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Aerobic bacteriology of active chronic otitis media & its antibiotic susceptibility pattern among patients attending a tertiary care centre in Vijayapura, Karnataka

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Abstract: *Background:* Active Chronic Otitis Media is a pertinacious disease of the middle ear, capable of causing severe destructive sequelae, with the manifestations of deafness, discharge and a permanent perforation. It is one of the most common childhood diseases, more common in India. Aim of Study was to elucidate the microbial predominance and chart its antibiotic susceptibility pattern among the patients of this disease. The emergence of drug resistant strains along with changing Antibiotic susceptibility profile makes it necessary to undertake this study. *Material and Methods:* 138 Patients who attended the OPD & IPD of a tertiary centre in Vijayapur were included. They were diagnosed as Chronic Suppurative Otitis Media by ENT Surgeons & had not received topical and/or systemic antibiotics, minimum 5 days before sample collection. Isolation & identification of bacteria was done by standard microbiological methods & their Antibiotic Susceptibility testing (AST) was done by Kirby-Bauer disc diffusion method (CLSI guidelines). *Results:* Chronic Suppurative Otitis Media was found to be more common in females (55%) than males (45%), more common in age group 1-10 years (31%). *Pseudomonas aeruginosa* (42%) was the most common organism to be isolated followed by *Staphylococcus aureus* (37%). *Pseudomonas aeruginosa* showed maximum sensitivity to Amikacin (96%) and Piperacillin (96%). *Staphyloco ccus aureus* was maximum sensitive to Gentamicin (94%) & Linezolid (94%). *Conclusion*: *Pseudomonas aeruginosa* (42%) was the most common organism to be isolated and showed maximum sensitivity to Amikacin (96%) and Piperacillin (96%)

Keywords: Active Chronic Otitis Media, Chronic Suppurative Otitis Media, Antibiotic susceptibility, Resistance.

Introduction

Chronic suppurative otitis media (CSOM) is a persistent disease of the middle ear, which is capable of causing severe destruction sequelae with the manifestation of deafness, discharge and a permanent perforation [1]. Recent terminology does not use the word suppurative and describes it as Chronic Otitis Media active. Active chronic otitis media is defined as chronic inflammation of the middle ear and mastoid mucosa with recurrent discharge (at least 2 weeks) through chronic perforation in tympanic membrane [2]. The role of CSOM in the burden of hearing impairment across the globe ranges from 3% up to 80%. Approximately, 164 million cases of hearing impairment may be due to CSOM. CSOM may be responsible for more than half of the global burden of hearing impairment, therefore eliminating it may reduce the burden of deafness across the world by four-fifth.

In Active Chronic Otitis Media, the aerobic bacteria most commonly isolated globally are *Pseudomonas aeruginosa, Escherichia coli, Staphylococcus aureus, Streptococcus pyogenes, Proteus mirabilis, Klebsiella species* [3]. Antibiotics to which these bacteria are sensitive are therefore the mainstay of treatment. Quinolones, like Ciprofloxacin, Ofloxacin are most useful when used topically and orally while the antibiotics for parenteral use include Penicillins like Carbenicillin, piperacillin, ticarcillin, mezlocillin, azlocillin, nafcillin, ampicillin, penicillin G,

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Cephalosporins: Cefuroxime, cefotaxime, cefoperazone, cefazolin Aminoglycosides like Gentamicin, tobramycin, amikacin and Macrolides like Clindamycin [3]. If left untreated, the disease may cause complications besides deafness.

The most common extra cranial complication is subperiosteal abscess followed by labyrinthine fistula. Meningitis is the most common intracranial complication, among patients with intracranial complications, approximately 19% die and 30% have permanent facial paralysis, deafness, diplopia, epilepsy or hemiparesis. CSOM is responsible for 2.163 million DALYs (disability-adjusted life-years), 94% of which come from the developing world [3]. Complications of Otitis Media are responsible for 28,000 deaths per year [2].

The advent and use of antibiotics has been responsible for significant reduction in mortality and morbidity due to CSOM. However, irrational use of same has led to emergence of drug resistant strains. Hence, this study was carried out to identify the aerobic bacteria causing COM and their Antibiotic Susceptibility Pattern with following objectives in mind. Prepare a protocol for empirical antibiotic therapy in accordance with the local pattern and to elucidate microbiological predominance. Knowledge of Antibiotic sensitivity is essential to start cost-effective treatment.

Material and Methods

After obtaining permission from ethical committee, two sterile swabs were collected with full aseptic precautions from each ear diagnosed with CSOM of 138 patients, attending the E.N.T OPD & IPD of Sri B.M Patil Medical College, BLDE Hospital Vijayapur, Karnataka for a duration of 6 months from December 2016- May 2017.

Inclusion criteria: Patients in our institution, diagnosed as CSOM, by ENT surgeons, who had not received topical and/or oral antibiotics minimum 5 days before swab collection were included in our study.

Exclusion criteria: Patients who were on topical and/or oral antibiotics & those who did not give consent were excluded from study.

Sample Collection: Two swabs from infected ear were collected with full aseptic precautions and sent to Microbiology department;

Swab-1: Gram stain was performed on swab 1. It diagnosed whether the causative organism was Gram positive or Gram negative. The presence of pus cells was noted. Presence of more than one type of bacteria was also noted.

Swab-2: Identification of bacteria was done by standard bacteriological methods [4] after streaking the swabs on McConkey agar & Blood agar, biochemical reactions were done and organism was identified. Antibiotic susceptibility was performed by Kirby-Bauer Disc Diffusion method using Hi Media Antibiotic discs Mumbai (India). CLSI (Clinical and Laboratory Standards Institute (M100S, 26th ed.) guidelines [5] were followed.

Results

Maximum isolates of *Pseudomonas aeruginosa* were Sensitive to Amikacin (95.6%) and Piperacillin (95.6%). Netilmycin was found to be sensitive in (91.2%) followed by Gentamycin (86.7%) Norfloxacin was found to be sensitive in (84.5%) isolates along with Ceftazidime (84.5%) followed by Levofloxacin (84.4%), Ciprofloxacin (82.3%) and Carbenicillin (71.2%).

Out of 138 cultures, 10 were sterile. 105were mono microbial and 23 were polymicrobial. *Pseudomonas* spp was commonest (42%) followed by *Staphylococcus aureus* (37%). Among Gram positive cocci CONS were 7% followed by *Enterococcus* 1.2%.

Klebsiella pneumoniae were 9%, *Escherichia coli* 1.9%, *K.oxytoca* 1.2% and *Proteus mirabilis* 1.2%. (Fig-1).

Right CSOM (57%) was more common than left (43%) and (6%) were bilaterally affected.

CSOM was more common in age group 1-10 years (31%) (Fig 2). Low socio-economic class was more affected (56%) Right CSOM (57%) was more common than left (43%)

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Pseudomonas aeruginosa exhibit maximum sensitivity to Amikacin (96%) along with Piperacillin (96%).

Fig-1: Bacterial Profile

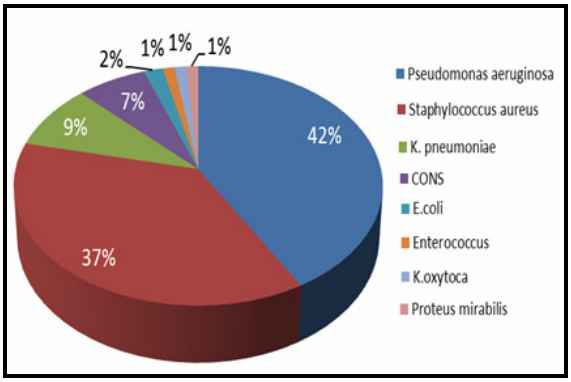
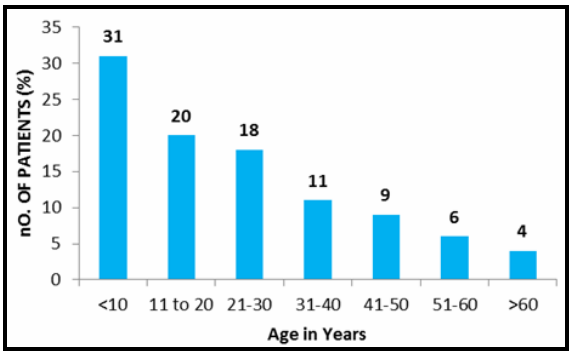
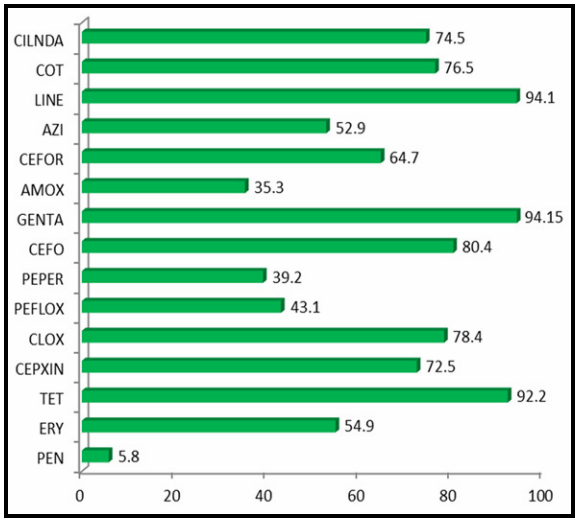


Fig-2: Showing Age-Distribution



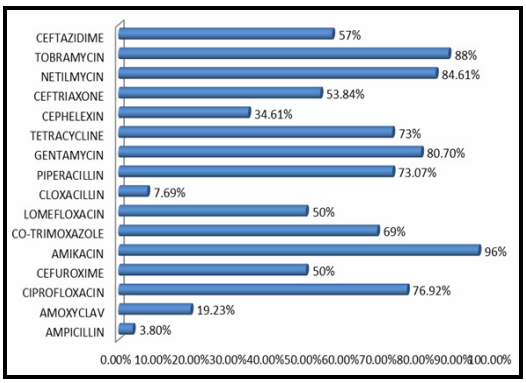
Staphylococcus aureus exhibit maximum sensitivity to Gentamicin (94%) (Fig-3).

Fig-3: Antimicrobial sensitivity pattern of *Staphylococcus aureus* and other GPC.



Gram Negative Bacilli were maximum sensitive to Amikacin (96%) (Fig-4).

Fig-4: Antimicrobial sensitivity pattern of Gram Negative Bacterial isolates.



Discussion

CSOM is a very common health problem in our country with India belonging to highest incidence group > 4% [3]. It leads to many extracranial as well as intracranial complications which may be fatal, if untreated. In our cross-sectional prospective study, maximum patients are from age-group 1-10 years (31%). This is similar to results obtained by Arvind *et al* (39%) [6]. However, Raghu *et al* [7] and Harinder *et al* [8] proclaimed maximum patients from 16-30 years age group.

Gender distribution in our study showed 55% females and 45% males. Similar finding was reported by Prakash M [9] *et al* Hirapure [10] *et al* and Rajat Prakash [11] *et al*. However, Shazia Parveen *et al* [12], reported male preponderance Males 56% females 44% along with Arvind, *et al* [6] 51% males and 49% females. Commonest organism in our study was identified as *Pseudomonas aeruginosa* (42%) followed by *Staphylococcus aureus* (37%). Similar finding was reported by Abida *et al* [13], Raghu Kumar *et al* [7], and Sabarinathan *et al*[14].

Researchers who reported *Staphylococcus aureus* as most common were Prakash M [9] *et al,* A.H Singh *et al* [15], Shrestha *et al* [16] and Rajat Prakash *et al* [11]. Other Gram positive bacteria reported in our study were *Coagulase Negative Staphylococci* (7%), *Enterococcus*. (1.2%) Gram negative bacteria were *Klebsiella pneumoniae* (9%), *Escherichia coli* (1.9%), *Klebsiella oxytoca* (1.2%) and *Proteus mirabilis* (1.2%).

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Pseudomonas was maximally sensitive to Amikacin (95.6%) and Piperacillin. (95.6%) Tahira Mansoor [17] *et al* reports the same findings. Kamran Iqbal [18] and Arun Ghosh [19] *et al* reported maximum sensitivity to Piperacillin Tazobactum.

Staphylococcus aureus was very sensitive to Gentamycin (94%) and Linezolid. Saranya [20] et al, agree with our findings whereas Shazia Parveen [12] *et al* reported maximum sensitivity to Amikacin, Gentamycin and Cloxacillin. Most Gram negative bacteria were found to be sensitive to Amikacin, (96%) our findings endorsed by Arvind *et al* [6] Harinder [8] *et al*, Poorey [21] *et al*. Shalini Gupta [22] *et al* reported maximum sensitivity to Imipenem and Amikacin. Saranya [20] *et al* reported maximum sensitivity to Amikacin and Ciprofloxacin. Ofloxacin was found to be the most sensitive drug by Shazia [12] *et al.* Ciprofloxacin was found to be more sensitive than Gentamycin by Gh. Ettehads *et al* [23].

The discordance in age-groups affected, bacteria isolated and sensitivity pattern may be because the Microbial predominance and their antibiotic sensitivity pattern change over time due to the climate, antibiotic usage & geographic factors [6]. Recent studies on this topic have also reported almost similar findings to our study. The most common bacteria isolated were same, *Pseudomonas aeruginosa* followed by *Staphylococcus aureus. Pseudomonas* was most sensitive to Amikacin, Imipemem and Piperacillin/ Tazobactum. Vancomycin and Linezolid were most effective for *Staphylococcus aureus.* It was also added that if the aetiology is polymicrobial with different antibiotic sensitivity patterns, multidrug therapy may be necessary [24]. In a study by Basavraj Hiremath [25] *et al,* Aminoglycosides, Gentamycin and Amikacin were found to be most effective but have ototoxicity as their side-effect which prevents their regular use. Geeta *et al* [26] have endorsed the need of Antibiotic policy according to the region as Antibiotic Susceptibility varies according to region.

Conclusion

Pseudomonas aeruginosa was the most common organism to be isolated and showed maximum sensitivity to Amikacin (96%) and Piperacillin (96%). Dry ear along with rational, targeted and optimum antibiotic usage for exact duration is the mainstay of treatment. Ideally, culture and sensitivity is essential for therapy and empirical treatment is to be deprecated but setup and economic constraints may make it necessary. The emergence of drug resistant strains due to inadequate treatment or self-medications along with changing Antibiotic susceptibility profile makes it necessary to constantly update our knowledge and revise Hospital Antibiotic policy accordingly.

Limitations of our study: It is a single center study. Anaerobic bacteria were not included. An exhaustive multi centric study including anaerobes with bigger sample size and inclusion of molecular diagnostics to identify drug-resistant strains is advocated.

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