

Original Research Article

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Prevalence and Antibiotic Sensitivity of *Pseudomonas aeruginosa* Isolated from CSOM in NMCH, Patna, India

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ABSTRACT

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 Microbiology department of Nalanda Medical College & Hospital, Patna. Samples were taken from 150 patients (both male and female) in all age groups during the period of Dec 2015 to March 2017 suffering from CSOM and having active ear discharge. Total 103 patients were found to be culture positive from the 150 known case of CSOM. Their Gram staining, direct microscopy, 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. The most common causal organisms isolated were *Pseudomonas aeruginosa* 35(33.98%) followed by *Staphylococcus aureus* 29 (28.15%). The antimicrobial profile of the major isolates i.e. *Pseudomonas aeruginosa* and *Staph. aureus* revealed maximum sensitivity to Piperacillin / Tazobactam against 100% and 93.1% isolates respectively. *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
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Introduction

Chronic suppurative otitis media (CSOM) is a prevailing and notorious infection in developing countries causing serious local damage and threatening complications. It is characterised by painless discharge from ears dating from months to years and is the single major cause of deafness in India. It is common amongst children of low socio economic strata (Mymen, 2005). The introduction of antibiotics has reduced the incidence of intra cranial complications in

otitis media. Early and effective treatment based on the knowledge of causing microorganisms and their sensitivity results in good clinical recovery and prevents damage and complications. *Pseudomonas aeruginosa* was the most common pathogen among the cases of CSOM reported by several workers in India and abroad with an incidence ranging from 21% to 52.94% (Gulati *et al.*, 1969; Brook *et al.*, 1979; Ayyagiri *et al.*, 1981;

Maninder *et al.*, 1985; Atanu *et al.*, 1991). Hence, in this study an effort has been made to:

Identify the most common bacterial etiology of CSOM.

Determine the antibiogram of the *Pseudomonas aeruginosa*

Materials and Methods

This was a retrospective study conducted at Nalanda Medical College and Hospital, Patna from Dec 2015 to March 2017. Ear discharge were collected from them under strict aseptic precautions using two sterile cotton swabs with the assist of aural speculum and processed immediately in the microbiology laboratory.

The first swab was used for direct Gram stain and the second swab was cultured in nutrient agar, blood agar and MacConkey agar plates and incubated at 37°C for 24-48 hrs. The colonies of *P. aeruginosa* were identified by colony morphology, pigment production, characteristic musty or earthy odour (Collee *et al.*, 1996).

The identification was confirmed by motility and biochemical tests, which included fermentation of sugars, oxidation fermentation, indole production, nitrate reduction, oxidase, and catalase test.

Antimicrobial susceptibility testing was done by Kirby-Bauer's disc diffusion method, according to the guidelines of Clinical and Laboratory Standards Institute (CLSI) (Bailey and Scotts, 1990).

The following anti-microbials were used- Tazobactam/Piperacillin (100 mcg), Gentamicin (10 mcg), Amikacin (30 mcg), Ciprofloxacin (5mcg), Ceftriaxone (30 mcg),

Ceftazidime (30 mcg), Levofloxacin (5 mcg) and Imipenem (10 mcg) (Hi Media, Mumbai). *P. aeruginosa* ATCC 27853 was used as the control strain.

Results and Discussion

A total of 150 patients were selected for the study, Out of the 150 swabs, 103 showed growth giving an Isolation Rate of 68.66%. A total of 150 bacterial isolates were studied from Dec 2015 to March 2017. The study included patients in the Age ranged from 6 month to 80 Years, with Peak age group being 11-30 years was noted in 66 cases (54.36%) (Table 1). The male and female distribution was 58.32 % and 41.68 % respectively.

Pseudomonas aeruginosa (33.98%) was the most common bacterial agent found in chronic discharging ear, followed by *Staphylococcus aureus* (28.15%), CONS (13.59%), *Klebsiella* (7.76%) and *E. coli* (4.85%) Antibiotic susceptibility was tested by Minimum inhibitory concentration (MIC) method using Mueller-Hinton agar. Sensitivity pattern of

Pseudomonas aeruginosa showed that Tazobactam/Piperacillin was active against 100% of isolates followed by Imipenem 91.4%, Levofloxacin 85%, Ceftazidime, Amikacin and Ciprofloxacin (Table 2).

Knowledge of local bacteriological profile is important for empirical of CSOM. Untreated cases of CSOM may result in a broad range of intracranial and extra-cranial complications. In the present study most common age group affected was 11-30 years (Table 1). This finding is similar to other studies (Wikler, 2006; Shyamala *et al.*, 2012; Wariso *et al.*, 2006). In the study males were more affected than females. Some studies have found male preponderance (Prakash *et al.*, 2013) while others have found female preponderance

(Teele *et al.*, 1989). This difference might be due to local demographic characteristics. Microbial growth was seen in 68.66% of the cases, 31.34% cases were sterile. Other studies have reported sterile cases ranging between 3% to 16.9% (Ahmed *et al.*, 1999; Loy *et al.*, 2002; Chakraborty *et al.*, 2005).

Pseudomonas aeruginosa was the most common organism isolated followed by *Staphylococcus aureus*.

Other studies have reported varying prevalence between these two organisms. Some studies have reported *Staphylococcus aureus* as the most common organism (Vijaya, 2000; Kumar *et al.*, 2008), other studies have reported *Pseudomonas aeruginosa* as the most common organism (Malkappa *et al.*, 2012; Gaur *et al.*, 2013; Taneja *et al.*, 2009). This finding suggests that microbial pattern differs with time and geographical location.

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 positive cases
1.	<1	0
2.	1-10	12
3.	11-20	36
4.	21-30	30
5.	31-40	11
6.	41-50	7
7.	51-60	4
8.	61-70	3
9.	71-80	0

Table.2 Sensitivity pattern of organism isolated from CSOM Patients

Type of organism	Total No. (%)	AK (%)	CAZ (%)	CT (%)	CP (%)	GM (%)	IM (%)	LEV (%)	TZ (%)
<i>P. aeruginosa</i>	35 (33.9)	23 (65.7)	29 (82.8)	18 (51.4)	25 (71.4)	16 (45.7)	32 (91.4)	31 (88.5)	35 (100)
<i>S. aureus</i>	29 (28.1)	17 (58.5)	26 (89.6)	24 (82.7)	22 (75.8)	18 (62.1)	22 (75.8)	24 (82.7)	27 (93.1)
CONS	14 (13.5)	7 (50)	2 (14.2)	2 (14.2)	3 (21.4)	0	2 (14.2)	2 (14.2)	3 (21.4)
<i>Proteus species</i>	4 (3.8)	3 (75)	3 (75)	3 (75)	2 (50)	0	3 (75)	2 (50)	3 (75)
<i>E.coli</i>	5 (4.8)	4 (80)	3 (60)	3 (60)	1 (20)	3 (60)	4 (80)	4 (80)	3 (60)
<i>Strep. pneumoniae</i>	8 (7.7)	7 (87.5)	4 (50)	4 (50)	7 (87.5)	4 (50)	4 (50)	7 (87.5)	7 (87.5)
<i>K. pneumoniae</i>	8 (7.7)	4 (50)	2 (25)	6 (75)	2 (25)	2 (25)	4 (50)	7 (87.5)	6 (75)
Total	103 (100)								

AK-Amikacin, CAZ-Ceftazidime, CT-Ceftriaxone, CP-Ciprofloxacin, GM-Gentamicin, IM-Imipenem, LEV-Levofloxacin, TZ-Tazobactum/Piperacillin

P. aeruginosa showed highest resistance to Gentamicin and Ceftriaxone and least resistance with Tazobactam/Piperacillin and Imipenem (Table 2). Other authors have reported sensitivity of 45% to 87% with Aminoglycosides (Indudharan *et al.*, 1999; Kumar *et al.*, 2012). Sensitivity to Quinolone antibiotic was 71.4% with Ciprofloxacin and 88.5% with Levofloxacin. Other studies have reported sensitivity to Quinolones ranging from 61% to 90%. Sensitivity to third generation Cephalosporins ranged from 50% to 70%. This finding is in agreement with other studies (Ahmed *et al.*, 1999; Loy *et al.*, 2002; Chakraborty *et al.*, 2005). Among all the organisms, *Pseudomonas aeruginosa* is prone to cause a problem in therapeutic control of CSOM (Taneja *et al.*, 2009). *Staphylococcus aureus* has inherent trait of resistance. In the present era of newer antibiotics, the emergence of antibiotic resistance is becoming more common. Another factor responsible for resistance is patient non-compliance, as soon as symptoms subside, many patients stop taking antibiotics before completion of therapy.

Pseudomonas aeruginosa was the most common pathogen followed by *Staphylococcus aureus* isolated from CSOM. Piperacillin/Tazobactam was found to be the most suitable antibiotic followed by Imipenem and Levofloxacin for *Pseudomonas aeruginosa*. The resistance against ceftriaxone and Gentamicin was found to be very high.

The important factor that is responsible for resistance is inappropriate duration, dose and selection of antibiotics. It is essential to use antibiotics in proper way to prevent emergence and spread of resistant pathogens.

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