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Assesment of The Magnitude of Chronic osteomylitis and its Associated Factors in Children as Diagnosed on X-Ray Visiting at Felegehiwot Comprehensive Specialized Hospital

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BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCES
DEPARTMENT OF CLINICAL RADIOLOGY

ASSESMENT OF THE MAGNITUDE OF CHRONIC OSTEOMYLITIS AND ITS ASSOCIATED FACTORS IN CHILDREN AS DIAGNOSED ON X -RAY VISITING AT FELEGEHIWOT COMPREHENSIVE SPECIALIZED HOSPITAL

BY
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A THESIS REPORT SUBMITTED TO DEPARTMENT OF CLINICAL RADIOLOGY,

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OF THE REQUIREMENTS FOR SPECIALIZATION IN CLINICAL RADIOLOGY

by

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SEPTEMBER, 2022

Bahir Dar, Ethiopia

Declaration

This is to certify that the thesis entitled €Assessment of The Magnitude of Chronic Osteomyelitis and Its Associated Factors in Children as Diagnosed by X-ray Visiting at Felegehiwot Comprehensive Specialized Hospital, submitted in partial fulfillment of the requirements for specialization in clinical radiology Bahir Dar University, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

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Name of the candidate Date Place

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I want to thank Bahir Dar University College of medicine and health sciences to give me the chance on studying this research. I would also like to thank my advisors Dr.Genetu Belay (MD,radiologist) and Eyob Ketema(MPH)for their inestimable comments, valuable support and encouragement throughout the working process of this research

I gratefully acknowledge all study participants, data collectors and supervisors for their willingness and cooperation during the time of data collection.

ABSTRACT

Background: Chronic osteomyelitis (COM) is a bone infection lasting 6weeks or more with radiological evidences. There are few researches done with a focus on Osteomyelitis and even less on chronic osteomyelitis in pediatric patients. In Ethiopia there are few researches done on osteomyelitis in general. So, the aim of this study is to fill this gap.

Methods: Hospital based cross-sectional study was done between April 15,2022 and August 15,2022 in children with age of 18 and below visiting Felege Hiwot Comprehensive Specialized Hospital (FHCSH). A total sample size of 168 participants were involved in the study. Random sampling technique was applied to select the study participants. The data was collected from the patients, their charts and x-ray requests. The data was cleaned, stored, checked its completeness and entered to EPI data version 3.1 and then exported to SPSS version 23 for analysis. Descriptive analysis was done and Bivariable and Multivariable logistic regression were used for analysis.

Results: The prevalence of Chronic osteomyelitis (COM) was found to be 86.3%. The tibia & femur were the most common involved bones and metaphyseal involvement is very common. The most common radiological findings were sequestrum (56%) and involucrum (53%). Of the total patients with radiological evidences of chronic osteomyelitis 16.6% had complications the most common of which is pathologic fracture (12.4%).

Being male [AOR=6.162,95%CI (1.324.147)], age group above 10 years [AOR=4.048, 95%CI (1.03215.886)], rural residency [AOR=4.046, 95%CI (1.2313.364)] having a discharging sinus [AOR=5.237, 95%CI (1.39919.693)] clinical complaint duration of

more than one year [AOR=5.189,95%CI (1.224-27.588)] and a preceding event of trauma [AOR=10.363,95CI (1.101-97.509)] were associated with getting chronic osteomyelitis.

Conclusion: The prevalence of chronic osteomyelitis is high. On this studybeing male, age group above 10 years, rural residency, having a discharging sinus, clinical complaint duration of more than one year and a preceding event of trauma were factors associated with Chronic osteomyelitis. Therefore, health care providers should have a high index of suspicion of COM in older male children who came from rural areas with a chronic discarding sinus following traumatic events and they should increase the public awareness on bone infections.

Keywords: Children, Chronic osteomyelitis, Ethiopia, Magnitude, Radiographic Findings,

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List of Abbreviation/ acronyms

AOM= acute osteomyelitis

AOR-Adjusted Odds Ratio

COM=ChronicOsteomyelitis

COM=Crude Odds Ratio

CI=Confidence Interval

FHCSH = Felege Hiwot Comprehensive Specialized Hospital

MRN = Medical Record Number

OM=Osteomyelitis

OR=Odds Ratio

RTA=Road Traffic Accident

SD=Standard Deviation

1.Introduction

1.1 Background of the study

Osteomyelitis is inflammation of the bone medullary cavity and adjacent bone structures with soft tissue components. Chronic osteomyelitis (COM) is defined as bone infection lasting 6weeks or more with radiological evidence [1, 2].

The nature of blood supply to the diaphysis, metaphysis and epiphysis depends on the age patient which subsequently affect the focus of infection. In infants younger than 18 months there is metaphyseal and epiphyseal origin of infection. In children between 18 months and 16 years there is an initial and predominant metaphyseal focus of infection. From 16 years there is a potential epiphyseal spread of infection [1, 3].

In infants, the pathogens most frequently isolated from blood or bones are Staphylococcus aureus, Streptococcus agalactiae, and Escherichia coli. However, in children more than 1 year of age, Staphylococcus aureus Streptococcus pyogenes, and Hemophilus influenzae are most commonly isolated [4].

The most common site of infection is the long bones, especially the tibia and femur. Most infections are monostotic, but polyostotic involvement of up to 6.8 % is reported in infants, and even 22 % in neonates [3, 5].

The main presenting features are long standing (chronic) discharging sinuses and/or chronic bone pain. There is usually a history of acute osteomyelitis in the past, trauma or surgery for fracture treatment. Occasionally there may be a flare phenomenon characterized by acute exacerbations of pain, swelling and redness of the region involved. Other associated features in long standing cases include muscle wasting and joint

contractures. A deep boring bone pain may be the only presentation in Brodie,s abscess[6].

Conventional radiography is the initial modality of choice to evaluate osseous changes. In the majority of cases, it will be the only imaging technique used in the diagnosis and treatment of childhood osteomyelitis. The ease of access and the relatively low radiation dose make it an ideal imaging tool for skeletal pathologies. Also, it is possible to exclude other pathologies such as malignancies and fractures. However, conventional imaging should not be used to exclude osteomyelitis in the first 10 days of symptoms. Conventional imaging has a reported sensitivity of 25 to 50 % and a specificity of 75 to 83 %, but evidence is limited (level of evidence III) [3].

Inhomogeneous osteosclerosis and/or sequestrum formation (necrotic bone) is characteristic for Chronic Osteomyelitis (COM) on plain radiography. A sequestrum represents a segment of necrotic bone that is separated from the living bone by granulation tissue and bone resorption. It is typically denser than the living bone. In some cases, a layer of new periosteal bone or involucrum is formed around the necrotic bone. A sequestrum surrounded by an involucrum gives a typical bone-in-bone picture. Perforations through the involucrum(cloaca) envelop may be visible. In some instances, the typical „bone-in-bone, picture may be absent and the infected area merely appears densely sclerotic with surrounding regional osteoporosis [6]. Brodies abscess results from a persistent infection leading to formation of radiolucent lesion with marginal sclerosis[2]

Computed Tomography (CT) is useful in evaluating COM in areas with a complex anatomy and can provide information regarding the presence of sequestra, cloaca, cortical

destruction and the thickness of the involucrum. Magnetic Resonance Imaging (MRI) is very sensitive even in the early phase of bone infections. Bone scintigraphy is able to detect osteomyelitis with high sensitivity but with low specificity. Ultrasonography has very limited use in bone infections [3, 6].

1.2 Statement of the problem

Osteomyelitis is one of the most prevalent musculoskeletal infections in children. Worldwide the prevalence of childhood OM is low ranging from 1-13/100,000 children [2]. The incidence is lower in high income countries which is 1.5-14/100000 comparing it to the low-income countries which is 42-200/100000 [1].

The prevalence of COM is decreasing in the developed nations owing to the improvement in both socio-economic status and health care delivery in contradiction to the developing nations where the prevalence is still high which is related to the increasing traumatic incidents mainly from RTA and the high incidence of AOM which is either misdiagnosed or undertreated [7]. In addition the late presentation of the patients for treatment, poor nutritional and immune status of the patients and the poor access to antibiotics are additional factors for the prevalence of COM to be higher in the developing nations [8].

In the United States, each year, 1 in 5000 children under the age of 13 years is diagnosed with osteomyelitis, accounting for 1% of all pediatric hospitalizations [9]. In Germany the annual incidence of OM was 9.2/100,000 and in South Chorea the annual hospitalization rate was 7-8.1/100,000 [10, 11]. In Philippines OM accounted for only 0.015% (15 per 100,000) of the total pediatric admissions in the country [8]. However, in

African setting, COM accounted for 7.8% of all pediatric surgical admissions and 15.4% of total pediatric inpatient days ranking second following burns in Gambia [9]. A study done in Uganda showed that of 1844 orthopedic patients over 1 year, 187 (10%) had osteomyelitis. Of these, 153 (82%) had chronic osteomyelitis [12].

Previously the mortality rate from OM was higher but with the advent of antibiotics and complex surgical interventions the risk of death is almost negligible and the complication rate has dropped to 5%. But despite the drop in mortality rate patients from developing nations still suffer from chronic complications [8].

Children with COM mainly suffer from physical, psychological and socioeconomic morbidity. Physical morbidity includes general ill-health and locomotor problems. The extremity function may be compromised by the complications of COM. A disabled child by COM may not be able to function properly which can make them dependent to their family members for movement and this may also add to the economic problem in the family. These children most of the time had malodorous discharging sinus. The malodorous discharge and their disability will predispose them to social isolation and stigmatisms. Because of similar problems described these children may not have poor school attendance [13].

In addition to the its disabling complications ,COM can have a serous life threatening malignant transformation which is a squamous cell cancer (Marjolin's ulcer) [14].

The treatment of COM requires specialized orthopedic reconstructive surgery and long-term expensive antibiotics courses which are difficult to meet them in the resource poor settings [12]. COM is a disease of poverty, and nowhere surgical treatment could be

available, the vast majority of patients cannot afford it, even with these therapies, it can be difficult to eradicate and many patients never recover from the disease. Local management often involves inappropriate antibiotic cocktails and surgical procedures that may only temporarily control exacerbations of the disease, at enormous cost for the family and society at large. The major problem associated with COM is that the infectious process is persistent and it is highly recurring after treatment which may take many years for full recovery or ending with disfiguring complications. The recurrence rate in resource-limited environment is unknown, but it is generally accepted to be around 30% in richer countries [12, 15, 16].

The high disease prevalence of COM has economical complications. The medical cost associated with the management of osteomyelitis, in the USA in 1999, was estimated at $35 000 per episode [17].

Because patients with COM have frequent recurrences and multiple admissions for operative interventions hospitals have high burden of admissions [15]. In the main government referral hospital in Banjul, Gambia, osteomyelitis accounted for 7.8% of pediatrics surgical admissions and 15.4% of total patient days [18]. A study estimating the healthcare burden of osteomyelitis in Uganda reported that 3.5% of surgical procedures were for osteomyelitis, and 60% of these procedures were a sequestrectomy [12]. A hospital based multicenter study in Uganda reported COM to account near 10% of orthopedic outpatient consults and 8% of pediatric admission [11]. In Beit CURE Malawi, it accounted for 7.6 % of inpatient days and 6.7 % of all pediatric operations [13]

COM is also a problem and challenge to the orthopedic surgeons and the health facilities as it is never truly cured [17].In Ethiopia set up, COM accounted for 30% of admissions to Tikur Anbessa Hospital ,Addis Ababa Ethiopia [14].

Despite the significant burden impacted by COM there are limited researches done on it. In Ethiopia there are only few researches done on COM. There is one documented research done on osteomyelitis in pediatric patients. This study was done in Jimma university on 2021 on the treatment and clinical outcome of osteoarticular infections in general. But this study includes both OM and septic arthritis. It tried to address the management and outcomes of these infections and it does not study COM specifically. This study was conducted at Jimma university where the population may not have similar characteristics to bahirdar [19]. There is single documented research done in Ethiopia focusing on the patterns of COM at Tikur Anbessa specialized (TAH) Hospital, Addis AbabaUniversity (AAU), which was done on a two-year prospective study from 2005 to 2007 which included all ages. But this study was done 15 years ago which does not give us updated information and this study was conducted at a territory hospital in the capital of the country. So the result of the study may not be applied to the areas far from the capital like bahirdar where majority of the patients came from rural areas [14]. In Bahirdar Ethiopia there is single documented research done on COM Patients in Felege Hiwot Referral Comprehensive Specialized Hospital, Bahir Dar. But this research was done on nutritional status and associated factor in adult patients with COM [20].

So, the main aim of this research is to fill this gap.

1.3 Significance of the study

This study will give evidence-based knowledge to the clinicians which will help them on the diagnosis of COM and also helps predict the prognosis of each of the patients. Clinicians can also classify patients using Burke or Penny classification system which are used in pediatrics COM cases which is helpful at guiding treatment strategies. The findings on this study can also help the health professionals formulate diagnostic modalities and can be used to develop strategies to triage these patients easily.

Identifying the factors contributing to the development of COM can help create awareness to the community on what measures to take when facing those risk factors to prevent the onset of COM or complications associated with it.

For future researchers who are interested in conducting researches on similar and others thematic areas of COM it can serve as a baseline.

Finally, this study would provide valuable information for health policy makers, helping them formulate national and regional standards to reduce or halt those factors contributing to the development of COM

2.Literature review

2.1The magnitude of COM in children

According to a study done to review the characteristics of COM in the population of Pacific Islanders treated at one Hawaii children,s hospital, of the total number of orthopedic cases admitted to Shriners Hospital for Children per year, one out of every 75 cases is chronic osteomyelitis [21] .A study done in Northern Australia showed that the crude incidence of osteomyelitis (including those with contiguous septic arthritis) was 31 per 100,000 children; 90 per 100,000 for indigenous, and 9 per 100,000 for nonindigenous children [22].

According to a study done in Germany in 2019, the incidence of OM was 9.2 per 100,000 children of which 9.2% were classified as acute, 38.4% as chronic, and 22.4% were unspecified [10] .A study done in Norway to determine the incidence of COM and to differentiate it from other acute musculoskeletal features showed that the total annual incidence rate of osteomyelitis was 13 per 100 [23].

According to a study done in Uganda to estimate the health care burden of COM, out of 1844 orthopedics, outpatients with a documented diagnosis sampled over 1 year, 187 (10%) had osteomyelitis. Of these 82% were chronic [24] .A study done in Mbarara hospital, Uganda showed that the prevalence of COM was 9.7% in the orthopedics clinic[2]

According a study done in Jimma university, Ethiopia on the treatment and clinical outcome of pediatrics osteoarticular infections ,osteomyelitis accounted for 74% of the studied cases [19]

A study done in Tikur Anbessa Specialized Hospital ,Addis Ababa University Ethiopia, showed that COM accounts for 30% of admissions to the hospital [14].

2.2 Radiologic finding of COM in children

A retrospective study done in 2010 involving a review of medical records of pediatric patients with COM admitted at the Philippine General Hospital from 2006 to 2010 showed that the most common bone involvement was osteomyelitis type (89%) with the femur and the tibia being the most common involved bones each accounting 23%.11% of patients had polyostotic bone involvement with the most common being the radius and ulna which are involved in 11% of the cases and followed by femur and tibia involved in 6% of the cases. The radiographic findings were sequestrum (53%), lytic changes (28%), pathologic fracture (23%), involucrum(23%),periosteal reaction(18%),sclerosis(14%),soft tissue swelling(11%).Cloacae, increased joint space, Callus, Lucency, Cortical thickening, Bowing, Deformity, Dislocation, Bone resorption, Hyper density, Limb length discrepancy, Osteopenia, No osseous involvement all together account less than 10% of the radiologic findings [9].

A study done by Orthopedics Surgery Unit, Mardan Medical Complex Teaching hospital, Bacha Khan Medical College, Mardan, KPK, Pakistan from September 2011 to April 2012 on determining the causative organism of long bone COM showed that the most frequent sites of involvement of COM were the femur(40%) and the tibia(28%) followed by the humerus (16%), ulna(12%) and the fibula(4%) [4].

A retrospective study was done in Abakaiki,South east Nigeria between January 2005 and December 2015 with the aim of determining the pattern and outcome of childhood pyogenic OM in a low resource environment. The majority of the patients (65.8%) had

COM.88.2% of the cases were a monostotic pattern of pyogenic osteomyelitis and 11.8% of the cases were polyostotic pattern. On the upper limb the right side was more affected than the left side(17vs3) while it was the reverse on the lower extremity with the left being more affected than the right side(36vs28).The tibia was the most common bone affected(41.2%),followed by the femur(28.2%) and the humerus(14.1%).The patterns of radiologic findings in these study showed that sequestrum with structural involucrum(34.2%) and periosteal reaction(21.11%) were the most common findings.17.1% of patients had sclerotic lesion ,13.2% had sequestrum without structural involucrum,10.5% had localized cortical sequestrum,2.6% had lytic lesion and the least common was a brodie abscess seen in 3% of the cases[25].

A retrospective study was done by reviewing cases of chronic osteomyelitis at Ela Memorial centre,Ilorin,Nigeria between march 1995 and February 2005 on 107 patients which showed that 96.3% of patients presented with monostotic osteomyelitis and 3.7% had multiostotic OM. The tibia was the most common site of involvement (32.7&) followed by the femur (25.5%) and humerus[8].

According to a retrospective study which was conducted at the institution of Beit CURE, Malawi, on 145 cases of childhood chronic hematogenous osteomyelitis which uses the Beit CURE (BC) classification, it showed that the most commonly affected bone was the tibia (46 %), followed by femur (26 %) and humerus (10 %). Using the Beit CURE (BC) classification Type B, sequestrum type, was the most common (88 %), followed by type C, sclerotic type, (7 %) and type A, Brodie,s abscess (5 %). Type B3 was the most common classification (n= 59) and B1 the least common. The tibia had the greatest number of bone defects (B4 classifications). Involvement of the physes was found in 37

cases (28 %), with both proximal and distal physes being involved in five of these cases. On this study 135 cases were monostotic and four were polyostotic [26].

According to a retrospective done in children in Malawi the most common bones affected were the tibia (79 patients, 48.4%), the femur (47 patients, 29%) and the humerus (18 patients, 11%). There were four patients with polyostotic COM [27].

A crosssectional study was done between October 2016 to 2017 at orthopedics department of Mbarara Regional Referral Hospital which was aimed at assessing the prevalence, etiological agents and their drug susceptivity. A total of 76 patients with COM were enrolled into the study.14.9 %(eleven) of patients showed polyostotic COM of which three showed tibia and femur involvement, five had humerus and femur involvement, two patients showed femur and phalangeal involvement and one patient showed involvement of the humerus and the tibia. On the order of specific bone involvement the tibia was the most common site of involvement (37.8%) followed by the femur (32.4%) and the humerus (17.6%).The most common radiologic finding was sequestrum(85.1%),followed by the involucrum(79.7%),Brodie abscess(24.3%),periosteal reaction(13.5%) and pathologic fracture(6.8%) [21].

According to a prospective study done in Uganda rural setting the most common sites of involvement were the phalanges and the tibia each accounting for 45% and 21.6% respectively [28].

According to a prospective study done in Kenya from 2007-2009 on COM in 96 pediatrics patients the Infection sites included the following: tibia (45 cases), femur (32), foot (8), calf bone (4), humerus (4), ulna (2), and hip [29].

A prospective study was done by the department of orthopedics of AAU medical faculty on 442 patients from Jan 2005 to Jan 2007 with the aim of determining the patterns of COM and the outcome of its management. The most common radiological findings was a sequestrum which was found in 58% of the patients followed by involucrum formation which was found in 53.5% of the patients and joint space arrowing which was seen in 20.6% of the patients. The commonest site of bones involved were in the lower limbs, the tibia (36%) fibula(22%) and the femur (21%).Multiple bones were involved in 9 of the patients[14].

2.3 Factors associated with the magnitude of COM

2.3.1 Sociodemographic factors

According to a retrospective study done in Philippine General Hospital, Philippines, The mean age at presentation was 8 years old and most patients were males (54%), with a male to female ratio of 1.2:1[19].

According to a retrospective study done in Malawi on pediatrics patients with COM the median age at presentation was eight years (1 to 18). There were 102 males and 65 females with malt to female ratio of 1.5:1[27].

According to a retrospective study done in Abakaliki, South east Nigeria on the patterns and outcome of childhood osteomyelitis: Infants were significantly more likely to present in the acute phase of bone infection whereas the older children were more likely to present with chronic bone infection. The incidence of COM doubled after the first 2 years of life and tripled at the age of 11-15 years. The most common age range of COM is 11-15yrs of age showing that COM patient are more likely to be older patients(P<0.001). Infants from the rural residency are more likely to present with COM

than urban residents(P<0.011) accounting 76% and 24% respectively. Male patients account for 66% of the cases and the male to female ratio was 1.94:1. This patient, age and sex related findings is nearly similar to a study done at Mbarara Regional Referral Hospital where the age range of 1-17 account for 64.9% of the cases. On this study 55.4% of the participants were male with male to female ratio of 1.2:1 [25].

According to a retrospective study done in Ela Memorial Medical Centre ,illorin,Nigeria, on COM of all ages out of 107 cases 66.4% were male patients with male to female ratio of 2:1.the mean age of presentation was 21.9 years of age and 55.2% were below 20 years of age [8].

According to a retrospective study done in South-South Nigeria territory hospital, Federal Medical Centre Asaba, on osteomyelitis of pediatrics patients out of the 40 patients 19 (47.5%) were COM subtype of OM. From the 19 COM cases the age distribution shows that 8 were 5-9 years of age,6 were 10-14 years of age ,4 were 0-4 years of age and only one patient was in the age range between 15 and 18.From the 19 cases of COM 10 were Female and 9 were male patients with M:F ratio of 0.9:1 [30].

According to a prospective study done in the rural settings of Uganda the pick age of incidence of COM was 10-19 years followed by 0-9 years. On this study 63 of the study participants were Males and 57 were females [28].

According to a prospective study done in Kenya on COM from 2008-2009 on 96 patients they have 42 men and 54 women with mean age of 11.9±5.2 years [29].

According to the two years prospective study done in Ethiopia TAH, on COM male account for 76% of the cases with the ratio of 3.1: 1.the study included all ages with the

diagnosis of COM. The mean age of presentation was 18 years.The Majority of the patients came from the rural areas accounting for 68% of the cases [14].

2.3.2Preceding events

According to a retrospective study done in Philippine General Hospital, Philippines, predisposing factors documented to COM were mostly trauma (35%), wound (13%), abscess (13%) and previous diagnosis of chronic osteomyelitis (9%). Other predisposing conditions which account for. 5% of the cases include Swelling, Cellulitis, Fever, Sacral decubitus ulcer, Septic arthritis, Mass, Burn, Congenital deformity, Insect bite, Parotitis, Varicella, Vehicular accident [9].

According to a retrospective study done in Abakaliki, south east Nigeria, forty (84%) of the patients who presented with chronic hematogenous osteomyelitis had initial acute attack that was either neglected or poorly treated [25].

According to a retrospective study done in Ela Memorial Medical Centre ,illorin,Nigeria, on COM of all ages 81.3% of the cases were hematogenous with no preceding events.18.35 of the cases were preceded by RTA(6),Gunshot(3),falls(4),ORIF(3),Fractures(2) and traditional treatment of fracture by traditional bone setters(2) [8].

According to a prospective study done in rural setting of Uganda 46.6% of the cases had prick injury preceding COM and 10% had abscesses. The remaining preceding events were Humanbite(10%),open fractures following accidents, (5.8%)Immunization(1.6%),Gunshot (1.6%) and burn(0.2%) [28].

According to a prospective study done in Kenya on COM in pediatric patients on 96 patients, 57 of the patients (59.3%) had predisposing factors: exposed fractures (19.8%), wounds (14.5%), ongoing or previous infections (14.5%), 8 spina bifida (8.3%), 2 an thorn tree punctures (2.2%). The remaining 40.7% of the cases there were no known predisposing factors [39].

According to the prospective study done in Ethiopia , Jan AH COM,70% of the cases do not have preceding events starting spontaneously while 27% of the cases follow trauma [14].

2.3.3 Clinical presentation

According to a retrospective study done in Philippine General Hospital, Philippines, swelling (27%), draining sinus (24%), nonhealing wound (20%) and pain (14%) were the most common presenting signs and symptoms. Pain/tenderness, draining sinus tract, purulent discharge, limited motion, erythema and warmth, aside from being common signs and symptoms, were also the commonly observed physical examination findings in these patients [9].

According to a retrospective study done in Abakaliki, the south east Nigeria the most common clinical presentation of COM cases was discharging sinus(37) followed by swelling(25),pain(17),limping(11) ,extremity ulcers(10), fever (5)and anorexia(1) [25].

According to a study by International Committee of the Red Cross in Democratic Republic of Congo the Mean duration of disease prior to admission was 35 months (3240) for the 69 patients for whom data were available [15].

According to the study done in Mbarara Regional Referral Hospital, Uganda, the median time from disease onset to presentation was13 months [21].

According to a study done in Kenya on COM in pediatric patients 90.5% of the studied patients had fistulous tracts [29].

According to the prospective study done inEthiopia ,TAH ,on COM discharging sinus was the most common clinical presentation accounting for 93% followed by swelling (59%), pain (540, limping (42%), and limitation of movement (30%) [10].

2.4 Conceptual framework

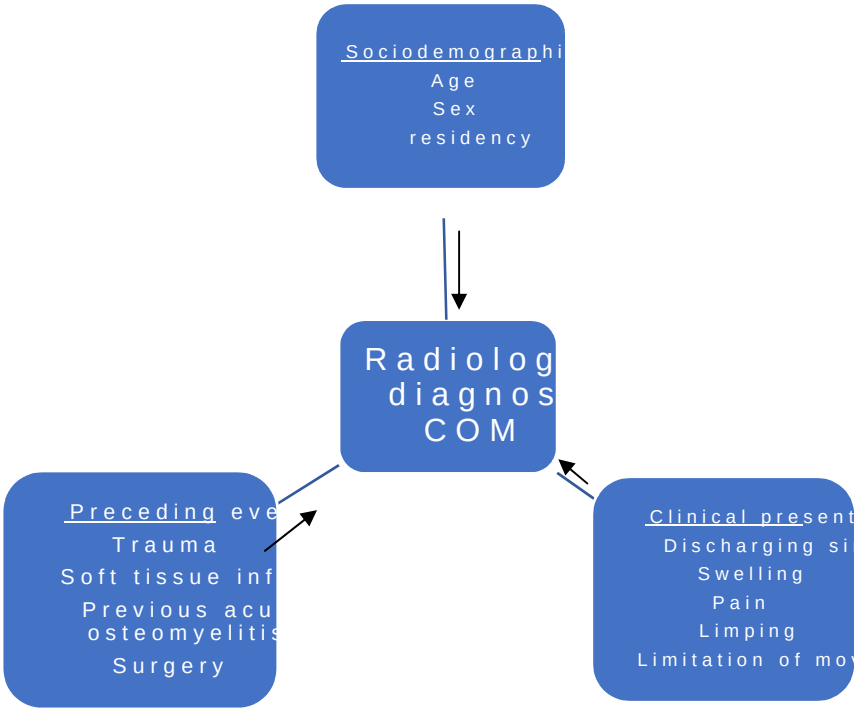

Figure 1: Conceptual Framework

3.Objective

3.1 General objective

-To assess the magnitude of COM and its associated factors in children at FHCSH, Bahir Dar, Ethiopia,2022

3.2 Specificobjectives

-To determine the magnitude of COM in children, at, FHCSH, Bahir Dar, Ethiopia,2022

-To describe the radiological findings of COM in children at, FHCSH, Bahir Dar, Ethiopia,2022

-To identify factors associated with COM in children at, FHCSH, Bahir Dar, Ethiopia,2022

4.Methods and Materials

4.1.Thestudyareaandthestudyperiod

The study was conducted at Felege Hiwot Comprehensive Specialized Hospital (FHCSH), in Bahir Dar Town, North West Ethiopia. Bahir Dar Town, the capital city of the Amhara region, is found 565 Kilometers far from Addis Ababa, the capital city of Ethiopia.

FHCSH serves a total of 12 million populations.

The radiology department in FHCSH is one of the many departments in the institution with three skilled radiologists. It gives radiologic medical service and residents are deployed to the department from Tibebe Ghion Specialized Hospital to cover duty time emergency imaging related activities.

This study was conducted from April 15,2022 to August 15,2022.

4.2 Study design

An institution based cross-sectional study was conducted

4.3 Population

4.3.1 Source population

All patients with the age of 18 and below who attended FHCSH in the time period between April 15, 2022 and August 15, 2022.

4.3.2 Study population

All patients with the age of 18 and below who had x-ray in the radiology department for a clinical presentation of discharging sinus, pain, swelling, limitation of movement and limping with complaint duration above 6 weeks in the time period between April 15, 2022 and August, 2022.

4.4 Sample size determination

- The sample size is determined using the single population proportion formula.

$$n = \frac{(z_{1-\alpha/2})^2 p(1-p)}{d^2}$$

α = level of significance

Z(1-α/2) =standard normal variate (at α 5% is 1.96)

P = the proportion of the target population estimated to have particular characteristics

d=margin of error

- Using p value<0.05 ($Z_{1-\alpha/2}$=1.96)

P= from a study done at Makerere University Medical School, Uganda the prevalence of children with COM was 10% [12].

- d=3%

Then n is 384, adding the non-response rate of 10% will give the final size of 422.

A total estimate of 50 X-ray requests with a clinical impression of COM per month is sent to have X-ray to the radiology department. So, a total of 250 cases were sent. Since this is <10,000 per study period we use population correction formula so that the final sample size will be 168. No documented researches were found on the study of magnitude COM and its associated factor to calculate the sample size from the statistically significant associated factors. So, a sample size of 168 is taken.

4.5 Eligibility criteria

4.5.1 Inclusion criteria

All patients with the age of 18 and below who present with the clinical presentations swelling, pain, discharging sinus, limping or limitation of movement of more than 6weeks sent to the X-ray in the radiology department in the time period between April 15, 2022 and August15, 2022 were included in the study.

4.5.2 Exclusion criteria

All patients with poor quality x-ray films were excluded.

4.6. Operational definitions

Chronic Osteomyelitis: is a bone infection lasting 6wks or more with radiological evidences. For this study the evidences include a combination of one or more of the following findings which include sequestrum, involucrum, soft tissue swelling which obliterates the fat planes, periosteal reaction, lytic destructions and Cloaca. Other findings which were used to diagnose a case as COM on our study were either extensive sclerosis or brodie,s abscess [14, 26].

Sequestrum - is a necrotic bone which appears denser than the surrounding bone on radiography [6, 31].

Involucrum - is a new bone which surrounds the sequestrum and it is less dense than sequestrum on radiography. It may appear thicker and extensive involving the entire shaft of the bone or normal density or inadequate [32].

Cloacae are perforations in the involucrum which appears as a defects in the involucrum in radiography to allow the continued discharge (drainage) of inflammatory products from the bone [6].

Brodie abscess – It is seen in the metaphysis as a geographic lytic lesion with a well defined, often broad, sclerotic margin. It is usually oval, with the long axis parallel to the long axis of the bone, and typically borders the growth plate [31]

Extensive sclerosis – a form of COM characterized by sclerosis without the classical sequestrum, involucrum and cloacae on radiography [6]

Periosteal reaction – is a nonspecific radiographic finding that indicates periosteal irritation. It has different types. The solid type appears as homogenous continuous single layer of new bone attached to the outer layer of the cortex. The laminated type of periosteal reaction appears as alternating layers of lucent and opaque densities on the cortex. The spiculated type of periosteal reaction is seen as radiating spicules arising from the cortex. Codman's triangle appears as a triangle periosteal new bone at the peripheral lesion-cortex junction. [32]

Monostotic bone involvement – is involvement of a single bone [2, 14].

Polyostotic bone involvement (Multiple bone involvement) – is involvement of more than one bone [2, 14].

4.7 Sampling Technique and procedures

Simple random sampling technique was used to select the study participants from the daily X-rayed children below the age of 18 at FHCSH who present with clinical complaint of discharging sinus, pain, swelling, limitation of movement with a complaint duration above 6 weeks. On average monthly 50 children below the age of 18 had x-ray for this complaint giving a total of 250 cases in the study period. So, using SRS technique 167 patients were selected from these 250 cases. X-ray requests of these patients were selected and demographic data, clinical complaints, preceding events were documented.

Subsequently the patient charts were followed to look for others preceding events and comorbidities. Data was also collected from the patients directly as well as X-rays of the patients were collected to describe the radiographic findings.

4.8 Study variables

4.8.1 Dependent variables

Radiologically diagnosed COM cases (Yes, No)

4.8.1 Independent variables

4.8.1.1 Sociodemographic variables

Age

Gender

Residency

4.8.12 Clinical presentation

Discharging sinus

Swelling

Pain

Limping

Limitation of movement

Duration of clinical presentation

4.8.1.3 Preceding events

Trauma

Soft tissue infection

Previous acute osteomyelitis

Surgery

4.9. Data collection and procedures

Data was collected using a pre tested structured questionnaire from the X-ray requests and patients. Subsequently the patient charts were also followed. X-rays of the patients were collected to describe the radiographic findings.

4.10 Data processing and analysis

Data were entered into EPI data version 3.1 and then exported to SPSS version 23 for analysis. Descriptive statistics and binary logistic regressions were computed. Binary logistic regression was used to select variables associated with COM. In binary logistic regression, both Bivariate and Multivariable logistic regressions was computed.

In Bivariate analysis, independent variables with p value <0.25 were selected as candidates for multiple logistic regressions. In multivariable logistic regression, statistically significant was considered at $p < 0.05$.AOR and their 95% confidence interval (CI) was used to measure strength of the association. Backward stepwise logistic regression was applied. Finally, the data were presented with tables, Charts and figures.

4.11 Data Quality Assurance

Before datacollection, data collection instrument was pretested by taking 5% (8) of subjects in Felege Hiwot Comprehensive Specialized hospital to check whether the questionnaires are simple, clear, andeasily understandable. Training on the interview technique procedureswas given to four data collectors and one supervisor by the principal investigator. Data recordingquality was checked at the end of data collection through

random evaluation of the collected toolfor consistency, completeness, clarity, and accuracy. Also, during data processing, the informationwas checked for completene ss

4.12 Ethical considerations

Ethical approval by the review board to the research and permission from the hospital management, head nurse and research review committee of Bahir Dar University College of medicine and health science to do the research taken to use available information in the FHCSH. This data will not be used for other purpose other than the research and confidentiality of study units.

4.13 Plan for dissemination of the findings

The result of the study will be presented to Bahir Dar Univers ity, College of public health and medical science, regional health bureau, Zonal health offices, to the targeted health facility and to NGOs working on this area. It will be presented in different seminar and workshops. Further attempt will be made to publish it on national and international scientific journals.

5.Results

5.1 Sociodemographic characteristics of the respondents

A total of 168 patients were included in this study. The mean age (± SD) of the respondents was 13.68(SD: ±4.6). Most (104,61.9%) of the patients came from rural areas. Males accounted for 122 (72.6%) of the cases.

5.2 Clinical presentation

Discharging sinus was the most common clinical presentation observed in 114 (67.9%) followed by swelling 113 (66.3%), pain 95(35.1%), limitation of movement 13(7.7%) and limping 4(2.4%).

Most patients (96,57.1%) present with clinical complaint duration of more than one year followed by 6weeks-6months (44,26.2%) and 6 months-one years (28,16.7%).

5.3 Preceding events

The disease started spontaneously in 55.4% and followed trauma in 40 (23.8%), soft tissue infections which include abscesses and cellulitis (24,14.3%), acute osteomyelitis treatment or diagnosis (5,3%) and surgery (3,1.8%).

From the trauma preceded cases, falling down was the most common mechanism of injury seen in 28(16.7%) of the cases followed by prick injury (6,3.6%), RTA (2,1.2%), Bullet injury (2,1.2%), stick injury (1,0,6%) and other types of mechanism of injury (1,0.6%) (Table 1).

Table1:Mechanism of Injury in Study Participants Who Had a Preceding Event of Traur
Felege Hiwot Comprehensive Specialized Hospitla,2022, Bahir Dar, Ethiopia

Mechanisms of injury	Frequency	Percent
Falling down	28	16.7
Prick injury	6	3.6
Bullet injury	2	1.2
RTA	2	1.2
Stick injury	1	0.6
Others	1	0.6
Total	40	23.8

Associated comorbid diseases were found in nine of the participants six of which had anemia, one had malnutrition, and the rest two were known epileptic and psychotic patients.

5.4 Characteristics of COM cases

From the total of 145 patients with radiological evidences of COM the mean age of presentation(±SD) was 13.4 (SD± 3.940). Males accounted for 101(66.9%) of the cases and 97(66.9%) patients came from rural areas. Discharging sinus was the most common clinical presentation observed (108,74.5%) followed by swelling (95,65.5%), pain (47,32.4%), limitation of movement (11,7.6%) and limping (3,2.1%).

Most patients present with a clinical complaint duration of more than one year (90,62.4%) followed by 6 weeks to 6 months (31,21.4%).

The disease started spontaneously in 55.2% of the cases and 44.8% had preceding events the most common of which was trauma (39,26.9%) followed by soft tissue infections (24,16.1%), acute osteomyelitis (5,3.3%) and surgery 3(2.1%). From those cases which followed trauma the most common mechanism of injury was falling down accident (28,71.8%) followed by prick injury (6,15.4%), RTA (2,5.1%) Bullet injury, (2,5.1%) and stick injury (1,2.6%). From all the cases with COM 5 had anemia, one had

malnutrition and the rest two patients were known patients of epilepsy and psychosis on follow up.

From the total patients with radiological evidences of COM, only 10 (6.9%) of them had multiple bone involvement. The lower extremity was involved in 86.9% (126) of the cases. The right side was involved in 74 of the total cases (51%). The tibia and the femur were the most common bones involved accounting 46.2% and 38.6% respectively. The humerus, calcaneus and fibular bones accounted for 6.9%,2.8% and 1.4% respectively. (Table 2)

In terms of location within the bone, metaphyseal and meta diaphyseal locations each accounted for 37.3% (53) of the cases, diaphyseal location accounts 21.1% (30), meta epiphyseal accounts for 1.4% (2) and metaepidaiphyseal location accounted for 2.8% (4) of the cases. There was no isolated involvement of the epiphysis.

Table 2: Frequency of Involved bones in Participants with Radiological Evidenced of COM Felege Hiwot Comprehensive specialized Hospital,2022, BahirDar, Ethiopia

Involved bone	Frequency	Percent
Tibia	67	46.2
Femur	56	38.6
Humerus	10	6.9
Calcaneus	4	2.8
Fibula	2	1.4
Other foot bones	2	1.4
Radius	2	1.4
Ulna	1	0.7
Hand bones	1	0.7
Total	145	100

The most common radiologic findings were sequestrum (94,56%,) and involucrum (89,53%). (Table 3) Periosteal reaction was seen in 34(20.2%) of the patients and the

most common type of periosteal reaction was solid (20,58.8%) followed by laminated type (9,26,5%), Codman,s triangle (1,2.9%) and combined form (4,11.8%) (Table 3).

Table3: Radiologic Findings of COM Patients at Felegehiwot comprehensive specialized Hospital ,2022 BahirDar Ethiopia

Radiologicalfindings	Frequency	Percent
Sequestrum	94	56
Involucrum	89	53
Soft tissue swelling	53	31.5
Lytic destruction	49	29.2
Periosteal reaction	34	20.2
Extensive sclerosis	25	14.9
Cloaca	22	13.1
Brodie,s abscess	10	6

Of the study participants with radiological evidences of COM ,24 (16.6%) had complications which include fracture (18,12.4%), angular deformity (5,3.4%) and joint involvement (4,2.8%). From the joint involvement 2 patients had joint space narrowing and the rest two had ankylosis and effusion. From the angular deformity two were valgus type and one was varus type.

5.5 Magnitude of COM

The magnitude of chronic osteomyelitis (COM) diagnosed with radiological evidences was found to be 86.3% with 95% CI (80.2-92.1).

5.6 Factors associated with magnitude of COM

On Bivariate logistic regression analysis respondents, age group, sex, residency, duration of clinical presentation, discharging sinus, pain, swelling and trauma showed a statistically significant association at p-value <0.25.

On multivariable logistic regression analysis respondent,s age group, sex, residency, duration of clinical presentation, discharging sinus and trauma were significant factors that made association at a p-value <0.05.

In our study children with age above 10 years were 4.0481 times more likely to develop COM than those with age below 5 years. [AOR=4.0481(1.1-15.286)].

In this study male Children were 6.162 times more likely to develop COM than female children [AOR=6.162 ,95% CI (1.32-34.147)].

The present study showed that children who came from rural areas were 4.046 times more likely to develop COM than those who came from urban areas [AOR=4.046 ,95% CI (1.236-13.364)].

The study also showed that Children who presented with a clinical complaint duration of more than one year were 5.189 times more likely to have COM than those who presents with a complaint duration of 6weeks-6months. [AOR=5.189,95% CI (1.24-21.588)]

This study showed that Children who had discharging sinus were 5.237 times more likely to have COM than those who didn,t have. [AOR=5.237,95% CI (1.3-20.393)].

In this study Children who had trauma as a preceding event were 10.363 more likely to have COM than those who didn,t have.[AOR=10.363,95% (1.9-57.509)] (Table 4)

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Table 4: Bivariable and Multivariable Logistic Regression Analysis Results for Factors Associated wit Magnitude of COM in Felegehiwot Comprehensive Specialized Hospital, 2022,BahirDar, Ethiopia

Variable	Categories	COM		COR (95s%)	AOR (95%)	P-value
		Yes	No			
Sex	Male	101	21	4.574(1.028-20.357)	6.162(1.12-34.147)	0.037**
	Female	44	2	1	1	
Age range(years)	>10	118	14	3.0650(1.156-8.172)	4.048(1.032-15.886)	0.045**
	5-10	22	8	1.686(0.184-15.480)	0.928(0.067-12.881)	0.956
	<5	5	1	1	1	
Residency	Rural	97	7	4.619(1.781-11.981)	4.046(1.236-13.364)	0.021**
	Urban	48	16	1	1	
Discharging sinus	Yes	108	6	8.270(3.034-22.544)	5.237(1.393-19.693)	0.014**
	No	37	17	1	1	
Swelling	Yes	95	18	1.895(0.664-5.405)	0.366(0.081-1.657)	0.192
	No	50	5	1	1	
Pain	Yes	47	12	2.275(0.935-5.533)	1.088(0.337-3.507)	0.888
	No	98	11	1	1	
Durationof clinical presentation	>1year	90	6	6.290(2.201-17.974)	5.189(1.247-21.588)	0.024**
	6months 1year	24	4	2.500(0.653-9.575)	2.951(0.491-17.750)	0.237
	6weeks 6months	31	13	1	1	
Trauma	Yes	39	1	8.094(1.055-62-086)	10.363(1.101-97.509)	0.041**
	No	106	22	1	1	

** indicates that variables are statistically significant at a P value <0.05

6.Discussion

The results of the study revealed that the proportion of children with radiological evidences of chronic osteomyelitis was about 86.3% with 95% CI (80.2-91.1). This was higher than the finding in studies done in Mbarara, Uganda (27.7%) [2], Makerere University Medical School, Uganda (10.2%) [12], Malawi (6.7%) [27] and Gambia (5.7%) [18]. This difference is because the data on our study was collected from selected patients who presented with discharging sinus, pain, swelling, limitation of movement and limping of more than 6 weeks duration which are the main presenting clinical features of COM. The Studies done in the countries listed above determine the proportion of COM from the total orthopedics visits. In addition, the difference might be due to the large sample size they used.

In this study the most common radiologic findings were Sequestrum, involucrum, soft tissue swelling and lytic destruction which was consistent with studies done at Uganda [2], Philippines, South East Nigeria [25], Malawi [26] and Tikur Anbessa Specialized Hospital, Ethiopia [14]. Multiple bone involvement was seen in only 6.9% of the COM cases which is consistent with studies done in Nigeria [8], Philippines [9] Tikur Anbessa Hospital ,Ethiopia [14]. The right side was involved in 51% of the cases and the left side was involved in 46.2% of the cases while 2.8% patients had both sides involvement which can be explained by the right side dominance of the extremities on the population [33] and so, more activities on the right side predisposing to traumatic incidents which can precede to COM [12].

The tibia and the femur were the most common bones involved accounting 46.2% and 38.6% respectively. This was consistent with studies done at Uganda [2], Philippines [9], Kenya [29] and Malawi [26]. This can be explained by the fact that tibia has poor soft

tissue coverage with no muscle layer on it which makes it vulnerable to traumatic incidents preceding COM and contiguous spread of soft tissue infections to it [11]. Since the femur is contiguously located to tibia so infections could spread locally or hematogenous to it [12]. This finding was inconsistent with a study done at the rural Uganda [28] which showed that the most common site of involvement was the phalangeal bones. This difference is explained by that the study was conducted at a peasant community and 46.6% of the cases had prick injury associated with the agricultural activities and pastoralism. This led to the high involvement of the phalangeal bones. The other reason was the study included all ages unlike our study which included pediatrics patients only.

Most of the infectious process involved the metaphysis and meta diaphyseal areas of the bone which could be explained by the blood supply pattern to the long bones where blood flow in the metaphysis is slow and turbulent and in children >18 months the metaphyseal blood vessels will not cross the physis to involve the epiphysis which can explain non involvement of the epiphysis on our study as well [28, 34].

On this study 16.6 % of patients had complications which include pathologic fracture, angular deformity (varus and valgus types) and joint involvement as joint space narrowing, effusion and ankylosis. This is similar to the study done in South east Nigeria where anemia, pathologic fracture and septic arthritis were the most common complications [25].

In this study the factors associated with the magnitude of COM being male, age group above 10 years, rural residency, having a discharging sinus, a clinical complaint duration of more than one year and a preceding event of trauma.

This study indicated that age group above 10 years was significant associated with development of COM. This finding was consistent with the study done in Uganda [24].Children whose age above 10 years were 4.0481 times higher odds of developing COM than those whose age was below 5 years [AOR=4.0481(1.032-15.886)].

This might be because at this age most children will attend school and they are highly active and they will be predisposed to traumatic incidents which could precede COM [2, 28].

Being male was significant associated with the development of COM. The predominant male distribution of COM on studies conducted in Nigeria [8], Tikur Anbessa hospital, Ethiopia [14], Uganda [2] , Malawi [27] and Philippines [9] supported our finding. The odds of COM were 6.169 times higher among male children compared to female children [AOR=6.162 ,95% CI (1.12-34.147)]. This finding might be because males participate in activities that predispose them to trauma compared to females which can precede COM [2, 35].

This study also indicated that a significant association was noted between COM and rural residency. The odds of COM were 4.046 times higher among children who came from rural areas as compared to those who came from urban areas [AOR=4.046 ,95% CI (1.236-13.364)]. This finding is supported by the predominance of COM in those patients who came from rural areas on studies done at Tikur anbessa hospital and [14]

Nigeria[25].Children from rural areas face malnutrition and poverty with lack of health facilities which can predispose them to COM[1]. Increasing the number of health facilities in the rural areas, improving the already built health facilities with qualified health professionals as well as with medical equipment will improve the detection rate of COM and the treatment of risk factors of COM which will decrease the magnitude. Giving awareness to the community in the rural areas about the predisposing factors, clinical presentation and complications of COM will decrease the magnitude of COM and the physical, psychological and socioeconomic morbidity associated with it.

In this study discharging sinus was significant associated with COM. The odds of COM were 5.237 times higher among children who had discharging sinus as compared to those who didn,t have [AOR=5.237,95% CI (1.393-19.693)]. This is supported by studies done in include Philippines[9], Nigeria[25],Kenya[29] Rwanda[1] and Tikur Anbessa Hospital, Ethiopia[14] where discharging sinus was the most common clinical presentation. Discharging sinus is the predominant clinical presentation of patients with COM. Most patients may not visit health facilities until a pus starts to ooze out of the sinus tract[11].

The present study also indicated that clinical complaint duration above one year was significant associated with COM. The odds COM were 5.189 times higher among patients with a clinical complaint duration of more than one year compared to those patients who present with a complaint duration of 6weeks-6months [AOR=5.189,95% CI (1.247-21.588)].This finding is supported by the studies done in Nigeria[25],Uganda[2] and Tikur Anbessa Hospital, Ethiopia[14] where most patients presented more than one year after clinical onset. This might be because patients may seek other alternative

traditional and religious medicines before presentation to the health facilities [2]. The other reason might be patients may prefer to take medications by themselves which may delay their presentation to hospital [2, 14]. The other reason could also include misdiagnosis [36]. A high index of suspicion and accurate diagnosis by the primary health care providers could make patients to be referred early to the areas where there are orthopedicians which can decrease late presentation.

In this study trauma showed a significant association with the development of COM. Children who had preceding incident of trauma were 10.363 times more likely to develop COM than those who didn't have trauma [AOR=10.363, 95% (1.705-109)]. This finding is supported by the studies done in Kenya [29], Philippines [9], and Tikur Anbessa Hospital, Ethiopia [14] where COM followed trauma in 19.8%, 35%, and 27% of the cases respectively. This calls for giving attention to those children with a history of trauma and clinical presentation suggesting bone infections to intervene them early.

7. Strength and Limitation of the study

7.1 Strength of the study

Taking the data from the patient directly, from x-ray requests, from X-rays and the charts of the patient were the strength of this study.

7.2 Limitaion of the study

Since the study is cross-sectional it may not demonstrate direct cause and effect between dependent and independent variables. In addition, this study is done at hospital level and it may not be generalized to the general population.

Diagnosis of COM rely on X-ray findings which may not be applicable at all times.

8.Conclusion, Future direction and implications

The magnitude of COM is high.

COM is common among older male children and the most common clinical presentations are chronic discharging sinus, swelling and pain.COM followed preceding events in 44.8% of the cases the most common of which was trauma. The tibia & femur were the most common involved bones and metaphyseal involvement was very common. The most common radiological findings were sequestrum and involucrum.

Being male, age group above 10 years, rural residency, having a discharging sinus, clinical complaint duration of more than one year and a preceding event of trauma were positively associated with COM.

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9.Recommendations

Based on our findings we recommend the following:

-Health care providers should have a high index of suspicion of the possibility of COM in those older male children who came from rural areas with a chronic discarding sinus following traumatic events. They should also increase the public awareness on predisposing factors, clinical presentation and complications of COM.

-The community should be thought on early visit of local health facilities when there is a child at home with a history of trauma and symptoms of infection.

-Intervention programs which aimed at preventing and modifying those factors associated with development of COM in children should be incorporated in the health care system for effective prevention and management of COM among children.

-Further similar cross-sectional studies at different hospitals of the country with large sample size and additional variables like nutritional assessment, tests for HIV and Swab culture are recommended on the prevalence and the factors associated with COM.

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ANNEX: CHECK LIST

BAHIR DAR UNIVERSITY SCHOOL OF MEDICINE AND COLLEGE OF HEALTH SCIENCES DEPARTMENT OF CLINICAL RADIOLOGY

ASSESMENT OF THE MAGNITUDE OF CHRONIC OSTEOMYLITS AND ITS ASSOCIATED FACTORS IN CHILDREN AS DIAGNOSED ON X -RAY VISITING AT FELEGEHIWOT COMPREHENSIVE SPECIALIZED HOSPITAL

Put €X• sign in front of your responses,

Multiple answers are possible

Part-I Socio- Demographic Characteristics

MRN _____

1. Age in years /months‡‡‡‡‡.

2. Gender

ðv Male Female

3. Location

ðv Rural Town

Part II Clinical information

1.What is the Clinical presentation of the patient?

ðv Discharging sinus
ðv Swelling
ðv Pain
ðv limping
ðv limitation of movement
ðv others(specify)

2.What was the duration of the clinical presentation?

ðv 6wks-6 Months
ðv 6months1yr
ðv >1year

3.Is there any preceding event prior to this presentation?

ðv Yes No

4.If the answer is „yes „for the above question, then what was the event?

- ðv Surgery to the area
- ðv Trauma to the area
- ðv previous acute osteomyelitis,
- ðv soft tissue infection
- ðv any other areas of infection

5.If the patient has trauma what was the mechanism of trauma?

- ðv Falling down accident
- ðv Bullet injury
- ðv Prick injury
- ðv RTA
- ðv Stick injury
- ðv Others

6, Any comorbid diseases? Yes No

7.If the answer is „yes, to the above question then, what was the comorbid disease?

- ðv Anemia
- ðv Malnutrition
- ðv DM
- ðv HIV/AIDS
- ðv Cardiac disease
- ðv Others (specify)

Part III: X -ray findings

1.To which specific site in the body is the pathology found?

- ðv Upper limb
- ðv Lower limb
- ðv Both
- ðv Other(specify)

2.which site in the bone is the lesion seen?

- ðv Right side Left side

3.How many bones are involved?

- ðv Single bone
- ðv Multiple bones
- ðv Other(specify)

4.which specific bones is/are involved?

- ðv Tibia
- ðv Femur
- ðv Humerus
- ðv Other site(specify)

5.which specific part of the bone is involved?

- ðv Metaphysis
- ðv Diaphysis
- ðv Epiphysis
- ðv Metadiaphysis
- ðv Metaephysis
- ðv Metaepidiaphysis

6.What was/were the x ray findings?

- ðv Involucrum
- ðv Sequestrum
- ðv Lytic destruction
- ðv Extensive sclerosis
- ðv Cloaca
- ðv Periosteal reaction
- ðv Soft tissue swelling
- ðv Brodie,s abscess
- ðv Others(specify)

7.If there is a periosteal reaction on the above question then what is the type of the periosteal reaction?

- ðv laminated
- ðv Solid
- ðv Spiculated
- ðv Codman,s triangle
- ðv Combined

8. was/were there any complication/s?

ðv Yes No

9.If the answer is yes for the above question, then what was /were the complication/s?

- ðv Fracture
- ðv Joint involvement
- ðv Angular deformity

10.If there is joint involvement what was the type of involvement?

- ðv Effusion
- ðv joint space narrowing
- ðv Ankylosis

11.If there is angular deformity, then what is type of deformity?

- ðv Varus type
- ðv Valgus type