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Original Research Article

Bacterial etiology of otitis media and their antibiogram among patients attending tertiary care hospital

Ashish Sharma[1]*, Nagababu Pyadala[2]

[1]Department of ENT, MNR Medical College and Hospital, Sangareddy, Telangana, India
[2]Department of Biochemistry, MNR Medical College and Hospital, Sangareddy, Telangana, India

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***Correspondence:**
Dr. Ashish Sharma,
E-mail: afg3392@gmail.com

ABSTRACT

Background: Otitis media is one of the common infection prevalent worldwide. Chronic ear infection in older children can cause hearing loss which leads difficulty in communication, learning and social adjustment. It can result to severe disability, death due to central nervous system disorder in developing countries. Hence, the present study aimed to determine the bacteriological profile and its antibiogram of ear infection.
Methods: This study conducted in ENT department of MNR Medical College and Hospital during the period of October 2019 to January 2020.
Results: A total of 120 patients were included in this study. Among the total, 70 were adult (58.3%), age group ranges between 20-55 years and 50 were children (41.6%). Bacterial isolates from ear swab included; *Staphylococcus aureus* 28, *Pseudomonas* 19, *Klebsiella spp* 15, *Proteus spp* 10, *Escherichiae coli* 7, *Enterobacter spp* 4 and *Citrobacter spp* 2. Overall bacteria mostly sensitive to drugs like pipercillin tazobactum (85%), amikacin (90%) and gentamycin (90.2%). Other than these drugs ampicillin (90.1%), cefazolin (90%), cefuroxime (89.4%), ceftriaxone (81%), oxacillin (83.4%), penicillin (88.2%) showed highly resistant to bacterial isolates.
Conclusions: Therefore, it is clear from this study that, most of the prescribed drugs were resistant to bacteria isolated from ear infection. Hence it is mandatory to include culture and sensitivity report to manage the cases of otitis media.

Keywords: Antibiotic sensitivity testing, Bacterial isolates, Otitis media

INTRODUCTION

Otitis media is a common infection of mastoid process and middle ear, which can leads to acute purulent otitis media and chronic suppurative otitis media.[1-2] Among children acute otitis media is most common infection in the ear and leads to more use of antibiotics.[2-8] The chronic suppurative otitis media is a chronic infection of mastoid process and the middle ear which causes perforation of tympanic membrane and ear discharge for at least 2 weeks.[3,9-12] The global data showed 65-300 million people suffered from otitis media, among them 60% patients suffering from hearing loss.[4,11] Geographically the causative agent of otitis media varies, but in acute infection most common bacteria are such as, *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Hemophilus influenza*.[8,13-16] In case of chronic infection organisms are such as, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Escherichiae coli* and *Pseudomonas aeruginosa*.[9,16,17] Different geographical distributions, clinical practices and prevalent of resistant bacteria strains results varies in antimicrobial sensitivity profile.[1,3,9] Therefore this study aimed to find out the bacterial profile and their antibiotic sensitivity pattern in patients suffering from otitis media.

METHODS

This study was a cross-sectional study conducted in MNR Medical College and Hospital, ENT department during

the period from October 2019 to January 2020. A total of 120 patients attending ENT clinic were involved in this study.

This study was approved by institutional ethical committee. All the specimens were collected according to the standard operating procedure. The detailed consent form was taken from participants, except from children, which was collected from parents. A sterile wooden swab was used to collect the throat swab from posterior pharyngeal wall and sent it immediately to microbiology laboratory. Before collecting the throat swab, total procedure was described to the participants. Specimen culture and sensitivity was performed as per the standard microbiological protocol.[14,18] All the throat swab was cultured in blood agar and MacConkey agar media and incubated at 37ºC temperature overnight aerobically and anaerobically. Antibiotic sensitivity testing was done according to Kirby Bauer disc diffusion method and zone diameter was collected to interpret the sensitivity pattern.[14,18]

Statistical analysis

All the data were analyzed by SPSS 20.0 statistical analysis software.

RESULTS

A total of 120 patients were included in this study. Among the total, 70 were adult (58.3%), age group ranges between 20-55 years and 50 were children (41.6%). Among 120 cases 71 (59.1%) were ear swab culture positive. Among all cases acute ear infection was present in 34 (28.33%) cases and 47 (39.1%) cases were chronic infection. Bacterial isolates from ear swab was included; *Staphylococcus aureus* 28 (23.3%), *Pseudomonas* 19 (16%), *Klebsiella spp* 15 (12.5%), *Proteus spp* 10 (8.3%), *Escherichiae coli* 7 (5.8%), *Enterobacter spp* 4 (3.3%), *Citrobacter spp* 2 (1.7%) and *Streptococcus pneumoniae* 3 (2.5%) (Table 1).

Table 1: Prevalence of bacterial isolates from otitis media patients.

Organism	Acute ear infection (%)	Chronic ear infection (%)	Total (%)
Staphylococcus aureus	12 (10)	16 (13.3)	28 (23.3)
Streptococcus pneumoniae	03 (2.5)	00 (0)	03 (2.5)
Pseudomonas aeruginosa	07 (5.8)	12 (10)	19 (15.83)
Klebsiella spp	06 (5)	09 (7.5)	15 (12.5)
Proteus spp	03 (2.5)	07 (5.8)	10 (8.3)
Esch. coli	01 (0.8)	06 (5)	07 (5.8)
Enterobacter spp	02 (1.6)	02 (1.6)	04 (3.3)
Citrobacter spp	01 (0.8)	01 (0.8)	02 (1.7)
Total	35 (29.16)	53 (44.16)	88 (73.3)

Table 2: Overall sensitivity pattern of bacterial isolates from ear infection patients.

Antibiotics	Sensitive (%)	Resistance (%)
Ampicillin	9.9	90.1
Amoxyclav	24	76
Vancomycin	94	6
Linezolid	79	21
Amikacin	90	10
Gentamicin	90.2	9.8
Piperacillin-tazobactum	85	15
Ceftriaxone	19	81
Cefazolin	10	90
Cefuroxime	9.6	89.4
Ceftazidime	16	84
Penicillin	11.8	88.2
Oxacillin	6	94
Chloramphenicol	64	36
Tetracycline	46	54

Overall bacteria mostly sensitive to drugs like piperacillin tazobactum (85%), amikacin (90%) and gentamicin (90.2%). Other than these drugs ampicillin (90.1%), Cefazolin (90%), Cefuroxime (89.4%), Ceftriaxone (81%), Oxacillin (83.4%), Penicillin (88.2%) showed highly resistant to bacterial isolates (Table 2).

DISCUSSION

Ear infection is the worldwide problem for all age group. The problem of ear infection is rising day by day. The Otitis media is more common in children than adults.[1-3] The younger children are more susceptible to otitis media due to their weaker immune status and frequent exposure to upper respiratory infection.[6,7] In this present study it was revealed that gram negative bacterial infection was more common than gram positive bacterial infection. Similar result was reported from Ethiopia.[1] *Staphylococcus aureus* was the most predominant isolates among all; 28 (23.3%) followed by *Pseudomonas* 19 (16%), *Klebsiella spp* 15 (12.5%), *Proteus spp* 10 (8.3%), *Escherichiae coli* 7 (5.8%), *Enterobacter spp* 4 (3.3%), *Citrobacter spp* 2 (1.7%) and *Streptococcus pneumoniae* 3 (2.5%). This study findings were supported by other study done by Akinjogunla et al.[1,2] It may be due to the various geographical distribution in various countries. Bacterial colonization of otitis media strongly depends on temperature, if rise in temperature, the isolation of bacteria will be more.[9] In recent scenario patients flow was increased in ENT department. Therefore, perfect knowledge of bacteria and their antibiotic sensitivity pattern is most important to manage the ear related bacterial infection. Hence, the present study focused on common bacterial isolates from ear infection and their antibiotic sensitivity pattern. Based on Table 2, the overall sensitivity pattern of antibiotics was as such; pipercillin tazobactum (85%), amikacin (90%) and gentamicin (90.2%) were mostly sensitive. Other than these drugs ampicillin (90.1%), cefazolin (90%), cefuroxime (89.4%), ceftriaxone (81%), oxacillin (83.4%), penicillin (88.2%) showed highly resistant to bacterial isolates. This study results were comparable with study done by Ferede et al.[3] But the chloramphenicol and tetracycline showed different pattern may be due to the emergence of resistance strains in this area. This study reported *Staphylococcus aureus* showed highly sensitive to vancomycin, amikacin, gentamicin, linezolid, also same organism also showed resistance to cefotaxime, ceftriaxone, ceftazidime, penicillin, oxacillin drugs. *Pseudomonas aeruginosa* also reported sensitive to amikacin, gentamicin, and it reported resistant to ceftriaxone, ceftazidime. Similar findings were reported by Abera et al and Worku et al.[1,19] Therefore according to the present study it is clear that almost all isolates were resistant to single or multiple drugs. The higher rate of multidrug resistance may be due to the miss use of antibiotics.

CONCLUSION

Therefore, in this study authors found *Staphylococcus aureus*, *Enterobacteriaceae* group and *Pseudomonas aeruginosa* were common isolates in otitis media in children and adult. Most of these isolates were resistant to commonly used drugs. Therefore, culture and antibiotic sensitivity report of ear infection cases are most important for appropriate management of otitis media.

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