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Research Article

Prevalence and Anti-Biogram of *Pseudomonas Aeruginosa* Isolated from Otitis Media in KBN Hospital, Gulbarga.

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Abstract: Otitis media is an inflammation of the middle ear cleft without reference to etiology or pathogenesis. Chronic suppurative otitis media (CSOM) is a destructive disease with irreversible sequelae and can proceed to serious intra and or extra cranial complications. The study of bacteriology and anti-biotic sensitivity is necessary in management of CSOM and is essential for the ENT surgeon to make the discharging ear dry for better results of surgical procedures like myringoplasty and ossiculoplasty. Among the bacteria, *Pseudomonas aeruginosa* (*P. aeruginosa*) has been particularly blamed for deep seated and progressive destruction of middle ear and mastoid structures through its toxins and enzymes. This was a retrospective study conducted in a tertiary care hospital in South India. Data was obtained from the microbiology records from March 2012 to March 2014. 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. Antimicrobial susceptibility testing was done by Kirby-Bauer's disc diffusion method, according to the guidelines of Clinical and Laboratory Standards Institute. A total of 176 cases of CSOM were included in the study. Microbial growth was seen in 156 (88.6%) while 20 (12.4%) were sterile. Among 156 bacterial growth, 41(26.2%) were positive for *P. aeruginosa*. Most cases were from males and most common affected age group was 0-20 years. Most common organism was *Staphylococcus aureus*, followed by *P. aeruginosa*. *P. aeruginosa* showed highest resistance to Ampicillin and Ciprofloxacin and least resistance with Polymixin B and Imipenem. Among all the organisms, Pseudomonas is prone to cause a problem in therapeutic control of CSOM. Regular antibiotic susceptibility studies should be conducted as the pattern of microbial growth changes with time. Knowledge of the pathogens and antibiotic sensitivity pattern responsible for CSOM helps in reducing the complications of CSOM.
Keywords: Chronic suppurative otitis media, *Pseudomonas aeruginosa*, Anti-biogram, Resistance

INTRODUCTION

Otitis media is an inflammation of the middle ear cleft without reference to etiology or pathogenesis [1]. Otitis media is classified into acute, sub-acute and chronic [2]. Chronic suppurative otitis media (CSOM) is a destructive disease with irreversible sequelae and can proceed to serious intra and or extra cranial complications [3]. The microbiological profile of otitis media depends on the type of otitis media. In the acute form, the most common organisms are *Hemophilus influenzae*, *Streptococcus pneumoniae*, *Pseudomonas aeruginosa* (*P. aeruginosa*) and anaerobic bacteria. In CSOM the wide range of microorganisms both aerobic (eg: *Pseudomonas aeruginosa*, *Escherichia coli* etc) and anaerobic (eg: Bacteroids, Peptostreptococcus etc) and fungi (eg: Candida) are responsible [4].

Since the advent of new antibiotics, the complications have reduced. But has lead to resistance to the commonly used anti-microbials due to increased and irrational use of broad spectrum antibiotics. Also the disease complications have returned [5]. The study of bacteriology and anti-biotic sensitivity is necessary in management of CSOM and is essential for the ENT surgeon to make the discharging ear dry for better results of surgical procedures like myringoplasty and ossiculoplasty [6].

Among the bacteria, *P. aeruginosa* has been particularly blamed for deep seated and progressive destruction of middle ear and mastoid structures through its toxins and enzymes [7]. The treatment of CSOM is controversial and is subject to change particularly in the developing countries, the anti-biotic susceptibility has been reported to vary with time and geographical area, probably due to irrational use of the antibiotics [5]. Hence the present study was done to know prevalence and anti-biogram of *P. aeruginosa*.

MATERIAL AND METHODS

This was a retrospective study conducted in a tertiary care hospital in South India. Data was obtained

from the microbiology records from March 2012 to March 2014. 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 Mac- conkey agar plates and incubated at 37^0C for 24-48 hrs. The colonies of *P. aeruginosa* were identified by colony morphology, pigment production, characteristic musty or earthy odor [8]. The identification was confirmed by motility and biochemical tests, which included fermentation of sugars, oxidation fermentation, indole production, nitrate reduction, oxidase, and catalase test [9].

Antimicrobial susceptibility testing was done by Kirby-Bauer's disc diffusion method, according to the guidelines of Clinical and Laboratory Standards Institute (CLSI) [10]. The following anti-microbials were used, Ampicillin (10mcg), Piperacillin (100 mcg), Gentamicin (10 mcg), Amikacin (30 mcg), Ciprofloxacin (5µg), Ofloxacin (5 mcg), Cefuroxime (30 mcg), Ceftriaxone (30 mcg), Ceftazidime (30 mcg), Polymixin B (300 U) and Imipenem (10 mcg) (Hi Media, Mumbai). *P. aeruginosa* ATCC 27853 was used as the control strain. The information was recorded and analyzed using Microsoft Excel (2010 version) and the results are explained in frequency and percentage.

RESULTS

A total of 176 cases of CSOM were included in the study. Microbial growth was seen in 156 (88.6%) while 20 (12.4%) were sterile. Among 156 bacterial growth, 41(26.2%) were positive for *P. aeruginosa*. The other organisms isolated are shown in table 1.

Table-1: Microorganisms isolated in positive cultures

Organism	Frequency	Percentage
Gram Positive		
Staphylococcus aureus	46	29.4
Coagulase negative Staphylococcus	14	8.9
Streptococcus pneumoniae	7	4.4
Gram Negative		
Pseudomonas aeruginosa	41	26.2
Klebsiella pneumoniae	11	7
Escherichia coli	5	3.2
Proteus mirabilis	4	2.5
Anaerobe		
Bacteroids species	14	8.9
Peptostreptococcus species	9	5.7
Fusobacterium	3	1.9
Fungi		
Candida species	2	1.2
Total	156	100

Most common organism was *Staphylococcus aureus*, followed by *Pseudomonas aeruginosa*

The demographics of the Pseudomonas aeruginosa isolated cases are shown in table 2.

Table-2: Demographics of *Pseudomonas aeruginosa* isolated cases (n=41)

Age group (Years)	Male	Female	Total
0-10	7	4	11
11-20	9	5	14
21-30	4	5	9
31-40	3	2	5
41-50	2	2	4
51-60	1	0	1
61-70	1	2	3
Total	**27**	**20**	**47**

Most cases were from males and most common affected age group was 0-20 years.

The antibiotic sensitivity pattern of *Pseudomonas aeruginosa* is shown in table 3.

Table-3: Resistance pattern of *Pseudomonas aeruginosa* (n=41)

Antibiotic	Frequency	Percentage
Ampicillin	24	58.5
Piperacillin	11	26.8
Gentamicin	15	36.5
Amikacin	7	17
Ciprofloxacin	21	51.2
Ofloxacin	19	46.3
Cefuroxime	14	34.1
Ceftriaxone	11	26.8
Ceftazidime	12	29.2
Polymixin B	0	0
Imipenem	0	0

Highest resistance was seen with Ampicillin and Ciprofloxacin and least resistance with Polymixin B and Imipenem

DISCUSSION

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 0-20 years (table 2). This finding is similar to other studies [11-13]. In the males were more affected than females. Some studies have found male preponderance [14, 15] while others have found female preponderance [16]. This difference might be due to local demographic characteristics.

Microbial growth was seen in 88.6% of the cases, 12.4% cases were sterile. Other studies have reported sterile cases ranging between 3% to 16.9% [17-20]. *Staphylococcus aureus* was the most common organism isolated followed by *P. aeruginosa*. Other studies have reported varying prevalence between these two organisms. Some studies have reported *Staphylococcus aureus* as the most common organism [1, 21, 22], other studies have reported P. aeruginosa as the most common organism [20, 23-25]. This finding suggests that microbial pattern differs with time and geographical location.

P. aeruginosa showed highest resistance to Ampicillin and Ciprofloxacin and least resistance with Polymixin B and Imipenem (table 3). Various studies have reported different sensitivity pattern. Sensitivity to Gentamicin was 64% and Amikacin was 83%. Other authors have reported sensitivity of 45% to 87% with Aminiglycosides [26, 27]. Sensitivity to Quinolone antibiotic was 50% with Ciprofloxacin and 54% with Ofloxacin. Other studies have reported sensitivity to Quinolones ranging from 61% to 90% [1,26,27]. Sensitivity to third generation Cephalosporins ranged from 66% to 70%. This finding is in agreement with other studies [18-20].

Among all the organisms, Pseudomonas is prone to cause a problem in therapeutic control of CSOM [25]. *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.

Limitations of the study

This was a retrospective study and the sample size was small. Future studies should be prospective and should include a large sample size.

CONCLUSION

Most common age group affected was 0-20 years and prevalence of CSOM was more in males. *Staphylococcus aureus* was the most common organism isolated followed by *Pseudomonas aeruginosa*.

Pseudomonas aeruginosa was moderately sensitive to common antibiotics. Declining resistance to Quinolones is a cause of concern. Regular antibiotic susceptibility studies should be conducted as the pattern of microbial growth changes with time. Knowledge of the pathogens and antibiotic sensitivity pattern responsible for CSOM helps in reducing the complications of CSOM.

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