

Study of Osteomyelitis in paediatric patients

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Abstract

Introduction: Osteomyelitis is defined as inflammation of bone. Though the main culprits are bacteria occasionally fungi may also be involved. Prognosis of untreated or delayed treatment onset osteomyelitis is often bad and leads to adverse outcomes. Very few cases of osteomyelitis are reported from India as compared to other infectious conditions. In this study we aim to study the number of patients, male: female ratio, type of osteomyelitis and the bacterial profile associated with osteomyelitis. **Methods:** After obtaining Institutional Ethics approval, the present study was conducted from 1st January 2016 - 31st December 2016 at KVG Medical College, Sullia. Blood and sample like fluid aspirate or discharge collected was subjected to microscopy and culture. Antibiotic susceptibility testing was done using disk diffusion methods. Radiological data of the patients was also collected. **Results:** Bacteria were isolated from 32 cases. The most affected age group was of 6-10 years of age (46.87%). Males were more affected as compared to females and male: female ratio was 3:1. Maximum number of patients were of acute osteomyelitis (87.5%) followed by subacute osteomyelitis (9.38%) and chronic osteomyelitis was found in just a single patient (3.12%). Long bones like tibia (56.25%), femur (18.75%), humerus (12.5%) were mostly affected. Blood culture was positive in 65.62% cases. *Methicillin Sensitive Staphylococcus Aureus (MSSA)* was the most common isolate (56.25%) followed by, *Methicillin Resistant Staphylococcus Aureus (MRSA)*, *Acinetobacter*, *Coagulase Negative Staphylococcus (CONS)*, *Streptococcus pyogenes*, *E.coli* and *Pseudomonas*. **Conclusion:** Thus, *S. aureus* was the most common cause of acute bacterial osteomyelitis and mostly affected school age group children.

Key words: Osteomyelitis, Staphylococcus aureus, Organism

Introduction

The term osteomyelitis refers to a broad group of diseases characterized by inflammation or infection of the bone and/or bone marrow [1]. Osteomyelitis was first described by Chassaignac in the year 1852. The word "osteomyelitis" is derived from the words osteon (meaning bone) and muelinos (meaning marrow) [2].

The pathophysiology behind this is the inoculation of metaphyseal vessels at the transition point of arteriolar vessels to the venous sinusoids slowing down the blood flow and increasing the vascular turbulence [3]. Osteomyelitis is mainly divided into 3 types: Acute, subacute and chronic type. Acute osteomyelitis presents

with < 2 weeks' duration, subacute osteomyelitis from 2 weeks- 3 months and chronic osteomyelitis is for > 3 months [4].

The causes of osteomyelitis may be secondary to a contiguous focus of infection after trauma, surgery, or insertion of a prosthetic joint; or secondary to a contiguous focus of infection associated with vascular insufficiency, primarily occurring in patients with diabetes mellitus and/or peripheral vascular disease and following hematogenous spread of infection, which is major mechanism for vertebral osteomyelitis and in children [5]. According to literature, *S. aureus*, *Enterobacter spp.*, *Streptococcus (group A and B)*, *Haemophilus influenzae* are most commonly involved causative agents in pediatric osteomyelitis [6]. Bacteria

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like *Mycobacterium*, *Bartonella*, *Coxiella*, *fungi* (*Histoplasma*, *Cryptococcus* and *Blastomyces*, *Candida*) are amongst rare causes of osteomyelitis and are seen in patients who are immunocompromised or who have the history of travel to an endemic area [7].

The common clinical features are fever, pain at the site of infection, reluctance and difficulty to use affected extremity. Less common clinical manifestations are anorexia, malaise and vomiting. Focal swelling, tenderness, warmth, and erythema are usually present on examination [8].

Drainage of purulent material may take place with fistula. Early diagnosis and prompt treatment leads to very less mortality (around zero) and the complication rate around 5% [9].

Aim

- 1) To study the number of patients of osteomyelitis in the given setting.
- 2) To study male: female ratio.
- 3) To study type of osteomyelitis.
- 4) To study the bacterial profile associated with osteomyelitis.

Results

In our 1 year duration, there were 32 cases presenting with signs and symptoms of osteomyelitis i.e. clinical osteomyelitis. We could isolate bacteria in all the cases.

Table-1: Age Distribution in cases of Osteomyelitis.

Age (Years)	Number (n=32)	Percentage (%)
0-5	9	28.13
6-10	15	46.87
10-15	8	25
Total	32	100%

Maximum number of cases (46.87%) were seen in 6-10 years’ age group.

Table-2: Sex distribution in patients presenting with Osteomyelitis.

Sex	Number (n=32)	Total Admissions	Incidence
Males	24 (75%)	2077 (52.72%)	1.15%
Females	8 (25%)	1862 (47.27)	0.42%
Total	32 (100%)	3939 (100%)	0.812%

Males were affected 3 times more as compared to females. Overall incidence was found to be 0.812%.

Material and Methods

The present study was conducted from 1st January 2016 - 31st December 2016 at KVG Medical College, Sullia. Institutional Ethics Committee approval was obtained. Pediatric patients coming with the complaints of fever, bone pain with clinical diagnosis of osteomyelitis were included in the study. Study was performed only with informed consent from the patients/legal guardian.

Patients were examined for signs like tenderness, oedema or warmth. X ray or computerized tomography (CT) scan of the patients was done and data was collected. Specimens like, discharge from that site or fluid by aspiration were collected depending on the case presentation.

Blood culture was done in all the patients. Samples were sent for Gram staining and culture. Culture was done on blood agar and MacConkey agar.

Conventional methods (biochemical tests) were used for bacterial identification. Antibiotic Susceptibility testing was performed using disk diffusion method. Treatment was decided and started based on the reports of Antibiotic susceptibility tests.

Table-3: Type of Osteomyelitis.

Type of osteomyelitis	Number(n=32)	Percentage (%)
Acute (< 2 weeks duration)	28	87.5
Sub-acute (2weeks-3 months)	3	9.38
Chronic (> 3 months)	1	3.12
Total	32	100%

Acute osteomyelitis was the most common type in our study (87.5%).

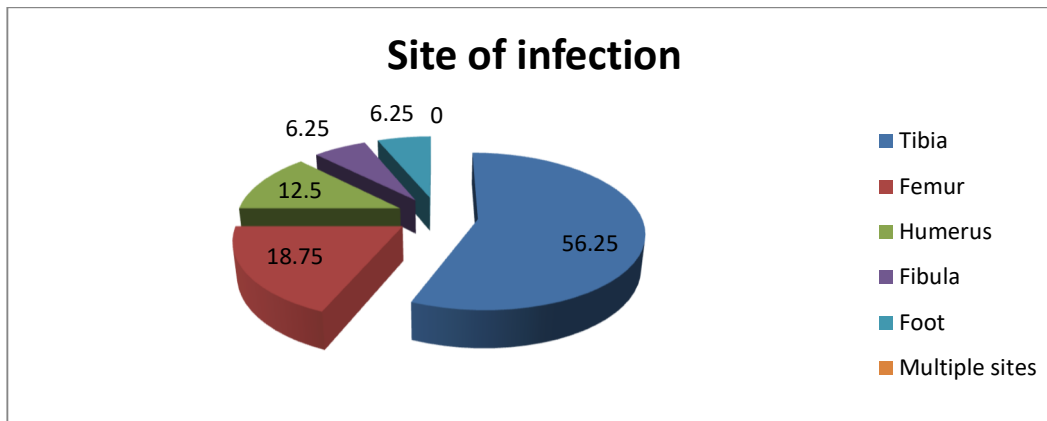


Figure-1: Site of Infection

Tibia was the most commonly affected (56.25%) site followed by femur (18.75%).

Table-4: Samples on Blood Culture.

Blood culture result	Number(n=32)	Percentage
Positive	21	65.62
Negative	11	34.38
Total	32	100%

Thus, 65.62% cases were positive by blood culture while 34.38% cases were negative.

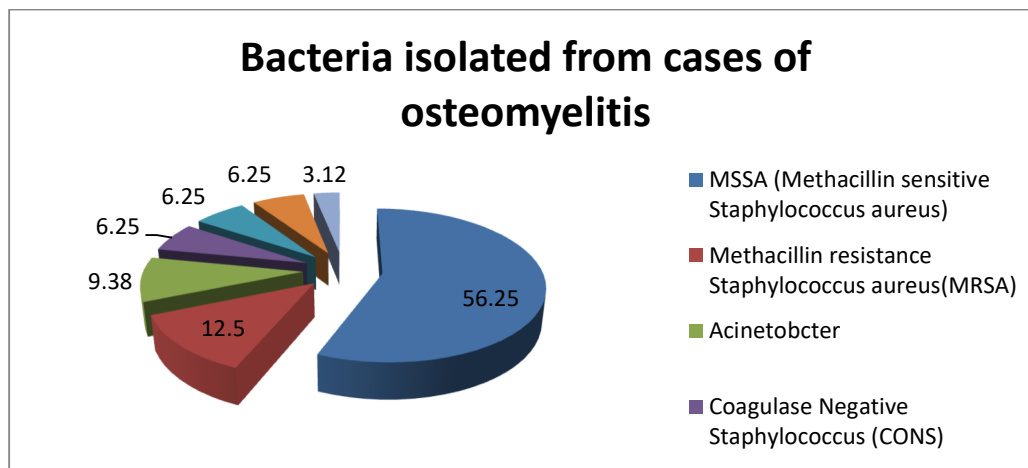


Figure-2: Bacteria isolated from cases of Osteomyelitis

MSSA was the most commonly isolated, in about 56.25% cases. *MRSA* was isolated in 12.5% cases, *Acinetobacter* in 9.38%, *CONS*, *S.pyogens* and *E.coli* were isolated in 6,25% each. *Pseudomonas* was isolated in 3.12%.

Discussion

In our study 6-10 years age group was the most affected (46.87%), as seen in table 1. This finding correlates well with the study of Puccini et al who found maximum number of cases in 6-14 years' age group (61.9%) cases [10]. This finding also correlate with Zaoutis et al, who studied children aged 2 months to 17 years and found detection rate of 42% in < 5 years and 58% for 6-17 years. As per results seen in table 2, males were more affected (75%) as compared to females (25%). Similar findings were seen in other studies [10] and reviews [11]. Our study reports an overall incidence of 0.812% pediatric osteomyelitis.

Cases of acute osteomyelitis (Table 3) were much more (87.5%) as compared to subacute (9.38%) and chronic osteomyelitis (3.12%). This may be due to the fact that in our study, 28.13% cases were of < 5 years and in this age group it is difficult to elicit pain as compared to older age group.

This brings the older pediatric age group (> 5 years) more quickly to hospital as compared to younger group. A western study mentioned that acute osteomyelitis is seen more commonly among children [12].

We found (Figure 1) tibia (56.25%), femur (18.75%) and humerus (12.5%) were more involved as compared to other bones. The reason for such a finding could be due the possibility of these bones being more prone to injury as compared to other bones. This finding correlates well with a similar study by Puccini et al [10]. Two cases of foot osteomyelitis found in our study had a history of trauma.

Blood culture was found to be positive in 65.52% cases (Table-4), which as per literature is able to detect around 50% cases [13]. Discharge from the site have more detection rate [10].

Like other studies also, *S.aureus* was most common isolate (68.75%) amongst cases (Figure 2). The reason is, *S.aureus* adheres to bone by expressing receptors (adhesins) for components of bone matrix (fibronectin, laminin, collagen and bone sialo glycoprotein); the expression of the collagen-binding adhesion permits the attachment of the pathogen to cartilage [5]. *Acinetobacter*, *E. coli* and *Pseudomonas* were the Gram-Negative bacteria that were isolated.

Conclusion

S.aureus was the most common cause of acute bacterial osteomyelitis and mostly affected school age group children.

List of Abbreviations

MSSA: Methicillin Sensitive Staphylococcus Aureus

MRSA: Methicillin Resistant Staphylococcus Aureus

CONS: Coagulase Negative Staphylococcus

S.pyogens: Streptococcus Pyogens

E. coli: Escherichia Coli

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