the same time, age groups are more common amongst 21 to 40 years patients, followed by 41 to 60 years.

In the present study, the second most common cancer was chondrosarcoma, a cartilage cell cancer. Only 2 to 10% of all chondrosarcomas are of mesenchymal origin. In case reports and small series, approximately 600 cases of MCS have been reported, and only three series of 20 or more cases have been identified in English-language medical literature.[13] Mesenchymal chondrosarcoma has been known for 58 years, but it continues to pose diagnostic and management difficulties owing to its rarity. To date, only a few case series have been written.[14]

The third most prevalent cancer in the present study found was osteosarcoma. Osteosarcoma is a malignant bone tumor that develops early in life. It's rare cancer in adults, accounting for less than 1% of all cancers diagnosed in the US yearly.[15] There is a bimodal age distribution in osteosarcoma with an incidence in early adulthood and later over the age of 65.[16] In the current study, it is more prevalent in males as compared to females, and a majority of the cases are diagnosed in the patients who are below 20 years of age. We could not find a later peak in incidence that matched epidemiological data from another institute in our region.[17] The age and male preponderance, on the other hand, are related to global incidence rates.[18] The lower end of the femur and the upper end of the tibia were the most common sites of initial disease. This accounted for 79.6% of the total incidences. Concurrently, pulmonary metastasis accounted for 64% of all metastatic cases at the time of diagnosis.[19,20]

Pakistan's health and development systems are overburdened by ineffective palliative care, which is largely unknown and ignored. Cancer treatment centres are concentrated in large cities, out of reach for the vast majority of the population. Pakistan has

one of the highest ratios of health workers to the total population in the world (1:90 per million). The relatively small sample is the limitation of the study. Design studies with larger sample sizes and more study variables in future are recommended.

CONCLUSION

This study found musculoskeletal cancers to have significant associations with gender and age groups. It is also concluded that soft-tissue sarcoma, chondrosarcoma, and osteosarcoma are the most common musculoskeletal cancers in the Pakistani population.

Ethical permission: Liaquat University of Medical & Health Sciences Jamshoro, Medical Research Centre ERC Exemption letter No. LUMHS/MRC/643, dated: 18-03-2021.

Conflict of Interest: The authors have no conflict of interest to declare.

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Data Sharing Statement: The data supporting this study's findings are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

AUTHOR CONTRIBUTION

Memon SM: Manuscript Writing, Analysis and Results Interpretation
Mangi FH: Study Concept and Data Collection
Memon FA: Data entry and Statistical Analysis
Sushel C: Data Collection and Discussion
Shaikh AG: Data Collection, Organizing and Summarization
Shaikh TA: Study Design and Data Collection

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