

Isolation and Selective Drug of Chose for Pseudomonas Aeruginosa as a Causative Agent in Suppurative Otitis Media

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Abstract

Background: Chronic Suppurative otitis media (CSOM), is a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent (otorrhea) ear discharge through a perforated tympanic membrane. The bacterial cause for CSOM can include both aerobic and anaerobic bacteria, the most common microorganisms found in CSOM are *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus mirabilis*, *Klebseilla pneumonia*, diphtheroid group, *Citrobacter sp.* and anaerobic bacteria and fungi like *Candida sp* as well as *Aspergillus sp.*

P. aeruginosa was the most common iso 30500000) followed by *S.aurease* 27% (27 isolates), *Proteus mirabilis* 11% (11 isolates), *E.Coli* 11%(11 isolates), *Klebseilla pneumonia* 9 %(9 isolates), respectively while other different species was 5% (5 isolates) and 2% (2 isolates) was fungi. Antimicrobial sensitivity for *P. aeruginosa* test by VITEK 2 System based on the main inhibitor concentration (MIC). The Piperacillin showed to be highly sensitive again *P. aeruginosa* 77.1% (27 isolation) followed by Meropenem, Imipenem, Levofloxacin and Amikacin 65.7% (23 isolation), 60%(21 isolation), 40%(14 isolation), 34.2%(12 isolation) respectively while Ciprofloxacin showed to be the less effected again *P. aeruginosa* 20% (7 isolation). Ceftazidime, Tobramycin and Ciprofloxacin were highly resistance 68.5% (24isolation), 62.8% (22 isolation) . 54.2%(19 isolation) respectively.

Keywords: Otitis media, *P. aeruginosa*, Antibiogram, Sensitive, Piperacillin

Introduction

Chronic Suppurative otitis media (CSOM), is a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent (otorrhea) ear discharge through a perforated tympanic membrane (1) depending on whether the disease process affects is

classified into two types, tubotympanic the pars tensa and atticotympanic or pars flaccida of the tympanic membrane (1,2) Incidence of the disease is higher in developing countries, especially among low socioeconomic societies because of malnutrition, overcrowding, poor hygiene, inadequate health care, and recurrent upper respiratory tract infections (2) The most important symptoms which make patients seek medical advice are hearing loss and suppurative drainage, reported in around 50% of the cases (3,4). CSOM is a persistent disease with high risk of irreversible complications which may range from persistent otorrhea, mastoiditis, labyrinthitis, and facial palsy to more serious intracranial

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abscesses or thrombosis (2,5,6). The bacterial cause for CSOM can include both aerobic and anaerobic bacteria, the most common microorganisms found in CSOM are *P. aeruginosa*, *Staphylococcus aureus*, *Proteus mirabilis*, *Klebsiella pneumoniae*, diphtheroid group, *Citrobacter* sp., etc and anaerobic bacteria (5,7,8) and fungi like *Candida* sp as well as *Aspergillus* sp. (8,9) *P. aeruginosa* is one of the most predominant organisms to cause CSOM (10,11), with an incidence ranging from 21% to 52.94%⁽¹²⁾.

The overall incidence of complications from otitis media is extremely low; infratemporal and intracranial complications occur in one in 100,000 children and in one in 300,000 adults per year^(13,14). Patients with middle ear effusion may have persistent or fluctuating conductive hearing loss (14,15). Children with chronic middle ear effusion score lower on tests of speech, language, and cognitive abilities (15). Central perforation of the eardrum may cause chronic infection in the middle ear and mastoid cavity. Acute mastoiditis (i.e., pus in the mastoid air cells) may erode through the bone, forming a subcutaneous collection of pus (16). Contiguous spread or hematogenous seeding may infect the inner ear, petrous portion of the temporal bone, meninges, and the brain. Mastoiditis and intracranial complications of acute otitis media are more common in developing countries where persons have limited access to medical care (16,17).

Material and Methods

This study was carried out in the Department of Microbiology of Al-Haboby Hospital in Thi-Qar governorate. Total of 100 patients with bilateral and unilateral CSOM. All age and sex including in our study

patient who had received antibiotics were excluded from the study.

Sample collection

Two sterile cotton swab was collated from patient ear discharge under aseptic precautions.

Methods

Case study and sample collected in Al-Haboby Hospital in Thi-Qar governorate. All age and sex including in our study patient who had received antibiotics were excluded from the study. Two sterile cotton swab was collated from patient ear discharge under aseptic precautions. One of swab was used for direct examination and gram staining and the second swab was used to culture onto Blood agar media, MacConkey agar media and nutrient agar media followed by incubation at 37 °C for 18-24 hrs *Pseudomonas* isolates and identified according to characteristic of colony morphology, pigment production and odor confirmed by VITEK 2 System for Identification and Antimicrobial Susceptibility Testing (bioMérieux).

Procedure

One of swab was used for direct examination and gram staining and the second swab was used to culture onto Blood agar media, MacConkey agar media and nutrient agar media followed by incubation at 37°C for 18-24 hrs *Pseudomonas* isolates and identified according to characteristic of colony morphology, pigment production and odor confirmed by VITEK 2 System for Identification and Antimicrobial Susceptibility Testing (*bioMérieux*) antibiotics tested were categorized into 6 classes.

Diagnostic Card

CARD Name	Company	Country of origin
GN card	<i>bioMérieux</i>	France
AST card	<i>bioMérieux</i>	France

Results

A total of 100 cases of CSOM were included in the study

P. aeruginosa was the most common isolate accounting for 35% (35 isolates) depended on bionumber

(000305130500000) followed by *S. aureus* 27% (27 isolates), *Proteus mirabilis* 11% (11 isolates), *E. Coli* 11%(11 isolates), *Klebseilla pneumonia* 9 %(9 isolates), respectively while other different species was 5% (5 isolates) and 2% (2 isolates) was fungi as show in bellow Table 1 .

Table 1. Show the frequency and percent of different species of Microorganisms

species	Frequency	Percent
<i>P. aeruginosa</i>	35	35%
<i>S. aurease</i>	27	27%
<i>Proteus mirabilis</i>	11	11%
<i>E. Coli</i>	11	11%
<i>Klebseilla pneumonia</i>	9	9%
other species	5	5%
fungi	2	2%
Total	100	100

Antimicrobial sensitivity

Antimicrobial sensitivity for *P. aeruginosa* test by VITEK 2 System based on the main inhibitor concentration (MIC).

The Piperacillin showed to be highly sensitive again *P. aeruginosa* 77.1% (27 isolation) followed by Meropenem, Imipenem ,Levofloxacin and Amikacin

65.7% (23 isolation) , 60%(21 isolation) , 40%(14 isolation) , 34.2%(12 isolation) respectively while Ciprofloxacin showed to be the les effected again *P. aeruginosa* 20% (7 isolation). Ceftazidime , Tobramycin and Ciprofloxacin were highly resistance 68.5% (24isolation). 62.8% (22 isolation) . 54.2%(19 isolation) respectively as showed below in table ⁽²⁾.

Table 2. Show the antimicrobial Pattern depended on MIC according to manufacture

Family	Penicillins	Carbapenems		Aminoglycosides			Fluoroquinolones		Cephalosporins			
Item	PRL	MEM	IM	AK	G	TOB	LVO	CIP	CEF	CFA	CRO	CZM
Sensitive												
Frequency	27	23	21	12	9	10	14	7	16	11	9	8
Percent	77.1%	65.7%	60%	34.2%	25.7%	28.5%	40%	20%	45.7%	31.4%	25.7%	22.8%
Intermediate												
Frequency	2	4	3	10	8	6	10	6	5	8	10	3
Percent	5.7%	11.4%	8.5%	28.5%	22.8%	17.1%	28.5%	5.7%	14.2%	22.8%	28.5%	8.5%
Resistance												
Frequency	6	8	11	13	18	19	11	22	14	16	16	24
Percent	17.1%	22.8%	31.4%	45.5%	51.4%	54.2%	31.4%	62.8%	40%	45.7%	45.7%	68.5%
Total	100	100	100	100	100	100	100	100	100	100	100	100

Piperacillin (PRL). Meropenem (MEM). Imipenem (IM). Amikacin (AK). Gentamicin (G). Tobramycin (TOB). Levofloxacin (LVO). Ciprofloxacin (CIP). Cefoxitin (CEF). Cefazoline (CFA). Ceftriaxone (CRO). Ceftazidime (CZM).

Discussion

Chronic Suppurative Otitis Media may lead to fatal intra-cranial and extra-cranial complications like facial palsy, brain abscess and meningitis if not adequately treated with (18,19). *P. aeruginosa* is the most common bacteria isolated from chronic supportive otitis media. This finding is in tandem with the observations by other studies (20). Our study was disagreement with other studies done by (21,22), that reported staphylococcus aureus was predominant causative agent in CSOM followed by *P. aeruginosa*.

Among the β -lactamase inhibitor antibiotics Piperacillin was found to be the most effective antibiotic against *P. aeruginosa* this finding was agreement with (23) which recommended the use of combinations Piperacillin + Tazobactam were more effected against *P. aeruginosa* infections followed by Carbapenems Meropenem and Imipenem similar to the findings seen in studies done by (24,25). Among the Aminoglycosides, Sensitivity was seen with Amikacin (34.2%). This finding is in agreement with studies. Cephalosporins are common used in treatment of *P. aeruginosa* Ceftazidime and Ciprofloxacin were very high resistance against Chronic Suppurative

Otitis Media^(26,27). Although Cefoxitin, Cefazoline, Ceftriaxone, and Ceftazidime were more effected in this family again *P.aeruginosa* which is in contrast with study done be ^(28,29), which Showed cephalosporins were highly sensitivity in Chronic Suppurative Otitis Media. Fluroquilonones, Levofloxacin was (40%) sensitive while Ciprofloxacin (20%) was again *P. aeruginosa* which is similar to the study done by ^(30,31).

Conclusions

In conclusion, this is the first paper that provided original data concerning a *P. Aeruginosa* as a causative agent in suppurative otitis media. *P.aeruginosa* is the most common bacteria isolated from chronic supportive otitis media. Among the β -lactamase inhibitor antibiotics Piperacillin was found to be the most effective antibiotic again *P. aeruginosa*. Selective the correct antimicrobial will help in decreasing the complications of CSOM. *P. aeruginosa* were found to be the common cause of CSOM in the present study. Furthermore, *P. aeruginosa* was resistant to commonly used antimicrobials. piperacillin is a drug of chose in our study. Antibiogram of isolates is recommended in decreasing the complications of CSOM. Finally, in spite of this paper, further studies are required under different laboratories and different complement components compounds in order to improve and to increase our knowledge about this very interesting infection with *P. aeruginosa*.

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