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CHANGING MICROBIOLOGICAL TRENDS IN CASES OF CHRONIC SUPPURATIVE OTITIS MEDIA PATIENTS

Bansal Sulabh, Ojha Tarun, Kumar Suresh, Singhal Amit, Vyas Pratibha

Department of Otorhinolaryngology, Mahatma Gandhi Medical College and Hospital, Jaipur, Rajasthan, India

E-mail of Corresponding Author: sulabhbansal17@gmail.com

ABSTRACT

Background: Chronic Suppurative Otitis Media (CSOM) is a common infectious chronic ear disease in India. The present study was aimed to identify bacterial isolates associated with CSOM and their Antibigram in patients attending ENT OPD of Mahatma Gandhi Medical College & Hospital, Jaipur.

Materials and Methods: Samples were taken from 190 patients (both male and female) in all age groups during the period of Jan 2012 to June 2012 suffering from CSOM and having active ear discharge. Their Gram staining, Direct microscopy with KOH, Culture sensitivity, and Biochemical tests were carried out to identify the organisms and to know their sensitivity pattern. Drug susceptibility testing was conducted using a modified Kirby Bauer disk diffusion method.

Results: The most common causal organisms isolated were *Pseudomonas aeruginosa* 80 (45.9%) followed by *Staphylococcus aureus* 46 (26.4%) amongst the 167 (87.9%) bacterial isolates (including 10 isolates of MRSA). Fungi accounted for 7 (3.7%) of the isolates while 16 (8.4%) were culture negative isolates. The antimicrobial profile of the major isolates i.e. *Pseudomonas* and *Staph. Aureus* revealed maximum sensitivity to Piperacillin / Tazobactam against 90% isolates.

Conclusion: *Pseudomonas aeruginosa* is the most common isolate followed by *Staphylococcus aureus*. Both of these are sensitive to Piperacillin / Tazobactam. The study of microbial pattern and their antibiotic sensitivity determines the prevalent bacterial organisms causing CSOM in local area and to start empirical and more targeted treatment of otitis media and its complications for successful outcome, thus to prevent the emergence of resistant strains.

Keywords: Chronic Suppurative Otitis Media, Ear Discharge, Methicillin – resistant *Staphylococcus aureus*, Microbiology, Sensitivity.

INTRODUCTION

Otitis Media is an inflammation of the middle ear cleft irrespective of etiology and pathogenesis. Sources of infection in Otitis Media is mainly dependent on the route by which the infection reaches the middle ear and the chief route by which this occurs is the Eustachian Tube. (1) Causes in such cases is nasopharyngeal disease and in children it is usually the adenoids. The causative infection may be in the nose, paranasal sinuses, or in the oropharynx. (2)

Chronic Suppurative Otitis Media (CSOM) is a persistent disease of middle ear, which is capable of causing severe destruction and sequelae with manifestation of Deafness, Discharge and Perforation. (3) Disease is more common in children belonging to lower socioeconomic group. (3) Most common organism found in CSOM are *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus mirabilis*, *Klebsiella pneumoniae*, *E. coli*, *Aspergillus* sps. and *Candida*. (4) The disease is mainly classified into two types: Mucosal and Squamous type depending upon whether the disease process

affects the Pars tensa or the Pars flaccida of the tympanic membrane.(5)

However, due to increased and irrational use of wide-spectrum antibiotics, the resistance in the bacterial isolates has become very common along with emergence of multiple strains of bacteria. (6) Changes in the Microbiological flora following the use of sophisticated synthetic Antibiotics have increased the relevance of the reappraisal of the modern day flora in CSOM and their in vitro antibiotic sensitivity pattern is very important for the clinician to plan a general outline of Treatment. (7)

The present series deals with study of the Bacterial flora in cases of CSOM who attended the ENT Department OPD with complaints of chronically discharging ear.

MATERIAL METHODS

The study was carried out at ENT Outdoors of Mahatma Gandhi Medical College and Hospital, Jaipur from Jan 2012 to June 2012. A total of 190 patients of all age groups and both genders were included. Only those were selected who had not taken any treatment either systemic or local in the form of eardrops for the last seven days. The ear discharge from each diseased ear taken on a sterile swab in ENT OPD and sent to the Microbiology Department for their Gram staining, Direct microscopy with KOH, Culture sensitivity, and Culture Sensitivity testing. Swabs were taken from the deeper part of External Auditory Canal were inoculated on MacConkey's, Blood, Chocolate and Sabouraud's Dextrose agar and incubated aerobically at 37 degree for 24-48 hrs. Antimicrobial susceptibility testing was performed on Muller Hilton agar using the modified Kirby Bauer disc diffusion method. The antibiotics tested were: Amikacin, Gentamycin, Ciprofloxacin, Ceftazidime, Ceftriaxone, Imipenem, Augmentin (Amoxicillin/Clavulanic Acid), Tazocin (Tazobactam/Piperacillin), Levofloxacin, Vancomycin.

RESULTS

The study included 190 patients in the Age ranged from 6 month to 80 Years, with Peak age group being 15-30 years was noted in 108 cases (56.84 %).(Table 1) The male and female distribution was 62.1 % and 37.9 % respectively .Out of the 190 swabs, 174 showed growth giving an Isolation Rate of 91.6 %. The analysis by sex and age did not show a predominance of any particular group of patients related to any aetiological agents. Result of sensitivity pattern of organisms isolated from Chronic Suppurative Otitis Media patients are shown in table no 2. TaZobactum / Piperacillin-TZ (80%), Levofloxacin - LEV (73.1%) and Ceftazidime - CAZ (72.9 %) showed maximum activity to most of isolated organisms.

In 190 patients, mild Degree of hearing loss were found in 71 (37.%) patients, moderate Degree of hearing loss in 86 patients (45.2 %), while in 33 patients (45.7 %) sever to profound of hearing loss were observed.(Table 3).

DISCUSSION

Chronic Suppurative Otitis Media (CSOM) is a major public-health problem, and India is one of the countries with high-prevalence where urgent attention is needed.(8) The otologist and paediatrician are commonly observing CSOM and its various complications such as facial palsy, unalterable local destruction of middle ear structures, serious intracranial and extracranial complications. (8) Early diagnosis of etiological microbes can avoid these complications, however it also facilitate rapid and successful treatment.

High prevalence of culture positive cases of CSOM (91.18%) was seen in the present study. We found that the CSOM was more prevalent in first and second decade of life and accounted for 51% of the cases. This finding agrees well with the observations made by other researchers. (9,10) Children are more prone to upper respiratory tract infections (URTIs). Furthermore, cold weather pre-disposes children to URTI. Both of these two

reasons contribute well to high-prevalence of CSOM in children. (11)

The male to female ratio was found to be 1.2:1. Cases of CSOM were more common in females than in males. This study was comparable with the outcome of few authors (10,12) and in difference with other researchers. (13)

Pseudomonas aeruginosa the most common isolate (45.9%) in our study was 100% sensitive to Tazocin (Tazobactam/Piperacillin), 92 % to Imipenem and 88.7% to Levofloxacin. *P. aeruginosa* resistance against Quinolones may be due to irrational use, wrong dosage, easy accessibility and developing enzymatic resistance of organism against Quinolones. (14) Similar differences have been noted in literature regarding activity of Aminoglycosides against *P. aeruginosa*. (14) *Pseudomonas*, however, is the predominant cause of CSOM in tropical region does not usually inhabit the upper respiratory tract, its presence in the middle-ear cannot be ascribed to an invasion through Eustachian Tube. (15) other researches from India, (9) and Pakistan (10) demonstrated similar trends as *Pseudomonas* was the most prevalent organism and this could be due to regional and effect of climatic difference may results the variation in micro-organisms.

Staphylococcus aureus (other than MRSA) the second most common isolate (20.6 %) in our study was 100% sensitive to Tazocin (Tazobactam/Piperacillin), 72.2% to Levofloxacin and 52% to Amikacin. The susceptibility pattern of *Staphylococcus aureus* found in our study against most of the antibiotics is almost consistent with the one reported in few other local studies this observation was in line with diversity of microbial flora of CSOM infection in colder regions as reported in studies by Ettehad, *et al.* (16) from Iran (31.15%) and Singh, *et al.* (17) from India (36%).

Coliforms including *Proteus* and *Escherichia coli* were isolated from 8.0% and 6.8% cases respectively, and these findings were tandem to

the reports by Mansoor, *et al.* (10) who reported the same to be 8% and 4% .

The most commonly found fungi in CSOM are *Candida* species and *Aspergillus* species. (18) In the present study, fungal etiology was found in 7 (12.25%) cases. In a study from Haryana, India, fungal etiology was found in 15% of cases. (19) Fungal infections of the middle-ear are common as fungi thrive well in moist pus.

Antimicrobial susceptibility test (AST) was carried out for all the aerobic isolates (except for 10 isolates of Diptheroids). AK was found to be most effective drug followed by CAX, GEN and ciprofloxacin (CIP). These findings were parallel to the reports by other authors. (10,19,20) For the antibiotics commonly available as topical ear drops, GEN, and CIP showed good activity for most of the commonly isolated organism and can be used as effective first line topical antibiotic in the treatment of CSOM. Studies have revealed that quinolones like CIP are safe and effective particularly against *S. aureus* and *Pseudomonas aeruginosa*. (21,22)

Isolation of various aerobic, anaerobic, and fungal isolates shows that different conditions of CSOM could be differentiated on microbiological grounds. Thus, for better management of CSOM, microbial classification of infection as well as drug sensitivity test of organism recovered are essential for making appropriate decision of antimicrobials that will effectively eradicate the pathogen.

CONCLUSION

Pseudomonas aeruginosa is the most common isolate followed by *Staphylococcus aureus* from the culture specimens of Chronic Otitis Media. Both of these are sensitive to Tazobactam/Piperacillin, except MRSA. *Pseudomonas aeruginosa* was 100% sensitive to Tazobactam/Piperacillin combination. *Pseudomonas* is increasingly becoming more resistant to the common drugs like Quinolones. Vancomycin is 100% effective against MRSA.

Therefore, evaluation of microbiological pattern and their Antibiotic Sensitivity pattern in local area become helpful in prescribing empirical antibiotics for successful treatment of Otitis Media and thus minimizing its complications and emergence of resistance strains.

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Table 1: Age ranged from 6 month to 80 Years, with Peak age group being 11-30 years

S.No.	Age in Year	No of cases	No. of Positive cases(bacterial & fungal)
1.	<1	1	1
2.	1-10	19	17
3.	11-20	70	60
4.	21-30	60	48
5.	31-40	20	16
6.	41-50	6	4
7.	51-60	6	4
8.	61-70	4	2
9.	71-80	4	2

Table 2: Sensitivity pattern of organisms isolated from Chronic Suppurative Otitis Media patients

Type of organism	Total No. (%)	AK (%)	CAZ (%)	CT (%)	CP (%)	GM (%)	IM (%)	LEV (%)	TZ (%)	AUG (%)	VM (%)
P. aeruginosa	80 (45.9)	64 (70)	70 (83.3)	44 (52)	62 (73.8)	42 (50)	74 (92.5)	71 (88.7)	80 (100)	-	-
S. aureus	36 (20.6)	20 (52.5)	36 (100)	36 (100)	26 (72.2)	20 (52.5)	36 (100)	26 (72.2)	36 (100)	36 (100)	36 (100)
MRSA	10 (5.7)	5 (50)	0	0	2 (20)	0	0	0	0	0	10 (100)
Proteus species	14 (8.0)	12 (75)	10 (62.5)	11 (68.75)	8 (50)	0	12 (75)	10 (71.4)	14 (87.5)	9 (56.3)	-
E.Coli	12 (6.8)	10 (83.3)	8 (66.5)	6 (50)	1 (8.3)	6 (50)	10 (83.3)	9 (75)	8 (66.5)	4 (33.3)	-
Citrobacter sp.	5 (2.8)	5 (83.3)	2 (50)	2 (50)	5 (83.3)	4 (66.5)	2 (50)	5 (100)	2	0	-
K. Pneumoniae	4 (2.2)	2 (50)	1 (25)	3 (75)	1 (25)	1 (25)	2 (50)	4 (100)	3 (75)	1 (25)	-
Cornybacterium sp.	3 (1.7)	2 (66.6)	2 (66.6)	1 (33.3)	2 (66.6)	1 (33.3)	0	2 (66.6)	0	1 (33.3)	3 (100)
Citrobacter sp.	3 (1.7)	3 (100)	2 (66.6)	2 (66.6)	3 (100)	2 (66.6)	3 (100)	2 (66.6)	3 (100)	2 (66.6)	-
Fungi	7 (3.7)	-	-	-	-	-	-	-	-	-	-
Total	174 (100)	123 (70.6)	127 (72.9)	98 (56.3)	111 (63)	76 (43.7)	135 (71)	139 (73.1)	146 (80)	53 (48.1)	49 (28)

AK- Amikacin, CAZ-Ceftazidime, CT – Ceftriaxone, CP – Ciprofloxacin, GM- Gentamicin, IM- Imipenem, VM- Vancomycin, TZ – TaZobactum/Piperacillin, LEV – Levofloxacin, AUG- Augmentin

Table 3: Showing Degree of hearing loss in patients affected from CSOM

Degree of hearing loss	No of affected patients	% of affected patients
Mild (26 -40db)	71	37 %
Moderate (41-55db)	86	45.2 %
Severe (56-91db)	27	14.2 %
Profound (91 db)	6	3.15%