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A Review on Bone Cancer - Its Incidence Rates Worldwide

Krishna Mannem[1*], Hemanth Kumar Muttevi[1], Harika Kakumanu[1], Sivani Kadapa[1], Baijid Mubeena Shaik[1] and Om Sai Prakash Lanka[1]
***1Sir C R R College of Pharmaceutical Sciences, Eluru, A.p, India.**

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***Corresponding Author Email:** Krishna.mannem@gmail.com

Abstract

Bone cancer is second largest group of sarcomas. There are different types bone cancers seen in both adults and children but these are very rare all over the world. These bone cancers are very likely seen in children from the age of 0 to 14 and there are diagnosed by techniques like X-rays technique, Imaging test like C.T scan, MRI scan, PET-CT scan, Bone scan and Surgical tests like biopsy and bone marrow aspiration. There are treated through surgically, chemotherapy, Radiotherapy and some advanced process like stem cell treatment. This paper gives information about different types of bone cancers with their etiology, pathology physiology, diagnosis their treatment and worldwide and India wide recent statistical incidence rate in both in male and female along with incidence percentages of rare bone cancers like Osteosarcoma, Chondrosarcoma and Ewing's sarcoma all over the world including India in the children from age of 0-14 in both boys and girls according to World health organization(WHO) and national cancer registry programme (NCRT).

Keywords
Bone cancer, Benign bone, chondrosarcoma, Malignant tumors, Osteosarcoma.

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INTRODUCTION

Bone cancer is malignant tumor of the bone that destroys healthy bone tissue. It very rare in adults. It starts in the cells that make up the bone. Cancer starts when cells begin to grow out of control. Cells in any part of body can become cancer and can spread to other parts of body.

Bone tumors can be benign (non-cancerous) or malignant (cancerous).

Benign bone tumors are rarely life threatening and do not spread within the body; however, they can grow and compress healthy bone tissue. Benign tumors include: Osteoid osteoma, Osteoblastoma, Osteochondroma, Enchordoma, Chondromyxiod fibroma.

Malignant tumors are cancerous tumors that can potentially result in death. Unlike benign tumors, malignant ones grow quickly, and can spread to new territory in a process known as metastasis. Types of malignant tumors include: - Osteosarcoma, chondrosarcoma, Ewing's sarcoma, malignant fibrous histiocytoma, fibro sarcoma, other sarcomas. Bone cancer is divided into primary (true) and secondary bone cancer, primary bone cancer forms in the cells of the bone and secondary bone cancer starts somewhere else, eventually spreading to bones.

Primary bone cancers are a specific sub type of a group of cancers known as sarcomas. Sarcomas are cancers that start in the bone, muscle, connective tissue, blood vessels, and can be found anywhere in the body. Types of primary bone cancer include:

- Osteosarcoma, Chondrosarcoma and Ewing's sarcoma are most common types of primary bone cancer, Ewing's and Osteosarcoma are mainly seen in children and young adults.
- Fibro sarcoma and Malignant fibrous histiocytoma typically develops in the soft tissue around the bones, such as tendons, ligaments, fat or muscle. These types of bone cancer also tend to occur in older adults, and usually affect the arms, legs or jaw.
- Giant cell tumor of bone has benign and malignant forms, although the malignant forms, although the malignant form is less common. It usually occurs in the leg bones of young and middle-aged adults, and rarely spreads to distant parts of the body. However, these cancers may return after surgical removal, and the chance of spreading to distant sites increases with each local recurrence.
- Chordoma affects bones in the spine and the base of the skull. This type of bone cancer occurs most frequently in adults, particularly men. It tends to be a slow-growing tumour with a low risk of spreading to distant sites, but it may return at the original site if not removed completely during surgery. Chordoma may also eventually spread to the lungs, liver and lymph nodes.
- Metastatic bone cancer forms in the bone but spreads to other parts of the body. Bone cancer that spreads to other organs is still called bone cancer, even if it has spread to lungs or lymph nodes.

Symptoms of bone cancer can vary depending on the size and location of the tumour. Pain is the most common symptom. Tumors arising in or around the joints often cause swelling and tenderness. Tumors can also weaken the bones thus causing fractures. Some other symptoms can be weight loss, fatigue and anaemia.

TREATMENTS OF BONE CANCER

There are basically three main treatments for treating of bone cancer there are given below: -

Surgery

The goal of surgery is to remove the tumor, so it is inhibiting to continue growing or spread to other areas of the body through the blood stream or lymph system. The goal is to remove the entire tumor. The reason for removing this normal layer of tissue is to assure that all the cancerous tissue has been removed. In the event, that a normal layer cannot be removed, amputation may be considered. When the tumor is an area that adequate removal or amputation is not possible, surgery with chemotherapy may be considered.

Limb-sparing surgery: -

In the no of cases, the surgery focuses on removing the tumor and sparing the limb so the function can be maintained.

Amputation: -

Due to advancement the need for amputation is to remove the limbs or parts of limbs has greatly reduced over a long time. if amputation is necessary, advances in prosthetic joints can significantly improve out comes and functions.

Amputation of the arm, legs, jaw or half of the pelvis (hemipelvectomy) may be necessary in some cases.

There are two kinds of hemipelvectomy- internal and external.

External hemipelvectomy-

It includes the removal of half of the pelvis with amputation of leg. It is also called as hindquarter amputation.

Internal hemipelvectomy

It includes the removal of half of the pelvis, but the leg is left intact. Amputation at the hip is known as hip disarticulation and the amputees are known as hip disartics.

Rotation plasty: -

In this surgery sometimes used for children who are still growing, the physician removes the tumor and area surrounding it including knee joint. the foot and ankle are then rotated and ankle functions as knee. This enable the person to function very well in all physical activities.

chemotherapy

"Chemo" has limited effectiveness in treatment of soft tissue sarcoma. As mentioned above, it may be considered when adequate surgical removal is not possible.

In this chemotherapy drugs are used to kill the cancer cells.it is recommend before surgery to reduce the size of tumor. After surgery, to kill any cancer cells remain.

It is done by drugs like vincristine, doxorubicin, cyclophosphamide, ifosfamide and etoposide.

Traditional Radiotherapy:

In this high energy beams like x-rays and protons of radiation are used to kill cancer cells or keep them from growing. It is not effective in all types of cancer but with soft tissue sarcoma it has been shown to decrease the chance that the tumor will come back in the original site. Whether a course of radiation

therapy is recommended before or after surgery is dependent on individual situations and tumor type. [01]

Complications

Pain, Swelling, Infection or bleeding from surgery.
Loose or broken graft from limb-salvage surgery.
Hair loss, Mouth sores, Nausea, Vomiting, Fever.
Burns, Diarrhea, Poor bone growth. Neutropenia.
Damage of vital nerves, bloods vessels, surrounding structures during surgery.
Lung, liver, bones damage due to metastasis.
Recurrence of tumor in future.

WORLDWIDE INCIDENCE RATES OF BONE CANCER AS PER WHO (Table 1,2,3,4,5)

COUNTRIES	ASR/ million Age 0-14 Male	ASR/ million Age 0-14 Female	COUNTRIES	ASR/ million Age 0-14 Male	ASR/ million Age 0-14 Female
ARGENTINA	9.5	3.3	ARKANSAS	4.1	6.4
BRAZIL	7.3	7	CALIFORNIA	6.6	5.9
CHILE	5.6	4.6	COLORDO	6.7	8
COLOMBIA	5.9	5.1	CONNECICUT	7.2	6.5
COSTA RICA	3.9	4.6	DELAWARE	7.5	5.4
CUBA	5.2	5.4	FLORIDA	7.4	6.1
ECUADOR	6.7	4.8	GEORGIA	6.1	7.5
FRANCE	6.5	3.9	HAWAII	10.1	7.2
HONDURAS	3.8	4.1	IDAHO	5.9	5.9
JAMAICA	1.2	3.8	LLLINOIS	5.4	5.9
MEXICO	6.4	6.7	INDIANA	6	6.1
PERU	6.5	5.2	LOWA	8.9	6.7
URUGUAY	7.8	6.9	KENTUCKY	5.8	6.7
CANADA	6.3	6.4	LOUISIANA	4.8	7.1
ALABAMA	3.3	4.8	MAINE	8.4	6.1
ALASKA	8.6	4	MARY LAND	6.5	4.8
ARIZONA	6	6.5	MASSACHUSETTS	6.4	6.2
MICHIGAN	5.3	6.2	OREGON	5.9	5.5
MINNESOTA	6	4.5	PENNSYLVANIA	5.9	5.6
MISSISSIPPI	5.6	6	RHODE ISLAND	5.8	6.1
MISSOURI	5.5	4.9	SOUTH CAROLINA	5.7	5.1
MONTANA	2.2	8.8	SOUTH DAKOTA	5.1	3.8
NIBRASKA	8.1	5.7	TENNESSEE	3.9	6.1
NEVADA	7	5.8	TEXAS	6.8	6.5
NEWHAMPCHIRE	6	10.5	UTAN	7	6.3
NEWJERSEY	5.8	9.8	VRMONT	3.8	7.6
NEWMEXICO	8.1	4.6	VIRGINIA	5.9	4.8
NEWYORK	6.9	6.2	WARSHINGTON	6.7	5.3
NORTH CAROLINA	6	6.7	WEST VIRGINIA	5.3	5.3
NORTH DAKOTA	5.2	5	WISCONSIN	6.8	5.8
OHIO	5.8	5.7	WYOMING	5.3	7.4
OKLAHOME	5.5	4.9			

TABLE 1 AMERICAN

COUNTRIES	ASR/ million Age 0-14 Male	ASR/ million Age 0-14 Female
AUSTRALIA	5.8	5.9
FRANCE	10.3	5.3
NEW ZEALAND	20.9	12.3

TABLE 2 OCEANIA

COUNTRIES	ASR/ million Age 0-14 Male	ASR/ million Age 0-14 Female	COUNTRIES	ASR/ million Age 0-14 Male	ASR/ million Age 0-14 Female
ALGERIA	6.1	3.8	MALI	7.8	9
BOTSWANA	2.5	3.9	MAURITIUS	7.5	1.5
CAMEROON	0.8	2.5	MAROCCO	9.5	8
EGYPT	5.2	5.5	SOUTH AFRICA	1.8	1.5
FRANCE	6.5	4.7	TUNISIA	6.1	5.2
KENYA	6.2	4.4	UGANDA	5.2	4.6
LIBYA	6	4	ZIMBABWE	6.2	5.8

TABLE 3 AFRICA

COUNTRIES	ASR/ million Age 0-14 Male	ASR/ million Age 0-14 Female	COUNTRIES	ASR/ million Age 0-14 Male	ASR/ million Age 0-14 Female
BAHRAIN	7	3.7	LEBANON	9.6	5.3
CHINA	5.4	4.9	PAKISTAN	7.8	6.7
INDIA	5.8	4.5	PHILIPPINES	7.2	6.8
IRAN	4.6	4.1	QATAR	5.8	6.4
ISRAEL	8.4	5.5	SAUDI ARABIA	6.3	5.3
JAPAN	4.9	4	THAILAND	4.3	4.3
JORDAN	9	7.1	TURKEY	4.2	4.3
REPUBLIC OF KOREA	6.7	6.5	VIETNAM	3.8	3.6
KUWAIT	1.1	0.1			

TABLE 4 ASIA

COUNTRIES	ASR/ million Age 0-14 Male	ASR/ million Age 0-14 Female	COUNTRIES	ASR/ million Age 0-14 Male	ASR/ million Age 0-14 Female
AUSTRIA	8.4	7	LITHUANIA	4.7	5.7
BELARUS	5.2	5.6	MALTA	8.5	6.2
BELGIUM	8.5	7.9	THE NETHERLANDS	7.2	7
BULGARIA	5.3	6.3	NORWAY	6	6.1
CROATIA	12	9.9	POLAND	5.9	5.8
CYPRUS	9.3	10.2	PORTUGAL	5.8	6.8
CZECH REPUBLIC	7	5.6	RUSSIAN FEDERATION	5	4.5
ESTONIA	4.4	5.9	SLOVAKIA	7.1	6.4
FRANCE	6.8	6.3	SPAIN	9.4	7.3
GERMANY	6	5.7	SWEDEN	4.8	5.4
HUNGARY	6.4	6.4	SWITZERLAND	7.9	8.1
ICE LAND	6.6	3.3	UKRAINE	5.2	5.6
IRE LAND	6.6	4.7	UK	5.8	5.5
ITALY	5.8	8			

TABLE 5 EUROPE

NO OF INCIDENCE CASES OF BONE CANCER IN INDIA AS NCRP

FIG-1

PRIMARY MALIGNANT BONE TUMORS:

OSTEOSARCOMA

Osteosarcoma is most common malignant bone cancer. Osteosarcoma, also known as osteogenic sarcoma, it is an ancient disease that is still incompletely known because all thought it arise from primitive mesenchymal bone forming, and its

histologic hallmark is the production of malignant osteoid. other cell populations may also be present, as these types of cells may also arise from pluripotential mesenchymal cells.

It is the most common type of bone cancer and typically starts in bone cells in the arms, legs. It occurs most frequently in people ages of 10-14 and above 65, and is more common in males than female. It is deadly form of musculo skeletal cancer that most commonly causes patients to die of pulmonary metastatic disease, it arises as solitary lesions within long bones in children. [10, 11, 12, 13, 14, 15, 16, 17, 18, 19]

The top three effected areas are the distal femur, the proximal tibia and the proximal humerus.

ETIOLOGY: -

The perfect cause of osteosarcoma is unknown. but some of the risk factors have been identified.

Risk factors: -

Rapid bone growth appears is seen in early period of osteosarcoma, as suggested by the increased incidence during the adolescent growth spurt seen mainly in dogs.

Genetic predisposition plays a role. bone dysplasia's, includes Paget disease, fibrous dysplasia, enchondromatosis and hereditary. The combination of constitutional mutation of the germ line retinoblastoma gene and radiation therapy is linked with a particularly high risk of cancer.

The only known environmental risk factor is exposure to radiation.

PATHOPHYSIOLOGY: -

Osteosarcoma is a bone cancer and it can occur is any bone of the body, usually in the extremities of long bone metaphyseal growth plates. Major areas are given below

Femur - 45% out of 100% mainly distal femur

Tibia -19% out of 100% mainly proximal tibia

Humerus -10% out of 100% mainly proximal humerus

Skull and jaw- 8% out of 100%

Pelvis -8% out of 100%

There are different types in this cancer and there are classified as high grade, intermediate grade, low grade

High grade osteosarcoma: -

There are the fastest growing types of osteosarcoma. It is mostly occurring in the children and young. there are many types of high grade of osteosarcomas

- Osteoblastic.
- Chondroblastic.
- Fibroblastic.
- Small cell.
- Telangiectatic.
- High grade surface.

Intermediate grade osteosarcoma: -

These uncommon tumours fall between high grade and low grade osteosarcoma.

- Periosteal

Low grade osteosarcoma: -

These are the slowest growing osteosarcoma. the tumors look more like normal bone and have few dividing cells

- Parosteal
- Intramedullary

DIAGNOSIS: -

It is done by physical examination of the physician and followed by imaging tests to locate the cancer and find out the spread by

1. X-ray.
2. Computerized tomography.
3. Magnetic resonance.
4. Bone scan.
5. Biopsy: -

In this the sample of tissue is remove from the tumor for lab testing. The can testing can show whether the tissue is a cancerous and which grade it below.

There are two types of procedures are followed in bio spy

Needle bio spy: -

The physician inert a thin needle through the skin and direct into the tumor. The needle is used to remove the small pieces of tissue from the tumour.

Surgical bio spy: -

The physician make incision through the skin and remove either the entire tumour. after the diagnosis the exact stage of cancer is known and it is also used know it is metastatic tumor.

EWING'S SARCOMA: -

Ewing tumor, also known as Ewing's sarcoma. It is an aggressive sarcoma of bone and soft tissue. It occurs most frequently in children and teenagers and are rarely seen in adults over age of 30. This is the second most common form of primary bone cancer.

when the bones are growing rapidly. the tumor may arise anywhere in the body, usually long bones of arms and legs then at pelvis and chest. It also develops in the skull or other flat bones. This tumor often spread to other parts like lungs.

This condition is generally is not inherited but it is arise from the mutation of body's cell that occurs after conception, mostly is randomly effect. In this rare disease, treatment advances since the 1970s have largely resulted from clinical trials conducted by national and international cooperative groups. Over the years, these trails are answered key chemotherapy questions and better defined risk groups allowing tailored treatment strategies. [2, 3, 4, 5, 6, 7, 8, 9]

ETIOLOGY: - The exact cause of Ewing's sarcoma is unknown till today but some chromosomal studies have been found that abnormal changes in their genetic makeup known as reciprocal translocation. The commonly occur mutation in 85% of Ewing tumors is done by involving of two genes the EWSR1 gene on chromosome 22 and FLI1 gene on chromosome 11. These two genes are rearranged in the manner that fusion gene of EWSR1/FLI1 gene by fusion of EWSR1 of chromosome 22 and FLI1 of chromosome. [29]

PATHOPHYSIOLOGY: -

Aurias and turc-carel in 1983 first described the translocation of t (11:22) (q: 24:12) in Ewing's sarcoma. It is primary mechanism for tumorigenesis. The gene EWSR1 is a member of ten eleven translocations and have multiple funtions, these are involved in the processing and transpotation of R.N.A, expression of genes and signaling of cells. [29]

DIAGNOSIS: -

BLOOD TESTS: - A complete blood count is a blood test that counts the number of each type of blood cells. Abnormal levels of white blood cells, red blood cells, platelets can be sigh of tumor has spread.

X-rays technique

Imaging test like C.T scan, MRI scan, PET-CT scan, Bone scan.

Surgical tests like biopsy and bone marrow aspiration

CHONDROSARCOMA

Chondrosarcoma forms in cartilage cells and is the second most common form of the disease. This type of bone cancer rarely occurs in people under age of 20, and the chances of developing it increase with age. Chondrosarcoma is a member of a category of tumors of bone and soft tissue known as sarcoma. About 30% of skeletal system cancers are chondrosarcomas. It is resistant to chemotherapy and radiotherapy. Unlike other primary bone cancers that mainly affect children and adolescents. Chondrosarcoma can present at any stage. It more often affects the axial skeleton than the appendicular skeleton.

ETIOLOGY: -

The cause is unknown. Patients may have a history of enchondroma or osteochondroma. A small minority of secondary chondrosarcomas occur in patients with Maffucci Syndrome and Ollier disease. It has been associated with faulty isocitrate dehydrogenase 1 and 2 enzymes, which are also associated with gliomas and leukemia's. Prognosis. chondrosarcoma sure there has been no recurrence or metastasis, which usually occurs in lungs. [20, 21, 22, 23, 24, 25, 26, 27]

PATHOPHYSIOLOGY: -

Chromosomal anomalies detected in some types of chondrosarcomas include 9p21, 10, 13q14, and 17p13**.**

Chromosomal structural abnormalities and genetic instability are seen well - differentiated chondrosarcomas analyzed by cytogenetics. however, the amplification of MYC and AP - 1transcription factors plays a vital role in the pathogenesis of chondrosarcoma.

DIAGNOSIS

Imaging studies-including radiographs (x-rays), computerized tomography (CT) and magnetic resonance imaging (MRI) are often used to diagnosis of chondrosarcoma. However, a definite diagnosis depends on the identification of malignant cancer cells producing cartilage in a biopsy. Specimen that has been examined by a pathologist. In a few cases, usually of highly anaplastic tumors, Immunohistochemistry (IHC) is required. There are no blood tests currently available.

INCIDENCE RATES OF **OSTEOSARCOMA CHONDROSARCOMA AND EWING'S SARCOMA AND RELATED SARCOMAS** WORLDWIDE AND IN INDIA

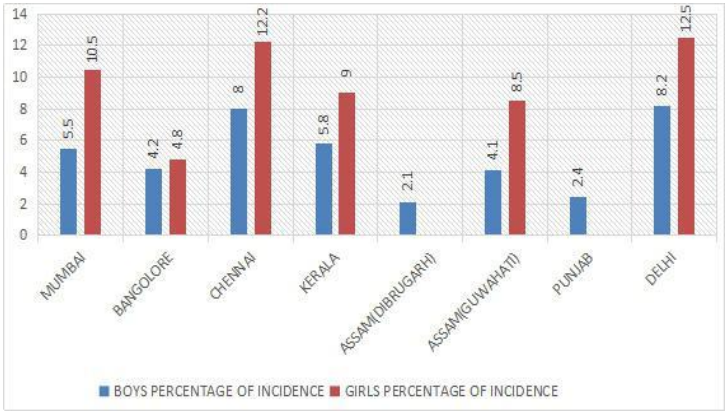

Fig 1 give the information of incidence rates in India as per national cancer registry program

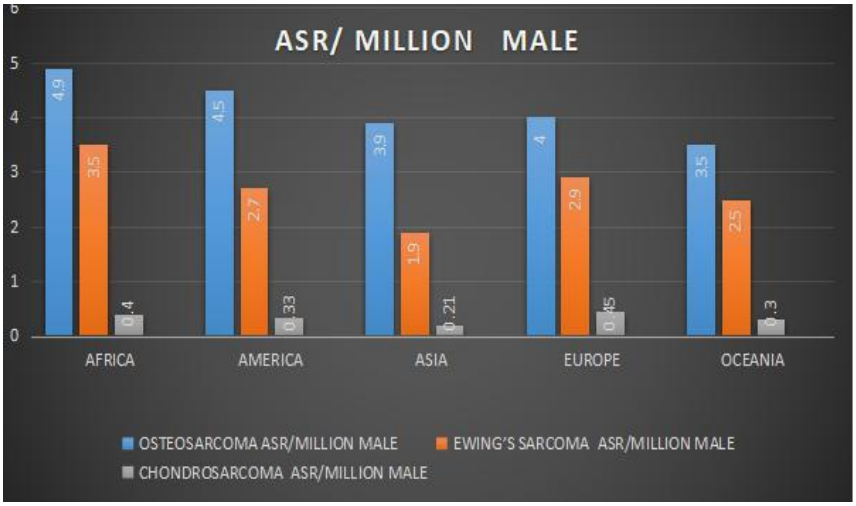

FIG 2

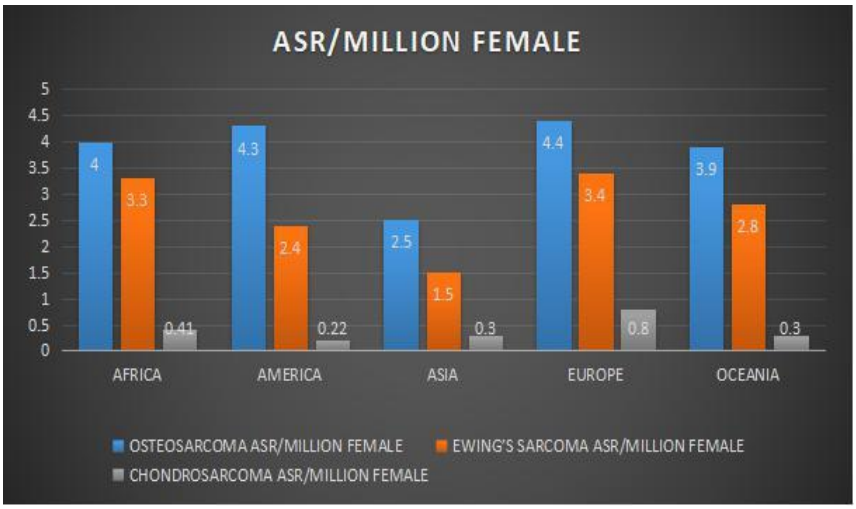

FIG 3

Fig 2,3 give the information about the incidence of bone cancers continental wide in both sexes

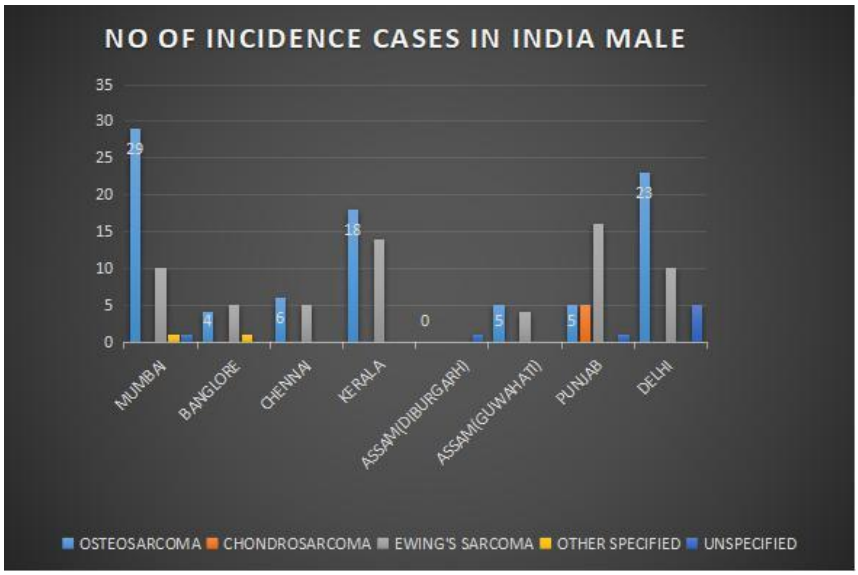

Fig 4

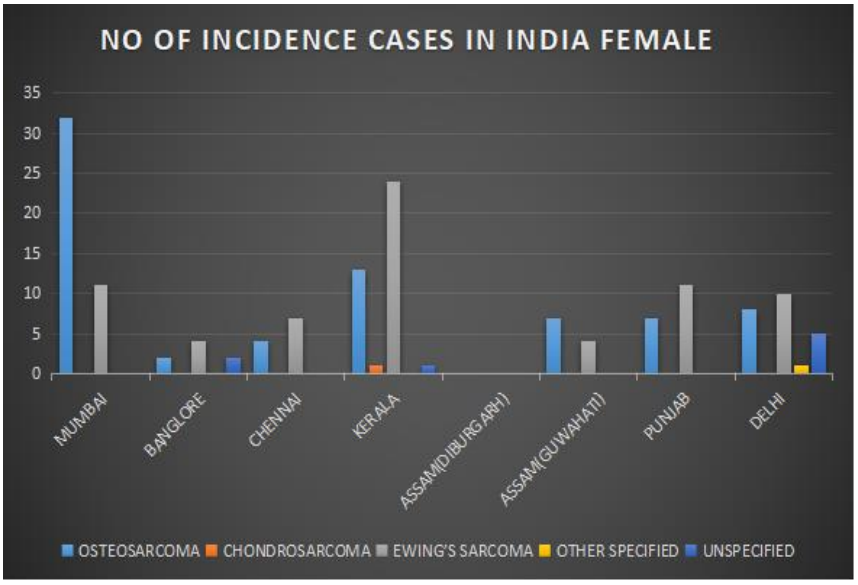

Fig5: Above graphs give the no of case of bone cancers in India in both boys and girls as per recent registry of national cancer registry programme conducted by national center disease informatics and research

MALIGNANT FIBROUS HISTIOSARCOMA (MFH) (UNDIFFERENTIATED PLEIOMORPHIC SARCOMA)

Malignant fibrous histiosarcoma is a common sarcoma (malignant tumor) that can start in the bone or in soft tissue. MFH is the most common type of soft tissue sarcoma of the extremity while MFH of bone is fairly rare. It occurs more frequently in someone who is in their 50s and more common in men than women. Types of MFH: -

1 Storiform-pleiomorphic MFH- The majority of MFH diagnosed

2 Myxoid MFH- 2nd most common type of MFH.

3 Giant cell MFH- 3rd most common type.

4 Angiomatoid MFH- More often diagnosed in children and adolescents.

ETIOLOGY: -

There is no known cause of MFH but other conditions may be related. These include: -

1 Radiation for another malignancy.

2 History of paget's disease.

3 History of non-ossifying fibrous.

4 History of fibrous dysplasia.

5 Werner syndrome (soft tissue sarcoma)

6 Gardner syndrome (soft tissue sarcoma)

7 Li Fraumeni syndrome (soft tissue sarcoma)

PATHOPHYSIOLOGY: -

Staging of MFH/ undifferentiated pleomorphic sarcoma: -

It is important to know how aggressive a sarcoma is (the grade of sarcoma) as well as the stage of cancer (has it spread to other parts of the body). This information helps the physicians in determining the best approach to treatment, as well as assisting in discussions about prognosis.

MFH stage: -

Staging combines the information from the diagnostic testing to determine the extent or severity of the disease process. The size of tumor, if it has spread to other areas such as lungs, and the area all considered when determining the stage.

MFH staging is from one to four.

Stage 1- Meaning that the tumor is localized (only the origin site) and low to intermediate grade.

Stage 2- The tumor is higher grade, but doesn't spread to the lymph nodes.

Stage 3- The tumor has metastatic iced to lymph bodes and other sites in the body.

DIAGNOSIS: -

Because MFH is most often a soft tissue sarcoma, an x-ray may not show the tumor. MRI is typically necessary to determine if there is a tumor in the area and the full extent of tumor. **MRI** scan

An MRI enables the doctor to better see the full extent of the tumor. It is important to know if it is "invading" other tissues as treatment plans (such as surgical options) are being considered.

CT scan

A CT scan help to show the amount of bone destruction that the lesion is causing.

Biopsy-

It is necessary to determine the exact type of tumor as well as it's grade i.e., aggressiveness. It is important that it is done by an experienced specialist in appropriate biopsy of extremity tumors.

PET scan- This test is another that is necessary for staging of the cancer. It reveals, of the cancer has metastasized to the abdomen, brain or other areas of the

FIBROSARCOMA

It is rare type of cancer that affects cells known as fibroblasts. These are responsible for creating the fibrous tissue found throughout the body. When fibroblasts strike the body's fibroblasts lose control and multiply like other cancer fibro sarcoma, can spread throughout the body.

Fibro sarcoma can occur in bone, but it effects the nearby fibrous tissue not the bone itself.

PATHOPHYSIOLOGY:

It is a tumor of mesenchymal cell that is composed of malignant fibroblasts in collagen background. There are 2 types

Primary fibro sarcoma is a fibroblastic malignancy that produces variable amounts of collagen. It is either central (arising within the medullary canal) or peripheral (periosteum).

Secondary fibro sarcomama of bone arises from pre-existing lesion or after radiotherapy to an area of bone. This is more aggressive tumour and has poorer prognosis.

TREATMENT:

Treatment of fibro sarcoma depends on stage of cancer.

Stage-1:

Surgical removal of tumour

Radiation therapy, which could be before or after surgery.

Stage-2:

Includes removal of lymph nodes and potential radiation therapy

Clinical trial of surgery with chemotherapy

Clinical trial of hyperthermia therapy which increases body temperature in specific areas.

Stage-3:

Surgical removal of cancer which has spread to lungs

DIAGNOSIS:

Standard X-rays

CT scans

MRI scans, which use radio waves and magnets to map the tissues of body.

Ultrasound scans done before biopsy.

CHORDOMA

Chordoma is a rare type of primary bone cancer. It can develop in the bones of spine or the base of the skull. It is usually slow-growing.

ETIOLOGY

The exact cause of chordoma is unknown. Research into possible causes is being done. Very rarely, chordoma runs in families.

The signs and symptoms of chordoma:

If the chordoma starts in the spine, symptoms may include:

Pain, Numbness, Constipation, Feeling weak.

If the chordoma starts in the base of skull, symptoms may include:

Headache, Double vision, Facial pain, Changes in hearing, Feeling dizzy.

PATHOPHYSIOLOGY:

Most cases are sporadic, but rare cases may arise from a benign notochord tumor.

T - Gene duplication. T-box transcription factor involved in mesodermal differentiation during gastrulation including notochordal development

Familial associated tumors are rare; they are associated with T gene duplication

Rare cases associated with tuberousclerosis.

DIAGNOSIS:

MRI Scan

CT scan

Biopsy

<u>BENIGH BONE TUMORS</u>

CHONDROBLASTOMA

Chondroblastoma is a rare being, locally aggressive bone tumor that typically affects the long bones. it is thought to arise from an outgrowth of immature cartilage cells from secondary ossification centers, originating from the epiphyseal plate.

ETIOLOGY:

chondroblastoma is uncertain, as there is no specific characteristic abnormality breaking point observed The highly heterogeneous nature of the tumor makes classification particularly difficult especially considering the origins of chondroblastoma.

PATHOPHYSIOLOGY:

Although not specific to one mode of management lesion size, patient, sex, or follow up, the recurrence rate for chondroblastoma is relatively high and been shown in select studies to be dependent upon the anatomical location, method of treatment and biology aggressiveness of the initial lesion.

DIAGNOSIS:

Imaging studies like x-ray, MRI scan, CT scan, nuclear imaging.

Tissue diagnosis

Histological studies

OSTEOBLASTOMA

Osteoblastoma is rarely changed into tumor It is an uncommon osteiod tissue forming primary neoplasm of the bone. It is clinically and histologically similar to those of osteoid osteoma, therefore, some consider the two tumor to be variants of the same disease with osteoblastoma representing a gaint osteoid osteoma.

ETIOLOGY:

The cause of osteoblastoma is unknown. Histologically osteoblastoma are similar to osteoid osteomas, producing both osteoid and primitive woven bone amidst fibro vascular connective tissue, the difference being that osteoblastoma can grow larger than osteoid osteomas, but osteoid osteomas cannot grow.

DIAGNOSIS:

A CT scan or MRT scan where used located tumor.

A biopsy is often necessary to confirm an osteoblastoma diagnosis. In a biopsy, a tissue sample of the tumor is taken and examined under a microscope.

MALIGNANT GIANT CELL TUMOR

It is benign tumor but it often characterized by massive destructive of bone near the end of a long bone and causes pain and restricts movements. The most common site of malignant giant cell tumor is the knee.it is generally occur in young adults.

ETIOLOGY:

Malignant giant cell tumor (GCT) of bone is a rare tumor. It exacts cause in unknown and occur spontaneously may to due trauma, environmental factors or diet, it is not inherited. In some cases, it is also associated with hyperthyroidism.

PATHOPHYSIOLOGY:

Gaint cells are not neoplastic.

The neoplastic cells are primitive, mononuclear mesenchymal stromal cells that appear to be preosteoblasts markers. They express RANK & preosteoblast markers.

RANK on neoplastic preosteoblast binds RANK (Receptor activator of nuclear factor KB) on non-neoplastic macrophage like osteoclast precursors in the presence of CSF, this promotes osteoclasts differentiation and giant cell information. [28]

TREATMENT:

Surgery: - Remove the region of tumor to prevent the damage bone near to effected region.

Antisteoclast agents: - Bisphosphanates

Denosumab (anti RANK monoclonal anti body)

Denosumab:-It is treated giant cell tumor of bone demonstrates ossification, fibrosis, depletion of giant cells, prolifenation of mononuclear cells.

DIAGNOSIS:

Diagnosis is made by examining a sample of the affected area by using biospy

PRIMARY LYMPHOMA OF BONE(PLB)

Lymphoma was a 2 types

1.Hodgkin.

2.Non-Hodgkin.

1.HODGKIN:

Hodgkin lymphoma which used to be called Hodgkin`s disease is 1 of many types of cancer that develops in the lymphatic system. Lymphoma beings when healthy cells in the lymphatic system change and grow out of control. If Hodgkin lymphoma spreads, it may spread to the spleen, liver, bone marrow or bone.

NON- HODGKIN:

INTRODUCTION

In non-Hodgkin lymphoma cells in the lymphatic system become abnormal. Non Hodgkin lymphoma may occur in a single lymph node, a group of lymph node, or in another organ. This type of cancer can spread to almost any part of the body, including the liver, bone marrow and spleen.

ETIOLOGY

The non-Hodgkin lymphoma are neoplasm of the immune system arising almost anywhere in the body, but most frequently developing in lymph bones.

The pathology of a lymphoma depends

The cell lineage

On the degree of cell differentiation.

On the location of the cell of origin

PATHOPHYSIOLOGY

It is derived from monoclonal proliferation of malignant or less commonly. T- lymphocytes and their precursors. The current classification schemes characterized NHL`s according to cell of origin, clinical features and morphological featured.

DIAGNOSIS

Test may include x ray, CT, MRI and position emission tomography lymph node test. recommended a lymph node biopsy procedure to remove all or part of a lymph node for laboratory testing. Analyzing lymph node tissue in a lab may reveal whether you have non-Hodgkin lymphoma.

CONCLUSION: -

We summarized from the above information about the different types of bone cancers and their incidence rates all over the world including India by considering the statistical data OSTEOSARCOMA in world along with major cities in India is more prevalent majorly in female from age of 0-14 and other types of bone cancer are less considerable when compare to Osteosarcoma.

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REFERANCES

1. Marx ER, Stern D. Oral and Maxillofacial Pathology; A Rationale for Diagnosis and Treatment. 2nd ed. New Delhi: Quintessence Publishing Co. Inc.; p. 859-61 (2012).
2. Ross KA, Smyth NA, Murawski CD, Kennedy JG. The biology of ewing sarcoma. ISRN Oncol 2013;759725 (2013)
3. Weiss WS, Goldblum JR. Enzinger and Weiss 's Soft Tissue Tumors. 4th ed. Atlanta: Elsevier Saunders; p. 1289-308(2001).
4. Toomey EC, Schiffman JD, Lessnick SL. Recent advances in the molecular pathogenesis of Ewing's sarcoma. Oncogene 29:4504-16(2010).
5. Randall L, Calvert G, Spraker H, Lessnick S. Ewing's Sarcoma Family of Tumors (ESFT). ESUN. ;3-4. (2011)
6. Jedlicka P. Ewing Sarcoma, an enigmatic malignancy of likely progenitor cell origin, driven by transcription factor oncogenic fusions. Int J Clin Exp Pathol; 3:338-47(2010)
7. Ordóñez JL, Osuna D, Herrero D, de Alava E, Madoz-Gúrpide J. Advances in Ewing's sarcoma research: Where are we now and what lies ahead? Cancer Res; 69:7140-50(2009)
8. Dylla L, Moore C, Jedlicka P. MicroRNAs in Ewing Sarcoma. Front Oncol; 3:65(2013).
9. Kelleher FC, Thomas DM. Molecular pathogenesis and targeted therapeutics in Ewing sarcoma/primitive neuroectodermal tumours. Clin Sarcoma Res; 2:6(2012).
10. Raymond AK, Jaffe N Osteosarcoma multidisciplinary approach to the management from the pathologist's perspective, in Pediatric and Adolescent Osteosarcoma. p. 63–84. (2009)
11. Abate ME, Longhi A, Galletti S, Ferrari S, Bacci G Non-metastatic osteosarcoma of the extremities in children aged 5 years or younger. Pediatr Blood Cancer 55, 652–654. (2010)
12. Kager L, Zoubek A, Potschger U, Kastner U, Flege S, Kempf-Bielack B, Branscheid D, et al. Primary metastatic osteosarcoma: presentation and outcome of patients treated on neoadjuvant cooperative osteosarcoma study group protocols. J Clin Oncol 21, (2011–2018.)
13. Pakos EE, Nearchou AD, Grimer RJ, Koumoullis HD, Abudu A, Bramer JAM, Jeys LM, et al. Prognostic factors and outcomes for osteosarcoma: an international collaboration. Eur J Cancer 45, 2367–2375(2009).
14. Cho WH, Song WS, Jeon DG, Kong CB, Kim MS, Lee JA, Yoo JY, Kim JD, Lee SY Differential presentations, clinical courses, and survivals of osteosarcomas of the proximal humerus over other extremity locations. Ann Surg Oncol 17, 702–708. (2010)
15. Kaste SueC, Liu T, Billups CA, Daw NC, Pratt CB, Meyer WH Tumor size as a predictor of outcome in pediatric non-metastatic osteosarcoma of the extremity. Pediatr Blood Cancer 43, 723–728. (2004)
16. Kager L, Zoubek A, Dominkus M, Lang S, Bodmer N, Jundt G, Klingebiel T, Jürgens H, Gadner H, Bielack S Osteosarcoma in very young children. Cancer 116, 5316–5324(2010).
17. Hayden JB, Hoang BH Osteosarcoma: basic science and clinical implications. Orthop Clin North Am 37, 1–7(2006).
18. Ozaki T, Flege S, Liljenqvist U, Hillmann A, Delling G, Salzer-Kuntschik M, Jürgens H, Kotz R, Winkelmann W, Bielack SS Osteosarcoma of the spine: experience of the cooperative osteosarcoma study group. Cancer 94, 1069–1077 (2002).
19. Bielack SS, Kempf-Bielack B, Delling Prognostic factors in high-grade osteosarcoma of the extremities or trunk: an analysis of 1,702 patients treated on neoadjuvant cooperative osteosarcoma study group protocols. J Clin Oncol 20, 776–790(2002).
20. Angela C. Chi. Bone Pathology. In: Neville, Damm, Allen, Bouquot, editors. Text Book of Oral and Maxillofacial Pathology. 3rd ed. Missouri: Elsevier; pp. 664–9. (2009)
21. Mohammadinezhad C. Chondrosarcoma of the jaw. J Craniofac Surg.; 20:2097–100. (2009)
22. Gnepp DR. 2nd ed. Philadelphia: Saunders Elsevier; Diagnostic surgical pathology of the head and neck. (2009)
23. Hackney FL, Aragon SB, Aufdemorte TB, Holt GR, Van Sickels JE. Chondrosarcoma of the jaws: Clinical findings, histopathology and treatment. Oral Surg Oral Med Oral Pathol.; 71:139–43(1991)
24. Robert EM, Diane S. Oral and Maxillofacial Pathology. Chicago: Quintessence Publishing Co, Inc; Rationale for diagnosis and treatment; p. 810. (2003)
25. Robbins, Kumar, Abbas, Fausto. Mitchell-Basic Pathology. 8th ed. Pennsylvania: Elsevier Inc, Saunders; p. 815. (2007)
26. Inwards CY. Update on cartilage forming tumors of the head and neck. Head Neck Pathol.;1:67–74. (2007)
27. Garrington GE, Collett WK. Chondrosarcoma II Chondrosarcoma of the jaws: Analysis of 37 cases. J Oral Pathol. 17:12–20(1988);
28. Anract P, de PG, Cottias P, Pouillart P, Forest M, Tomeno B. Malignant giant-cell tumours of bone. Clinic pathological types and prognosis: a review of 29 cases. Int Orthop.;22:19–26. (1998)
29. P. S. Vidya Rani, K. Shyamala, H. C. Girish, Sanjay Murgod Pathogenesis of Ewing sarcoma: A review Journal of Advanced Clinical & Research Insights 2, 164–168(2015),