## "Study of Microbiological Profile of Osteomyelitis and Antibiotic Resistance Pattern of Bacterial Isolates with Special Reference to MDR Strains at A Tertiary Care Hospital Kanpur"

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### Abstract:

**Introduction:** Osteomyelitis is an inflammatory process that affects bone due to the contiguous infection, direct inoculation, or hematogenous spread of microorganisms. It is an infectious disease that is difficult to diagnose and treatment is complex because of its heterogeneity, path physiology, clinical presentation and management.

**Aim:** The study aimed to determine microbiological profile osteomyelitis and antibiotic resistance pattern of bacterial isolates with special reference to MDR strains.

**Material and Methods:** 100 samples from osteomyelitis cases were aerobically cultured and isolates from culture positives were identified by standard procedures. Antimicrobial susceptibility testing was done following CLSI guidelines 2020. Staphylococcal isolates were screened for methicillin resistance and Gram negative bacilli were screened for MDR production.

**Results:** Out of 100 samples,76% were culture positive and 24% were culture negative. Males were more affected than females. Staphylococcal spp. (53.9%) was predominant, E.coli (14.4%) and Klebsiella spp. (11.8%), Pseudomonas aeroginosa(9.2%), Proteus spp (5.2%), CONS (7.3%). Among the MDR strains of GPC-MRSA (7.3%). All the multidrug resistance Staphylococcal isolates were 100% sensitive for Vancomycin, Teicoplanin & Linezolid. Among the MDR strains of GNB ESBL were (73.5%), AmpC (17.6%) and MBL (2.9%) and they were 100% sensitive for Polymixin B and Colistin.

**Conclusion:** Since the culture positivity rate is high in our study we conclude that Antibiotic susceptibility pattern will help the clinician to choose appropriate drugs leading to successful treatment and prevention of emergence and dissemination of drug resistant isolates and we have to adhere to proper infection control measures.

Key Words: Osteomyelitis, MDR, MRSA, ESBL, MBL.

### Introduction

Osteomyelitis is the infection and inflammation of the bone. Inappropriate use of antibiotics and multidrug resistance has raised the morbidity and mortality rate in osteomyelitis [1]. Although bone cannot be normally colonized by bacteria events such as trauma, ischemia, surgery, the presence of foreign particles or prostheses placement may disturb the bone integration and eventually leading to the onset of bone infection. A long bone is the most common site for osteomyelitis [2]. Hematogenous spread after bacteremia can also result in osteomyelitis [3]. Osteomyelitis usually starts as an acute infection, but it may eventually turn into a chronic condition [4].

### **Material and Methods**

In this study, a total of 100 clinically diagnosed cases of osteomyelitis of all age group and both sex admitted in Orthopedic ward of RMCH & RC, Mandhana, Kanpur, from June 2020 to Dec 2020 were included with the written consent of patients. The inclusion criteria comprised of the aerobic bacteriological profile, while anaerobic bacteriological profile, mycobacterium and fungal profile were excluded in the study. Antimicrobial susceptibility testing was done following CLSI guidelines 2020[5]. Staphylococcal isolates was screened for methicillin resistance and Gram negative bacilli was screened for MDR production. The Samples collected were pus, sinus discharge and exudates. Two swabs for each specimen was collected aseptically. They were immediately processed in microbiology laboratory according to the standard operative procedure [6, 7]. The first swab was used for direct gram staining and for the presence of inflammatory cells and bacteria while second swab was inoculated on blood agar, Mac-conkey agar and nutrient agar [8] aerobically incubated overnight at 37°C. The isolated organisms were identified according to morphology in gram staining, colony characteristics and biochemical properties [8,7]. Antimicrobial susceptibility testing was done following CLSI guidelines 2020 [5].

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### Results

In our study out of 100 samples studied 76 (76%) were culture positive and 24(24%) were culture negative as shown in [Table 1 and Fig 1]. Males were more affected than the females. Majority of cases affected were found present in middle age group of 41-60 years. Staphylococcal spp. (53.9%) was predominant, E.coli (14.4%) and Klebsiella spp. (11.8%), Pseudomonas aeroginosa(9.2%), Proteus spp(5.2%), CONS (7.3%) as shown in [Table 2]. Among the MDR strains of GPC-MRSA (7.3%) as shown in [Table 3]. All the multidrug resistance Staphylococcal isolates were 100% sensitive for Vancomycin, Teicoplanin & Linezolid. Among the MDR strains of GNB, ESBL were (73.5%), AmpC (17.6%) and MBL (2.9%) as shown in [Table 3] and they were 100% sensitive for Polymixin B and Colistin.

# [Table/Fig-1]: Showed the culture positive and negative samples

No. Of	Positive	Negative
Samples	Cultures	Cultures
100	76	24



Table 2: Percentage of the isolated bacteria

Isolated organism(N=76)	Percentage (100%)
Staphylococcal spp	53.9%
E.coli	14.4%
Klebsiella spp	11.8%
Pseudomonas aeroginosa	9.2%
Proteus spp	5.2%
CONS	7.3%

#### Table 3: Percentage of MDR bacteria

MDR Bacteria	Percentage
MRSA	7.3%
ESBL	73.5%
AMPC	17.6%
MBL	2.9%

### Discussion

Chronic osteomyelitis is one of the most persistent diseases among most of the developing countries like India. In the present study of 100 samples studied, 76 (76%) were culture positive and 24( 24%) were culture negative which was similar to the study conducted by Khatoon et al [9]. Males were more affected than the females which correlate the study of Pandey A [10] and Peng at al [11] where males were affected more in number than females. Majority of cases affected were found present in middle 41-60 years age group which was similar to the study conducted by Pandey A in the year 2020 [10] and Mita et al [12]. Among the MDR strains of GPC-MRSA (7.3%). In our study Staphylococcal spp. (53.9%) was predominant, which was similar to the study conducted by Gopi et al [13]. This was then followed by E.coli (14.4%) and Klebsiella spp. (11.8%), Pseudomonas spp. (9.2%), Proteus (5.2%), CONS (7.3%) but in contrast with Mita et al. [12] where gram positive organism was (45.8%) less comparatively to gram negative organism (54.2%). All the multidrug resistance Staphylococcal isolates were 100% sensitive for Vancomycin, Teicoplanin & Linezolid. This study was correlating with Khatoon et al. [9] Mita et al. [12], Peng et al. [11] and also with study conducted by Suguneswari et al. [14]. Among the MDR strains of GNB ESBL (73.5%), Amp C (17.6%) and MBL (2.9%) and they were 100% sensitive for Polymixin B and Colistin. This study was similar to Khatoon et al. [9].

### Conclusion

Osteomyelitis continues to be a therapeutic challenge. It has been the major cause of morbidity since long time. The emerging multi drug resistant strain is a major .Even though concern for the treatment. Staphylococcus aureus has always remained the most common etiological agent of osteomyelitis, increasing infections due to Gram negative bacilli and even polymicrobial infections are gaining importance. MRSA infection is known to increase post-operative complications. Introduction of MBL or carbapenemase production in Gram negative bacilli is a matter of great concern.Timely knowledge of aetiology and antimicrobial resistance pattern of osteomyelitis isolates can help in rational use of antibiotics and control of drug resistance

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