PROFILE OF MUSCULOSKELETAL TUMOR IN SAIFUL ANWAR GENERAL HOSPITAL MALANG FROM JANUARY 2011 UNTIL DECEMBER 2018

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Abstract: Musculoskeletal tumors are relatively rare, with 0.2%-0.5% of all malignant tumors in all ages. *The geographic distribution of musculoskeletal tumors varies significantly around the world. This study aims to describe the musculoskeletal tumor profile in Saiful Anwar General Hospital. All data were obtained from the department of orthopaedic and traumatology database, Saiful Anwar general hospital. Thus, patients who were diagnosed with either bone tumor or soft tissue tumor between January 2011 to December 2018 were selected for the present study. The clinical-pathological conference (CPC) was carried out to ensure the validity of all the registered data. A total of 577 patients with tumors from January 2011 to December 2018 was obtained. Out of all the cases, 439 (76%) cases are bone tumors, and the remaining 138 (24%) cases are soft tissue tumors. The most frequent locations of the musculoskeletal tumors are the long bones of the thigh and lower leg. This study shows an increasing trend in musculoskeletal tumors incidence, despite decreasing numbers in several years. This result goes along with a rising trend in malignancy cases with a higher amount compared to the benign one. Moreover, MBD and osteosarcoma were found to be the most common tumor and primary bone tumors, respectively. However, the fact that there is some data loss in the study limited the study for a more accurate result.*

Keywords: *Musculoskeletal tumor; Bone tumor; Osteosarcoma; Malang; East Java*

INTRODUCTION

Musculoskeletal tumors are relatively rare and represent a serious medical problem in the world, shown by an increasing trend of mortality rates of tumor patients.[1,2] The geographic distribution of musculoskeletal tumors varies greatly around the world. Several countries, including India, China, and Japan, have a low rate of musculoskeletal tumors. Meanwhile, the highest incidence is reported in Western Europe and the United States of America (USA), especially osteosarcoma and Ewing sarcoma, which were frequently found in children and adolescents.[3,4] Primary bone tumors were reported as 0.2-0.5% of all malignancies in all ages, 3–5% of all tumors diagnosed in European children below 15 years, and 7–8% in adolescents between 15 and 19 years old.[2,5] The previous study also stated that a higher incidence rate of osteosarcoma was found in patients below 25 years.[6] Furthermore, the Globocan project of the International Agency for Research on Cancer (IARC) reported around 12.7 million new cancer cases and 7.6 million mortalities related to cancer across the world in 2008.[7] Therefore, it is necessary to raise worldwide awareness of the growing burden of cancer and to improve test and clinical research to provide proper strategies for the treatment of tumor patients.

Malang is a small city with 145.3 km2 wide area, housing 874.890 inhabitants, and grows with the rate of 1.47% each year.[8] However, at present, studies that report the incidence of musculoskeletal tumors in Indonesia are still limited, particularly in Malang, East Java. This study aims to describe the musculoskeletal tumor profile in Saiful Anwar General Hospital, so that the results can be used as a future reference in understanding the epidemiology of musculoskeletal tumor in Malang.

RESEARCH METHOD

This is a descriptive study that included a total of 577 patients. All data were obtained from the Department of Orthopaedic and Traumatology database, Saiful Anwar General Hospital, which is an institution in Malang city that covers the whole East Java Province of Indonesia. The inclusion criteria are all patients who were diagnosed with either bone tumor or soft tissue tumor between January 2011 to December 2018, including those who had a biopsy or tissue sampling, and all patients whose data had been validated by the clinical-pathological conference (CPC). The exclusion criteria are all patients with tumors except bone and soft tissue tumors, patients who were registered before January 2011 and after December 2018, patients with incomplete data, and patients whose data had not been validated by the CPC. There is no limitation regarding patient associated factors, and tumor-associated factors such as age, gender, race, tumor stage, grade, and size.

All data that met the criteria were evaluated from the Department of Orthopaedic and Traumatology database and recorded to Microsoft Excel for further evaluation. The data were subsequently calculated and categorized into groups based on tumor type, origin, diagnosis, year of admittance, age, location, treatment, and follow-up. The results were then tabulated and put into graphs for a better presentation.

Since this is a descriptive study, not an analytical study, this study did not use a statistical analysis test. All the data were collected and processed by using Microsoft Excel to calculate the frequency and percentages of the obtained variables.

RESULTS AND DISCUSSION

We managed 577 patients with tumors from January 2011 to December 2018. Out of all the cases, 439 (76%) cases are bone tumors, and the remaining 138 (24%) cases are soft tissue tumors. The most frequent locations of the musculoskeletal tumors are the long bones of the thigh and lower leg (Table 1).

Table 1. Study characteristics

Location	Bone tumor (n=439)	Soft tissue tumor (n=138)
Shoulder	15 (3.4%)	10 (7.2%)
Arm	34 (7.7%)	8 (5.8%)
Forearm	30 (6.8%)	5 (3.7%)
Hand	18 (4.1%)	10 (7.3%)
Spine	7 (1.6%)	0 (0%)
Pelvis	33 (7.5%)	8 (5.8%)
Thigh	128 (29.2%)	22 (15.9%)
Lower leg	106 (24.1%)	41 (29.7%)
Foot	10 (2.3%)	11 (8%)
Multiple	38 (8.7%)	9 (6.5%)
Others	20 (4.6%)	14 (10.1%)

Among 439 cases of bone tumors, there are 273 cases of primary bone tumor, with the malignant type reflected a higher number compared to the benign type each year. At the same time, Metastatic Bone Disease (MBD) constituted the remaining 166 out of 439 cases of bone tumors. The number of bone tumor patients, in both primary and MBD, drastically increased in 2017, but then decreased in 2018 (Table 2).

Table 2. Number of bone tumors

Year	Primary bone tumor (n=273)		MBD (n=166)
	Malignant (n=168)	Benign (n=105)	
2011	9 (5.4%)	8 (7.6%)	10 (6%)
2012	14 (8.3%)	7 (6.7%)	14 (8.4%)
2013	15 (8.9%)	13 (12.4%)	26 (15.7%)
2014	17 (10.1%)	11 (10.5%)	22 (13.3%)
2015	22 (13.1%)	13 (12.4%)	17 (10.2%)
2016	19 (11.3%)	11 (10.5%)	15 (9%)
2017	41 (24.4%)	22 (20.9%)	35 (21.1%)
2018	31 (18.5%)	20 (19%)	27 (16.3%)

After categorizing all the tumors based on its diagnosis, we found that MBD was the most common tumors (166 cases), followed by osteosarcoma (104 cases), giant cell tumor (GCT) (44 cases), osteochondroma (39 cases), multiple myeloma (28 cases), chondrosarcoma (19 cases), and liposarcoma (16 cases) (Figure 1).

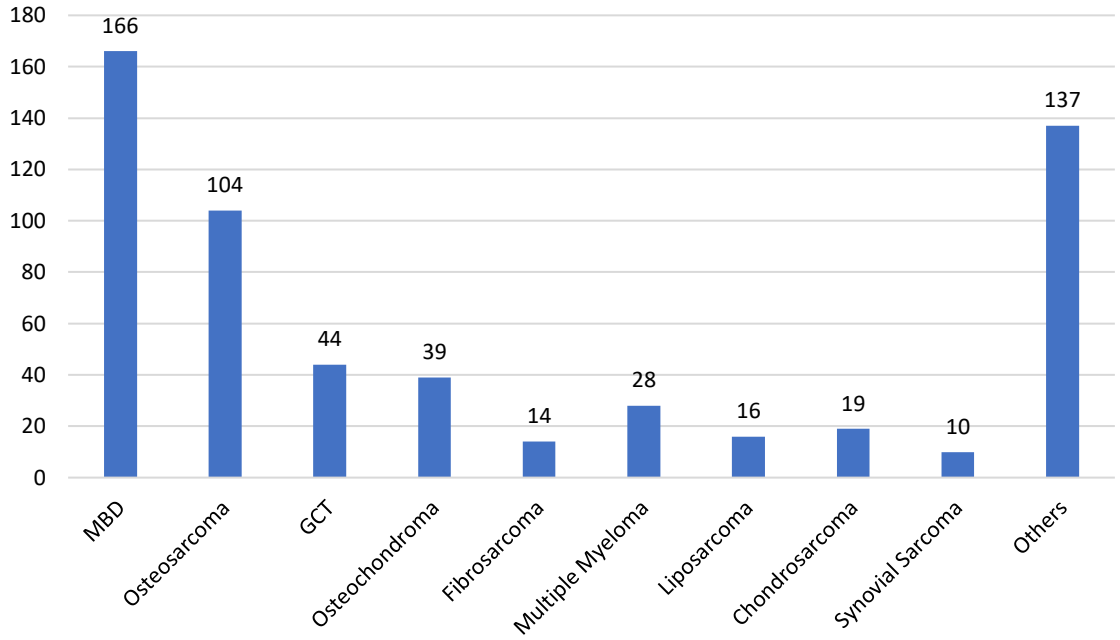

Figure 1. Number of tumor cases based on diagnosis

We found that the primary origin of MBD is breast cancer (25.9%) and lung cancer (23.5%). Of all the MBD patients, 25 (15.1%) patients were still alive until December 2018, 66 (39.7%) patients passed away, and 75 (45.2%) patients were unrecorded due to loss of contact with the patients (Table 3).

Table 3. MBD profile

Characteristics	MBD (n=166)
Origin	
Lung	39 (23.5%)
Breast	43 (25.9%)
Liver	9 (5.4%)
Thyroid	4 (2.4%)
Parathyroid	6 (3.7%)
Nasopharynx	5 (3%)
Urinary bladder	5 (3%)
Prostate	17 (10.2%)
Cervix	10 (6%)
Blood	8 (4.8%)
Drop out	20 (12.1%)
Follow-up	
Alive	25 (15.1%)
Passed away	66 (39.7%)
Loss of contact	75 (45.2%)

Furthermore, osteosarcoma, being the most frequent primary and malignant bone tumor, most often affect people aged less than 20 years old (50%), compared to 20-50 years old (39.4%), and more than 50 years old (10.6%). Consistent with musculoskeletal tumors in general, the most frequent location of osteosarcoma happened to be in the bones of the lower leg (36.5%) and thigh (24.1%). Of 104 cases of osteosarcoma, 102 (98.1%) patients have undergone surgery, and 2 (1.9%) patients refused any surgical procedure. During the follow-up, 21 (20.2%) patients were still alive, 54 (51.9%) patients passed away, and 29 (27.9%) patients were unrecorded due to loss of contact with the patients (Table 4).

Table 4. Osteosarcoma profile

Characteristics	Osteosarcoma (n=104)
Age (years)	
<20	52 (50%)
20-50	41 (39.4%)
>50	11 (10.6%)
Location	
Arm	13 (12.5%)
Forearm	8 (7.7%)
Pelvis	5 (4.8%)
Thigh	25 (24.1%)
Lower leg	38 (36.5%)
Others	15 (14.4%)
Treatment	
Operation	102 (98.1%)
Refuse operation	2 (1.9%)
Follow-up	
Alive	21 (20.2%)
Passed away	54 (51.9%)
Loss of contact	29 (27.9%)

Neoplasm is an abnormal, uncoordinated, and excessive growth of tissue. When this growth forms a mass, it is known as a tumor. It grows differently with its surrounding tissue even when the trigger is eliminated.[1] ICD-10 classifies neoplasms into benign, *in situ*, malignant, and uncertain or unknown behavior.[2] One type of tumor is the musculoskeletal tumor, which is infrequent compared to other types of tumors. It accounts for only around 0.5% of all malignancies in humans.[3] However, the malignant one accounts for 5-10% of all malignant neoplasms in children.[4] Unfortunately, there are still limited studies evaluating the musculoskeletal tumor in Indonesia, particularly in Malang, East Java.

Malang is a small city with 145.3 km^2 wide area, housing 874.890 inhabitants, and grows with the rate of 1.47% each year.[5] This study reports a record of musculoskeletal tumors in an institution in Malang city that covers the whole East Java Province of Indonesia. Consequently, the profile of musculoskeletal tumors described in this study is considered to be precise in representing the epidemiology of musculoskeletal tumors in Indonesia.

This study found that the number of bone tumors (n=439) was higher than soft tissue tumors (n=138) from 2011 to 2018. This result is similar to a study by Sugiyama et al.[6] that reported a higher number of tumors from the osteogenic origin (n=355) than the fibrogenic (n=15), fibrohistocytic (n=12), myogenic (n=1), and lipogenic (n=12) origin. Moreover, this study also found that malignant bone tumors (n=168) are higher in every year from 2011 to 2018 compared to the benign bone tumors (n=105). However, contrasting studies reported that benign tumors are more frequent than malignant tumors.[6,7] Rydholm et al.[7] stated that benign bone tumors are 100 times more frequent than malignant bone tumors with an incidence of around 300 per 100.000 population. Several factors can explain the result's discrepancy. The first one is the population age. Malignancy in bone was found to be more common in childhood and adolescence than in the elderly.[8,9] Nevertheless, a study by Sugiyama et al.[6] that found more benign bone tumors than malignant ones was conducted in Japan where a higher proportion of elderly citizens than the youngsters can be found.[10] In contrast, Malang has a higher population of citizens aged under 25 than the elderlies from 2011 to 2018, hence the higher number of malignant tumors. Secondly, the number of malignancies is increasing over the last 30 years, with the increased consumption of alcohol, junk food, and other carcinogenic substances.[11] Meanwhile, the study by Rydholm et al.[7] was conducted in 1984. Thus, the study might not be sufficiently accurate to picture current trends of malignancy. Lastly, both studies were conducted in Japan and Sweden, both developed countries with higher education status than Indonesia.[12–14]

This study found that of all tumors, MBD is the most frequent (n=166) with breast cancer as the primary origin (25.9%). This outcome is supported by some studies

that reported a similar result with the increasing rate of breast cancer.[15–17] Moreover, this study found osteosarcoma as the most common primary bone malignancy among all musculoskeletal tumors in the center. It accounts for 104 (18%) cases out of all musculoskeletal tumors cases. This result is in accordance with the literature, which showed that osteosarcoma as the most common bone malignant tumor.[18–27] This study revealed that osteosarcoma was mainly found in the lower leg (36.5%) and thigh bones (24.1%) and patients under 20 years old. This result agrees with studies by Nie & Peng[8] and Duong & Richardson[28]. The most widely accepted theory behind this phenomenon is because osteosarcoma mostly develops from osteoblast, a cell that is in abundance in children and adolescence who are experiencing a growth spurt. Meanwhile, the lower leg and thigh bone are sites with the highest rate of bone growth during the growth spurt.[29] Moreover, this study also reported that giant cell tumor is the second most common malignant tumor found in our center with 44 (7.6%) cases. However, this result is inconsistent with a study by Dorfman et al.[30], which stated that chondrosarcoma is the second most primary bone sarcomas, which attributes 25.8% of all sarcomas. The demographic status of the sample might explain this difference.

This study aims to describe the tumor profile in Malang from January 2011 to December 2018, which was treated in the Orthopaedic and Traumatology Department, Saiful Anwar General Hospital, as accurately as possible. Nonetheless, there is a limitation to this study. During the collection of the data, there are some unavailable data due to loss of contact with the patients. We believe that a future study that collects data from a complete sample can give a better result and understanding of tumor profile in Malang.

CONCLUSION

This study reports an increasing trend in musculoskeletal tumors incidence, despite decreasing numbers in several years. This result goes along with a rising trend in malignancy cases with a higher amount compared to the benign one. Moreover, MBD and osteosarcoma were found to be the most common tumor and primary bone tumors, respectively. The patient's record in the hospital's database system can allow analyzing a patient's prognosis and provide valuable information for the needs of research regarding musculoskeletal tumors. However, the fact that there is some data loss in the study limited the study for a more accurate result.

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