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EPIDEMIOLOGICAL STUDY OF BONE TUMORS IN WEST BENGAL-A RETROSPECTIVE AND PROSPECTIVE ANALYSIS.

Pathology

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ABSTRACT

Introduction- There are still now no standardized bone tumour data available for West Bengal which has a wide geographical variation.
Aims and objective-So the present study helps us to know the distribution and causation of bone tumors in West Bengal as well as to know the risk factors of the bone tumors in different category of people .
Materials and methods-Patients within age range of 5-65 years have been selected for this survey as most of the primary bone tumours are restricted within this age group. Retrospective and Prospective datas were collected during the time period of 2005-2010 as available data for pathology dept. tumor histopathology registry khata and population survey in tumor clinic of opd from 2011-15. All recorded datas have been analyzed using standard statistical method (Kappa Statistics) .
Results-A total of 130 patients were found to have had bone tumours from Pathology dept.registry data of our medical college from suspected 167 cases in this present sample survey studied for the period of 2005 to 2010 .We collected datas further from2011 to 2016 from the collective data of bone tumor clinic of dept. of Orthopedics were found to have had 287 malignant and 67 benign bone tumors among 354 cases selected for this study.
conclusion- we can say that a continuous work is required in this field to prepare a proper and statistically significant bone tumor register in this region of West Bengal and the search will goes on.

KEYWORDS:

Bone tumor,epidemiology of bone tumor,west Bengal.

Bone tumour primarily may be classified according to the tissue of origin - I. Bone-forming tumors; II. Cartilage-forming tumors; III. Giant-cell tumors; IV. Mesenchymal tumors; and V. Vascular tumors. The four most common types of bone sarcomas are osteosarcoma, chondrosarcoma,,malignant fibrous histiocytoma(MFH) of bone, and Ewing's sarcoma(ES). A team at a specialized center, including an orthopedic surgeon with experience in bone tumors, a radiologist, an experienced pathologist and a medical oncologist is essential for the appropriate management of these tumors[1,3].

Bone tumours are relatively uncommon and it is estimated that new cases of primary bone sarcoma is much lower in number in contrast with new cases of lung and breast cancer[2]. Most of the studies on incidence and relative frequency of bone tumours have been carried out in Europe, USA and other developed countries[1,2]. Relatively little information is available from Asian and African countries[4,5].

There are still now no standardized bone tumour data available for West Bengal which has a wide geographical variation. So the present study helps us to know the distribution and causation of bone tumors in West Bengal as well as to know the risk factors of the bone tumors in different category of people and the same study can be applied to control the health problem and evaluation of treatment modalities as a whole for bone tumor.

AIMS AND OBJECTIVES

The Aims and Objectives of the present study are as follows-

1. Epidemiological evaluation of benign and malignant bone tumours in West Bengal in relation to age, sex, race, site, different environmental pattern, and other variable parameter.
2. To prepare a standardized baseline data bank in relation to benign and malignant bone tumors in West Bengal under the changing influence of environment due to urbanization, mechanization and industrialization.

MATERIALS AND METHODS

Study area: The study has been carried out in the outdoor tumor clinic of Dept. of Orthopedics in a Medical College Hospital of kolkata, a tertiary care state govt. hospital and referral center catering a wide range of geographical area of west Bengal. The study also contains the data of bone tumours of dept. of pathology, histopathology registry khata

Study population: Patient within age range of 5-65 years have been selected for this survey as most of the primary bone tumours are restricted within this age group.

Study period: Retrospective and Prospective datas were collected during the time period of 2005-2010 as available data for pathology dept. tumor histopathology registry khata and population survey in tumor clinic of opd from 2011-15.

Selection of patients and parameters studied: After properly selecting the patients following parameters like age, sex, race, geographical variation, site, history of trauma, have been studied .

Study tools:

a. Questionnaire
b. Health record survey
c. Biochemical and hematological report survey
d. Radiological reports evaluation
e. Biopsy report evaluation

Plan for analysis of result: All recorded datas have been analyzed using standard statistical method (Kappa Statistics)

RESULT AND ANALYSIS

A total of 130 patients were found to have had bone tumours from Pathology dept.registry data of our medical college in Kolkata from suspected 167 cases in this present sample survey studied for the period of 2005 to 2010 among which 103 (81%) malignant and 27 (19%) benign bone tumors were found.

We collected datas further from2011 to 2016 from the collective data of bone tumor clinic of dept. of Orthopedics , as representative data of catchment area of our medical college of West Bengal were found to have had 287 malignant and 67 benign bone tumors among 354 cases selected for this study from 407 suspected sample of bone tumors during the same time period.

Results of our study are tabulated as follows:

Table – 1 Sex distribution of cases in different malignant bone tumors

Sex	OS (126)	ES (76)	CS (36)	Plsm (4)	MM (13)	HGGCT (20)	MFH (8)	FS (4)
Male	84(66.5%)	27(36%)	24(66%)	3(75%)	7(53.84%)	10(50%)	5(66%)	0
Female	42(33.5%)	49(64%)	12(34%)	1(25%)	6(46.16%)	10(50%)	3(33%)	4(100%)
Total	126	76	36	4	13	20	8	4

OS-osteosarcoma.ES-Ewings sarcoma.CS-chondrosarcoma.Plsm-Plasmacytoma

MM-multiple myeloma.HGGCT-high grade giant cell tumor.MFH-malignant fibrous histiocytoma. FS-fibrosarcoma.

Table – 2 Age distribution of cases in different malignancies.

Age /Yr	OS (126)		ES (76)		CS (36)		Plsm (4)		MM (13)		HGGCT (20)		MFH (8)		FS (4)		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
6 -15	37	18	14	25	3	1	X	X	X	X	X	X	X	X	X	X	54	44
%	44%		50%		11%												31.34%	
16-25	42	21	13	24	X	X	X	X	X	X	10	10	X	X	X	X	15	11
%	50%		50%								100%						38.80%	
26 - 35	5	3	X	X	8	4	X	X	X	X	X	X	3	2	X	X	2	5
%	6%				33%								66%				10.44%	
36-45	X	X	X	X	6	2	X	X	X	X	X	X	X	X	X	4	1	2
%					22%										100%		4.47%	
46-55	X	X	X	X	7	5	1	1	3	3	X	X	2	1	X	X	5	3
%					33%		50%		50%				33%				11.94%	
56-65	X	X	X	X	X	X	2	X	4	3	X	X	X	X	X	X	3	X
%							50%		50%								4.47%	
Total	84	42	27	49	24	12	3	1	7	6	10	10	5	3	X	4	39	28

Table – 3 distributions of clinical symptoms and signs by analyzing history in different malignant cases

Different tumors with no. of cases→	OS (126)	ES (76)	CS (36)	PL (4)	MM (13)	HGGCT (20)	MFH (8)	FS (4)
Swelling & Pain	109 (86.5%)	60 (78.5%)	28 (77.77%)	1(25%)	X	5(25%)	X	4
Only swelling	13 (10%)	16 (21.42%)	4 (11.1%)	X	X	15(75%)	3(33.3%)	X
Only pain	X	X	X	3(75%)	7(50%)	X	6(66.6%)	X
Pathological fracture	4 (3.33%)	X	4 (11.1%)	1(25%)	7(50%)	X	X	X
Associated symptoms 25 (20%)	22 (28.57%)	8 (22.2%)		X	7(50%)	X	X	4
Duration of symptoms 0–3 m	59 (46.66%)	5 (7.14%)	X	1(25%)	X	X	X	X
4-6m	38 (30%)	33 (42.85%)	4 (11.1%)	2(50%)	13(100%)	5(25%)	X	4
7-9m	17 (13.33%)	11 (14.28%)	4 (11.1%)	1(25%)	X	15(75%)	6(66.6%)	X
10-12m	8 (6.66%)	16 (21.42%)	12 (33.3%)	X	X	X	3(33.3%)	X
12-24m	X	5 (7.14%)	12(33.3%)	X	X	X	X	X
> 24m	4 (3.33%)	5 (7.14%)	4 (11.1%)	X	X	X	X	X
Rapidity of growth Rapid	59(46.66%)	5 (7.14%)	X	1(25%)	X	X	X	X
Gradual	38 (30%)	60(78.5%)	12 (33.3%)	2(50%)	13(100%)	20(100%)	8(100%)	4
slow	29 (23.33%)	11 (14.28%)	24 (66.6%)	X	X	X	X	X
History of trauma	55(43.33%)	11(14.28%)	8 (22.2%)	1 (25%)	7(50%)	X	1	X

Table – 4-Analysis of important clinical findings in different malignancies

Clinical features ↓		OS (126)	ES (76)	CS (36)	PL (4)	MM (13)	HGGCT (20)	MFH (8)	FS (4)
Anaemia	mild	34(26.6%)	21(28.57%)	7 (22.2%)	4	2	10(50%)	1(33.3%)	1
				27 (77.7%)	100%				
	Mod to severe	92(73%)	54(71.42%)		X	X	10(50%)	2(66.6%)	X
Oedema, jaundice, clubbing	Nil	Oe - 12(14.28%)	Nil	nil	Nil	nil	nil	Nil	
Lymph node	4(3.33%)	11(14.28%)	3(11.1%)	X	X	X	X	X	
Size	Globular	84(69.56%)	35(50%)	23 (66.6%)			3(75%)		
	Fusiform	20(16.66%)	19(26%)	7 (22.2%)			X	1(33.3%)	1
	Oval	22 (20%)	22(28.57%)	3(11.1%)	1		1(25%)		
consistency	Hard	97 (80%)	43 (57.14%)	31 (88.8%)	1		4(100%)		
	Soft - firm	12(10%)	12 (14.28%)	4 (11.1%)			X	3(100%)	
Temperature	Increased	112 (90%)	37 (50%)	19 (55.5%)			1 (25%)		
	Normal	14(10%)	32(50%)	15 (44.4%)	1		3(75%)	3(100%)	

Tenderness	Mild	33(26.6%)	42(57.14%)	19 (55.5%)	1		1(25%)		
	Mod	63(50%)	11(14.28%)	3 (11.1%)			1(25%)		
	severe	16(13.33%)	11(14.28%)	13 (33.3%)			2(50%)		

Table 5 - Site of swelling in different malignancies

Tumors	**OS (126)**	**ES (76)**	**CS (36)**	**PL (4)**	**HGGCT (20)**	**MFH (8)**	**MM (13)**	**FS (4)**
Site of the swelling	4 Upper left femur	21 Upper left femur	12 Upper right humerus	1 Neck of Rt. Femur	5 Lower left femur	3 Lower lt. tibia	7 Neck of Lt. femur	4 Upper Rt. femur
	38 Lower left femur	11 Upper right femur	4 Upper left humerus	1 D2 spine	5 Upper left humerus	3 Neck of Rt. femur	6 Lumbodorsal spine	
	8 Upper right femur	11 Upper left humerus	12 Upper right tibia	1 Upper Rt. Tibia	5 Lower Lt. radius	2 Lower Lt. femur		
	16 Lower right femur	5 Upper right humerus	4 Lower left femur	1 Rt. Ischial tuberosity	5 Lower Rt. radius			
	30 Upper left tibia	5 Rt ischium	4 Upper left tibia					
	13 Upper right tibia	5 Rt. Calcaniu m						
	13 Upper left humerus	5 Lower Lt. ulna						
	4 Upper right humerus	5 Lower rt. radius						
		5 Upper Lt. tibia						

Table 6: analysis of investigation reports available in different primary malignant bone tumors.

TUMORS		**OS(126)**	**ES(76)**	**CS (36)**	**PL(4)**	**HGGCT(20)**	**MFH (8)**	**MM(13)**	**FS (4)**
Anemia	Mild	25 (20%)	21 (28.57%)	12 (33.3%)		X	8(100%)		
	moderate	71 (56.6%)	33 (42.85%)	24 (66.6%)	4 (100%)	2			1
	severe	21(16.66%)	22 (28.57%)			2			
ESR	Raised	109 (86.5%)	X	15 (44.4%)	4 (100%)	X		4	
	Normal	17 (13.33%)	76(100%)	20(55.5%)	X	20 (100%)	8 (100%)		
Local X ray findings	Osteolytic or cavitary lesion	71(56.66%)	54(71.42%)	19(55%) with mottled calcification	4(100%)	20(100%)	2 with pathological #		
	Typical X ray of the tumor	21(16.66%)				10(50%)			
	Erosion	4(3.33%)	11(14.28%)			X			
	New bone formation	1(3.33%)	X			X			
	Sclerosis	17(13.33%)	X			X			
	Others	8(6.66%)	11(14.28%)	15(44.4%)		X	1		Moth eaten appearance
FNAC	Consistent with HP diagnosis	63 (50%)	54(71.42%)	24(66.6%)	3(75%)	20(100%)	X	4	
	Not consistent with HP diagnosis	17(13.33)	X	X	1(25%)	X	1		1
	Nondiagnostic	36(28.33%)	11(14.28%)	8(22.2%)		X	2		
	Could not be done	17(13.33)	11(14.28%)	4(11.1%)		X	X		
Chest X Ray	NAD	122(96.5%)	71(93%)	36(100%)	4(100%)	20(100%)	8(100%)	5	1
	Abnormal	1	1			X	X		X

DISCUSSION:

A total of 130 patients were found to have had bone tumours from Pathology dept.histopathology registry data of our medical college, Kolkata from suspected 167 cases in this present sample survey studied for the period of 2005 to 2010 among which 103 (81%) malignant and 27 (19%) benign bone tumors were found. We collected datas further from2011 to 2016 from the collective data of bone tumor clinic of dept. of Orthopedic as representative data of catchment area of our medical college of West Bengal were found to have had 287 malignant and 67 benign bone tumors among 354 cases selected for this study from 407 suspected sample of bone tumors during the same time period. Benign bone tumors are 21% and primary malignant bone tumors are 37% and secondaries are 24% as registered in bone tumor registry case records.

Cause of lower percentage of benign tumors may be due to their prolonged symptom free period and thereby non-attendance to hospital and cause of lower percentage of secondary bone tumors in comparison to primary malignant bone tumors may be due to the referral of those cases to other discipline of primary site concerned .

The histopathological reports were corroborated with clinic-radiological findings and other investigation reports. Among 354 cases of bone tumors 289 (81.22%) were correctly matched with cytological and histopathological diagnosis.

In the present epidemiological evaluation of distribution of bone

tumors on the tripod of time (age), place (site) and person (sex) we had 126 cases of osteosarcoma (44.77%), 76 Ewings sarcoma cases (20.89%), 36 chondorsarcoma cases (13.43%), high grade GCT 20 cases (5.97%), plasmacytoma 4 cases, 8 cases of MFH, 13 multiple myeloma and 4 fibrosarcoma cases out of 287 cases of primary malignant bone tumors. Among the cases of benign bone tumors a higher percentage of low grade GCT had been noted which if taken together with high grade GCT give rise to higher percentage of giant cell tumor in population surveyKumar R.V. et al6 reported that Osteosarcoma (37.7%) and Ewing's sarcoma (15.6%) were the most common primary lesions. The age of the patients ranged from 6 – 65 years with maximum number of patients in the 16-25 year age group (38.80%) followed by 6-15 years age group (31.34%). Rao et al7 performed a study on 523 cases of primary bone cancers in Dakshin Kannada district of Karnataka, India, over a period of 36 years and they reported peak incidence of this tumor was in 2nd and 3rd decade of life with a male preponderance. But in the study of Hicks et.al 8 the mean age of this tumor is 10 year. In our study also among 67 cases 39 (58.20%) were male and 28 cases (41.80) were female. A male preponderance also observed by some other authors like Snyder and Coley[9] Ottolenghi et.al[10]and Moore et.al[11]

In the present series, 274 lesions (91.04%) were located in the long bones and [13] cases involving flat and short bones. Snyder and Coley studied 474 patients and 49% of the lesions were in long bones, 49% in flat bones and 2% in short bones. Thommeson and Fredriksen [12] studied 85 bone lesions and of them 35 (40%) were in extremities and (60%), in flat bones. De-Santos et al [13] reported 91 primary malignant bone lesions where predominant site was flat bones 55 (60%) followed by long bones 29 (31.8%) and others [7] (7.8%). In our study, long bones were predominantly affected (91.04%) compared to other investigators. Flat bones were more commonly affected in plasmacytomas and multiple myelomas and these two variants were less in number in the present study which comprised of a small number of cases. In the present observation, lower extremities were more commonly affected (61.76%) than upper extremities (23.88%). In lower extremities, lower end of femur was affected in 74 cases (25.37%) followed by 61 cases (20.89%) in upper end of tibia, 53 cases (19.40%) in upper end of femur and 2 cases in lower end of tibia. In the upper extremities occurrence is highest in upper end of humerus.

In our study among the 126 osteosarcoma cases 84 (66.50%) were male and 42 cases (33.50%) were female and this male preponderance of osteosarcoma is also supported by the work of Murphey et.al14 where male was 68% and female was 32% among the 40 patients of osteosarcoma. We had 50% of osteosarcoma cases at age group 16-25 years followed by 44% in 6-15 years. But in the rest 6% cases of higher age group (26-35 years) there is female preponderance.

In 126 osteosarcoma cases, majority 109 cases (86.5%) presented with pain and swelling of the affected limb. In 59 cases (46.66%) the growth was rapid where duration of symptoms was for 0-3 months. History of trauma was associated in 55 cases out of 126 cases (43.33%) of Osteosarcoma. In26 cases there were history of previous trauma at the site of the tumor and in 14 cases trauma at the site of tumor accelerated the growth of the tumor. Associated symptoms (anemia, anorexia, fever, loss of body weight) were present in 25 (20%) cases. Significant anemia were present in 92 (73%) cases of osteosarcoma.

The swelling mainly affected the bone around knee joint. These sites were found to be involved in 97 (76.66%) cases. In 54 (43.33%) cases, it was found in lower metaphysis of femur and in 43 (33.33%) cases it was in upper metaphysis of tibia. This finding is also supported by the study findings of Hicks etal8 which states that the most common primary malignant bone tumor sites were the long bones (femur, tibia). Among these 97 cases 68 (69.56%) cases were found in left side. By plain X- ray of the local area here available showed osteolytic lesion and cavitary lesion were in 71 (56.66%) cases, typical radiological appearance of osteosarcoma i.e. sunray appearance, Codman's triangle with new bone formation were seen in only 20% cases .

Among the 126 cases of osteosarcoma histologically 113 (90%) cases were diagnosed as conventional variety which is also supported by the study of Hicks et.al8. 6.66% cases of osteosarcoma were telangiactetic variety in histopathology and few were parosteal variety in our observation. Conventional variety is the commonest osteosarcoma diagnosed.

The incidence of Ewing's sarcoma in our study is 20.89% which is obviously to some extent lower in contrast to literature findings. In our observation of Ewing's sarcomas, all occurred in age groups 6-15 year and 16 – 25 year in equal percentage (50%). Out of 76 Ewing's sarcomas 49 were female (64%), 27 (36%) were male which is in contrast to the said study by Ijaj Ahmad et al 15 who also reported about male preponderance of Ewing's sarcoma in Pakistan. In our study 60 cases (78.5%) of ES presented with pain and swelling of the affected areas with aggravation of pain at night in 22 (29%) cases. Pathological fracture found in four cases and associated symptoms were found in 22 cases (29%). Majority (60 cases, 78.5%) had history of gradual swelling of 4-9 month duration and history of previous trauma present only in 11 cases (14.5%). A group of forty-seven patients with Ewing sarcoma was identified from the Swedish Cancer Register 16 and Pain related to strain was reported by thirty (64 percent) of those with nine (19 percent) with pain at night. Twelve (26 percent) of those with Ewing sarcoma related the onset of symptoms to minor trauma occurring around the same time.

In 76 Ewing's sarcoma cases clinically anemia was seen in 54 (71.42%) cases. As far as location of the tumor concerned 21 cases were found in upper part of the shaft of left femur, 11 cases each in upper right Femur and upper left humerus. The other sites affected were upper end of right humerus, right ischium, lower third of left ulna, distal part of right radius and upper part of shaft of shaft of right left tibia. So any bone can be affected, most commonly the proximal long bones like femur and humerus as it is found in this study. The swelling were globular in 50% cases with hard consistency and increased local temperature. Mild to moderate tenderness were present in 54 (71.42%) cases and associated fever and loss of body weight was seen in 22 cases without any increase of ESR in any cases.

Radiologically 71.42% (54 cases) patients showed osteolytic lesion with normal chest X-ray. Cortical thickening and widening of medullary canal was also found but typical onion skin appearance and sun- ray appearance was not evident as they are the feature of progress of the tumor and maximum patient of this study were diagnosed earlier. FNAC was consistent with Ewing's tumor in 70% (63) cases which yielded cellular smears and the cells were uniform looking, round and small with scanty cytoplasm and round nuclei, arranged in small clusters, sheets and singly. Similar observation was made by Akhter M. et.al17 Meis T.M. et.al 18 and Silverman JF et. al.19 The absence of tumor giant cells and osteoid in the 20 cases of this study was also found by Hajdu and Melame20 and Ackerman et.al21 in their studies.

0ut of 36 chondrosarcoma cases which is 13.43% of our series, and which is very close to 15% incidence of chondrosarcoma studied by Schazowicz et.al22 and 11% by Dahlin and Unni 22. 24 (66%) cases were occurred in male and 12 in female (34%) which is tallied with 2:1 (M:F) sex ratio in literatures of classic conventional chondrosarcoma by Schazowicz et.al 22 who showed male 65% and Dahlin and Unni 23 60%. Chondrosarcomas are seen to be occurred in higher age groups. In our study, among 36 cases 32 (88%) were occurred in 26 – 55 year in contrast to age range of 20 to 60 years as found by the study of Gitelis et.al 1981[23]

In this study chondrosarcomas are predominantly presented with pain and swelling in 28 cases out of 36 (77.77%) with insidious onset and its duration was 10 months to > 2 years in 28 cases (77.7%) which is also found in the study of Gitelis et.al[23]. History of trauma was present in 8 cases (22.2%). Each 12 cases of chondrosarcomas found in upper end of right humerus, upper end of right tibia and 4 case each found in upper end of left humerus, lower end of left fibula and chest wall. So majority of chondrosarcoma in this study occurred in the proximal limb or axial skeleton from diaphysis or metaphysis of long bone in contrast with the findings of Schazowicz et.al[22] and Dahlin and Unni22 where most common site of this tumor was pelvis. No case of chondrosarcoma of small bone found in this series. Among the 36 cases of chondrosarcomas 23 (66%) were globular in shape and local temperature was increased in 19 cases. Tenderness was mild to moderate in 19 cases, venous prominence were present in 8 cases and clinically anemia found in 78% cases with elevated ESR in 44% cases.

Local plain X ray showed osteolytic lesion with mottled calcification (in 19 cases, i.e. 55%) with expansion of bone. Heterogeneous appearance, peripheral sclerosis, pathological fracture and presence of exostosis in adjacent and other parts of the body also found but not in all cases. Typical radiological combination of chondrosarcoma is ill

defined margins, fusiform thickening of the shaft and perforation of the cortex as described by Barnes R. 24 is not properly found in our series.

The number of high grade giant cell tumor was 20 which is 5.97% in our study of primary malignant bone tumors, and they have equal incidence in male and female. All the 20 cases of high grade GCT were seen in 16 – 25 year age group in contrast to the study of Yoshinao et. al25 who reviewed eight (8) cases of primary malignant giant cell tumor of bone and found that there was a wide range in age from 17 to 76 years, with the sixth decade of life being the most common and the tumor was more frequent among females (male to female ratio--3:5). The female preponderance (M:F 1:2) was also found in the observation of Yoshinao et. al.25 But in study of Gupta AK et. al 26 there is male preponderance in occurrence of this tumor. Among 20 cases of high grade GCT 75% i.e. 15 cases presented with painless swelling and one case with pain and swelling for duration of 4-9 month. The commonest presenting symptom found by Gupta et.al26. was swelling associated with pain and duration of symptoms varied from three months to one year. No history of trauma was found in these GCT cases and only one has the history of local recurrence Solitary Plasmacytoma of bone were 4 cases (5.97%) in our study and 75% of plasmacytoma occurred in male but in 13 cases of multiple myeloma there is equal incidence in male and female. Plasmacytoma and Multiple myeloma occurred in a higher age group 50 – 65 years but Patients presenting with Solitary Plasmacytoma of bone were younger, as compared to the patients with multiple myeloma and these features are tallied with other studies as found n literature.[27]

Although our study was based on biopsy proven cases and was spread over a time period of 10 years because of lack of proper data recording system, the results obtained can't be claimed as the representative of the whole population for the following reason.

1. We don't have properly organized hospital based and population based tumor registry.
2. Only a small portion of our population is motivated and this leads to poor follow up of cases and to understand the value of diagnosis.
3. Vast majority of the people are poor and living in rural areas with bad communication, thus has little chance to large medical institutions which are located in big cities only.
4. In the hilly areas the people may visit the local dispensary or a quack, and are treated without proper investigation and diagnosis
5. A large number of people living even in the cities, go out side west Bengal just after hearing the diagnosis of cancer as no so called bone tumor institute is available here.

Inspite of all these pitfalls a beginning has been made to conduct the epidemiological study of bone tumor on the scientific basis and this search will goes on.

SUMMARY AND CONCLUSION:

There are still now no standardized bone tumour data available for West Bengal which has a wide geographical variation. So the present study helps us to know the distribution and causation of bone tumors in West Bengal as well as to know the risk factors of the bone tumors in different category of people and the same study can be applied to control the health problem and evaluation of treatment modalities as a whole. In our study there are some limiting factor also like difference of opinion on slide review reports, lack of initiative from different dept. to register their cases in bone tumour clinic and absence of any specialized bone tumours center within govt. hospital.

So, to conclude we can say that a continuous work is required in this field to prepare a proper and statistically significant bone tumor register in this region of West Bengal and the search will goes on.

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