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Research Article

**SENSITIVITY PATTERN AND FREQUENCY OF  
METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS IN  
CHRONIC SUPPURATIVE OTITIS MEDIA**

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**Abstract:**

**Aim:** To describe the incidence of MRSA and its sensitivity to various antibiotics in patients with chronic purulent otitis media.

**Place and Duration:** In the department of ENT, Services Hospital Lahore for one-year duration from January 2019 to January 2020.

**Material and methods:** This descriptive multi-center study was conducted at Departments of ENT. Patients with unilateral or bilateral active chronic suppurative otitis media attending the outpatient clinic were included in the study. Pus samples were collected from the discharging ears and sent to the Microbiology Department for culture and sensitivity studies. The smears were obtained using sterile cotton swabs, then incubated and identified. Drug susceptibility was determined by disc-diffusion method.

**Results:** From the clinical specimens of 250 patients enrolled in the study, microbiological culture was yielded from 208(83.2%) specimens. Out of total 250 cultured isolates, MRSA was isolated in 24/250(9.6%) cases. Drug sensitivities pattern showed that vancomycin had highest sensitivity 24/24(100%) while the organism showed complete resistance to augmentin, gentamicin, ceftriaxone.

**Conclusion:** MRSA was 100% sensitive to vancomycin while the organism showed complete resistance to aminoglycosides, penicillins, and cephalosporins.

**Conclusion:** Although MRSA was 100% sensitive to vancomycin, the body was fully resistant to aminoglycosides, penicillin and cephalosporins.

**Keywords:** purulent otitis media, culture and susceptibility, MRSA, vancomycin.

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**INTRODUCTION:**

Chronic purulent otitis media (CSOM) is characterized by irreversible inflammatory changes in the middle ear cavity and the mastoid process. Purulent otorrhea is a common symptom in patients with CSOM. CSOM patients often have chronic otitis media and mastoiditis; with permanent perforation of the tympanic membrane due to recurrent otorrhea. Typical microorganisms found in CSOM are *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus mirabilis*, *Klebsiella pneumoniae*, *Escherichia coli*, *Aspergillus* and *Candida*. Methicillin-resistant *Staphylococcus aureus* otorrhea (MRSA) was first identified as a problem that occurred more than 10 years ago. In 2000, Hartnick *et al.* During the 14-month period, he identified 8 otorrhea MRSA-related cases, which represent the occurrence of MRSA-induced otitis media in only 0.2% of their population. There was also a significant increase in the incidence of community-acquired MRSA, which was distinguished from hospital-acquired MRSA, with no established risk factors such as long-term hospitalization, long-term multi-drug or antibiotic therapy, and permanent catheter use. In the practice of ENT, the management of patients with the MRSA otorrhea has changed significantly over the past decade. Treatment of MRSA otorrhea from mild to moderate is not less aggressive, but less effective, as documented in a literature review. They found that healthy patients with mild (not feverish) or moderate (feverish) MRSA infections had previously managed well after oral treatment with trimethoprim and sulfamethoxazole along with gentamicin, polymyxin B-neomycin-hydrocortisone or topical antibiotics ofloxacin. For patients with moderate to severe infections (toxic, immunosuppressive or limb-threatening and in need of hospitalization),

vancomycin in combination with rifampicin or gentamycin was usually the first-choice antibiotic.

**TOOLS AND METHODS:**

This descriptive multi-center study was conducted at the department of ENT, Services Hospital Lahore for one year duration from January 2019 to January 2020. Patients with unilateral or bilateral active chronic suppurative otitis media attending the outpatient clinic were included in the study. Pus samples were collected from the discharging ears and sent to the Microbiology Department for culture and sensitivity studies. The smears were obtained using sterile cotton swabs, then incubated and identified. Drug susceptibility was determined by disc-diffusion method. Patients using topical or systemic antibiotics in the last 7 days were excluded from the study. Stains were then incubated on MacConkey, Blood, Chocolate and Sabouraud Dextrose agar and incubated aerobically at 37 ° C for 24-48 hours. Isolates were identified by colony morphology, Gram staining, catalase, coagulase, oxidase and biochemical strips. Antimicrobial susceptibility testing was performed on Mueller Hinton agar using a modified Kirby-Bauer disc diffusion method. Antibiotics tested are amikacin, gentamicin, ciprofloxacin, ceftazidime, cefipim, clindamycin, rifampin, trimethoprim-sulfamethoxazole and vancomycin. Data were analyzed using SPSS 18.0.

**RESULTS:**

Out of 250 swabs, 208 showed growth giving an isolation rate of 83.2%. MRSA was isolated in 24/250 (9.6%) cases. It was isolated in 66.70% (16/24) male and 33.30% (8/24) female patients respectively. The most commonly affected age group was 11-20 years 7/24 (29.15%) while the least affected age group was 51-60 years 01/24 (4.15%) (Table 1).

**Table.1 Age and Gender wise distribution of MRSA isolates among the CSOM patients n=24**

Age (Yrs)	Male	Female	Total
<10	3 (12.50%)	2(08.35%)	5(20.85%)
11-20	6 (25%)	1(04.15%)	7(29.15%)
21-30	2(08.35%)	3(12.50%)	5(20.85%)
31-40	2(08.35%)	0	2(08.35%)
41-50	3(12.50%)	1(04.15%)	4(16.65%)
>50	0	1(04.15%)	1(04.15%)
Total	16(66.70%)	8 (33.30%)	24 (100%)

The drug susceptibility pattern indicates that vancomycin has the highest susceptibility to MRSA 24/24 (100%), while it is fully resistant to augmentin, gentamycin, ceftazidime, cefepime (Table 2).

**Table 2: Sensitivity pattern of MRSA to various antibiotics in CSOM patients (n=24).**

Drugs	No. sensitive of isolates	%age
Amikacin	11	45.85
Augmentin	00	00.00
Ceftazidime	00	00.00
Ciprofloxacin	03	12.50
Gentamicin	00	00.00
Clindamycin	10	41.70
Vancomycin	24	100.00
Rifampicin	14	58.30
Cefipime	00	00.00
Trimethoprim-sulfamethoxazole	03	12.50

**DISCUSSION:**

In our study, the incidence of MRSA was 9.6% (24 out of 250). This finding is in line with the findings of Brook et al., Who reported 8% of MRSA cases in their study. However, unlike these reports, other studies from Korea and the US. The United States has reported a lower incidence of MRSA in chronic otitis media than ours; it is 9% (137/2773) and 3.9% respectively. Similarly, another local study found an MRSA incidence of 1.5% in patients with CSOM and lower than our results. On the other hand, Hwang et al. Reported higher incidence rates than all previously reported results from Taiwan and Korea, ie 12.2% (27/221) and 28.1% respectively. These reports increase the incidence of methicillin-resistant *S. aureus* (MRSA) in patients with chronic otorrhea in healthy patients, without infection and traditional risk factors such as long-term hospitalization. These results are consistent with reports from the literature. Most MRSA isolates were found in the adolescent group, as confirmed by other studies. This can be due to many reasons, because small children can show low resistance, and also because of the relatively short and straight Eustachian tube. In our study, MRSA susceptibility to antimicrobials revealed that 100% of the isolates are sensitive to vancomycin, as confirmed by other studies. However, cases of clinical failure associated with vancomycin have been reported, and doctors question vancomycin's superiority in the treatment of MRSA infections. These failures can be explained by the increase in the minimum bactericidal activity of vancomycin, poor tissue penetration and the minimum inhibitory concentration (MIC) known as MIC creep for MRSA. Currently, intravenous vancomycin hydrochloride remains the preferred drug for the treatment of patients infected with MRSA. However, intravenous (IV) administration of this drug requires constant monitoring of levels, and sometimes patients experience certain unacceptable side effects. Sensitivity to RIFampicin Park et al., Korea, where 90% of the ears with chronic discharge of MRSA

isolates are sensitive to rifampin. Because resistance develops rapidly during therapy, rifampicin is never used as monotherapy in the treatment of staph infections. However, it plays a role in terminating treatment of MRSA infection. In our study, MRSA showed relatively low sensitivity to amikacin (45.85) and full resistance to gentamycin. In contrast, only 14.8% and 4.4% of MRSA isolates were resistant to gentamycin. Another study reported high resistance to MRSA against aminoglycosides. MRSA sensitivity to quinolones has shown a global downward trend in recent years. In our study, 12.5% of MRSA isolates were sensitive to ciprofloxacin. Similarly, another study found a reduction in sensitive strains of MRSA isolates to fluoroquinolones (8.8%). Madana and co-workers reported high antibacterial activity of fluoroquinolones (84%) against MRSA isolates. The tendency to reduce sensitivity may be due to a variety of factors, including harmful use, insufficient dosage and easy availability, and the development of the enzyme's resistance to quinolones. Clindamycin is a lincosamide antibiotic that binds to the 50S ribosome subunit, inhibiting bacterial protein synthesis. In our study, 41.7% of MRSA isolates were sensitive to clindamycin. Contrary to our results, however, another study found that only 8.8% of sensitive MRSA strains were isolated in chronic discharged ears. Cephalosporins are the most commonly prescribed class of antibiotics, and the third generation has an extended gram-negative spectrum. They are also used to treat MRSA infections. None of the MRSA isolates were susceptible to ceftazidime in our study, which can be compared with another study. Trimethoprim-sulfamethoxazole is a sulfonamide antibiotic that interferes with the synthesis of bacterial folic acid, inhibiting the formation of dihydrofolic acid from para-aminobenzoic acid and inhibiting the reduction of dihydrofolic acid to tetrahydrofolate. In this study, MRSA isolates are resistant to trimethoprim-sulfamethoxazole (77.5%). However, contrary to our results, other studies have documented that MRSA

isolates in chronic discharging ears are highly susceptible to trimethoprim-sulfamethoxazole, i.e. 100% and 84.3%, respectively.

### CONCLUSION:

While MRSA was 100% sensitive to vancomycin, the body was fully resistant to aminoglycosides, penicillin and cephalosporins.

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