

# Bacteriological Findings in Active Otitis Media with Perforated Tympanic Membrane

Muwafaq Ahmed Salih

Otorhinolaryngologists/ Al alam General Hospital/ Salah Al-Din directorate / Salah Al-Din/Iraq

## Abstract

**Background:** Discharge from the ear is one of the commonest symptoms of infections of the ear. It can arise in both adults and children from a number of sources, (External canal, Middle Ear, and Mastoid cavity). And may have a variety of aetiologies, but the most common causes were acute, and chronic otitis media with perforation of the tympanic membrane. **Aim of Study:** To evaluate the most common types of bacteria that found in a discharging ear, and to appreciate the most appropriate antibacterial drugs acting on these bacteria. **Patient and Methods** The present prospective study includes 200 patients presented with ear discharge to the department of otolaryngology in Sulaimani Teaching Hospital from July 2008 to July 2009 including age group ranging from 6m->40years from both sexes. Identification of bacteria was done by colonial appearance, gram stain and biochemical tests. **Results :** Of 200 patients with ear discharge the maximum age involved is >40 years, male to female ratio 1.01:1, most of the cases were chronic otitis media 154 (77%), and the commonest type of discharge were mucopurulent (31%) in which the most common type of pathogen was *staph.epidermidis*(18%). followed by *klebsiella sp.* (15%), and *Pseudomonas.aeruginosa* (11%). Acute otitis media constitute about 27% of cases in which the most common type of discharge was serous, and the bacteria was *staph.aureus* as a most common pathogen (31%), most of gram +ve bacteria are strongly sensitive to amikacin and gentamycin, all types of the cultured microorganisms were sensitive to ciprofloxacin. **Conclusion:** chronic otitis media is the most common cause of ear discharge (mucopurulent) in which the most common type of microorganism is *staph.epidrmidis*. and (purulent) type of discharge is *pseudomonas.aerogenosa*. while in acute otitis media the most common type of discharge is (serous) in which staph aureus is the most common type.

**Keywords:** Bacteriological findings; active otitis media; tympanic membrane.

## Introduction

Ear discharge in both adults and children, can arise from a number of sources (external canal, middle ear, mastoid cavity) and may have a variety of etiologies<sup>(1)</sup>.

Diagnostic considerations and subsequent treatment plans are directed by the source of the ear discharge, the age of patient, the type of discharge (clear, mucoid, purulent, or bloody), the nature of the drainage (acute, chronic, or pulsatile), and the presence of other symptoms such as otalgia, neurological deficits, or associated systemic disease or symptoms<sup>(1)</sup>, Evaluation may requires meticulous suctioning of secretions under a microscope to identify the source of the drainage and to differentiate between a primary infection or purulent drainage occurring secondary to an underlying

inflammatory process<sup>(1)</sup>.

Soft wax can be mistaken for a discharge, but, at the other extreme, daily offensive otorrhoea may be ignored by some patient with a serious middle ear disease<sup>(1)</sup>. Common causes of discharge differ between adults and children. In children, ear discharge is caused most commonly by either acute otitis media with tympanic membrane rupture or chronic otitis media through a tympanic membrane perforation<sup>(1)</sup>. In adults, discharge results most commonly from either otitis externa or chronic otitis media with a perforation<sup>(1)</sup>. Bacterial or fungal infections may complicate this chronic skin condition, but the acute infection is usually preceded by itching in the canal<sup>(1)</sup>.

The external ear canal and mastoid are primarily involved with coccidiomycosis, which may resemble eczema or an allergic dermatitis <sup>(2)</sup>. The most common bacterial pathogens causing otitis externa are *pseudomonas aeruginosa* and *staphylococcus aureus*. Less commonly, other aerobic, facultative, and anaerobic organisms have been cultured from infected ears <sup>(1)</sup>.

It is one of the most frequent diagnosis in children bellow the age of two years and is usually occur as a sequel of upper respiratory infections <sup>(3,4)</sup>

### Patients and Methods

The present prospective study includes 200 patients (200 ears) presented with discharging ear to the department of otolaryngology in sulaimani teaching and consultation department from july2008 to july2009 including age groups ranged from (6months->40years) from both sexes.

The sample collected for this study was discharge from the ear. Fine swab sticks were used with the help of absorbent material like cotton- wool mounted on a wooden rigid stick and were sterilized in an autoclave.

These were then picked up in a sterile test tube, avoiding contact of the stick with the external meatus in order to prevent contamination by the normal flora.

Sterile swabs taken and submitted to the lab and cultivated on the (Blood agar at 37c for 18 hours; MacConkey agar at 37 c for 18 hours and Chocolate agar in a CO2 Jar at 37 c for 18 hours). A direct KOH 10% wet preparation is done for fungal infection (mycelia or spores). Results of fungal infection were excluded. After incubation, all culture media examined for bacterial growth.

Identification of organisms depends on the type of the colonial appearance, gram stain biochemical test and other tests (e.g., catalase test, coagulase test and oxidase test). depending on the microorganism isolated. After a precise identification an antibiotic sensitivity test is done on a Petri dish of muller-Hinton agar or nutrient agar, using Kirby-Bauer method in which a number of antibiotic discs are used (about 7 discs per plate, after incubation at 37c for 18 hours the plate is inspected for inhibition zone. For each patient a data information sheet (questioner) was filled including name, age, sex, occupation, history about the duration and color of discharge and odor. Type of bacteria detected according to their score; the drug sensitivity was included.

### Results

The age group involved ranged from (6m->40 y), the maximum age distribution was >40 years 62 (31%). and the least age was (6m-2y) those age group were 14(7%) (Fig.1).

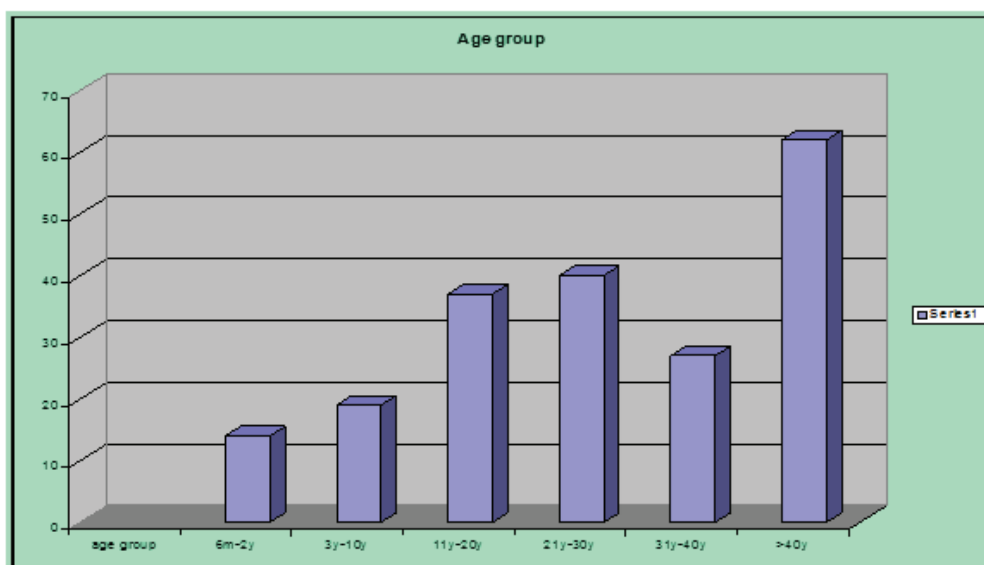
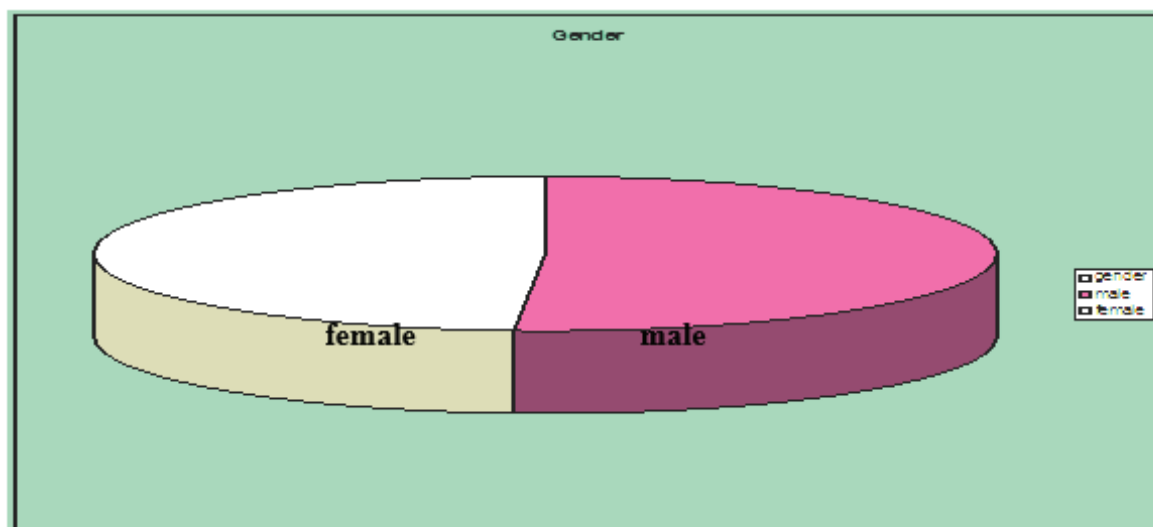


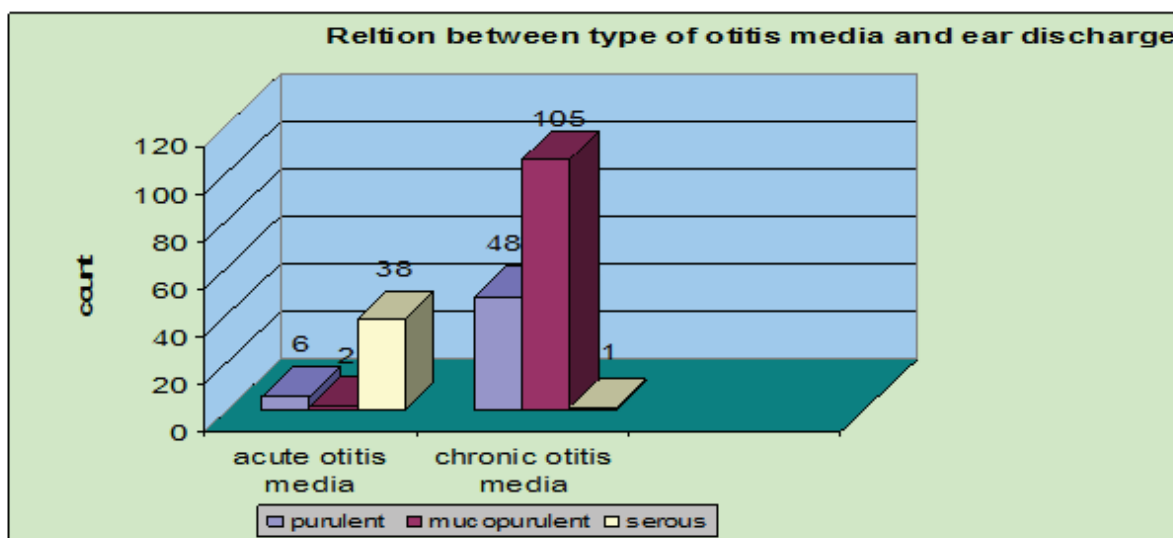
Figure (1): Distribution of otitis media according to age.

So, in Figure 2 from 200 patients 102 (51%) were males, and 98(49%) were females. the male to female ratio was 1.04:1.



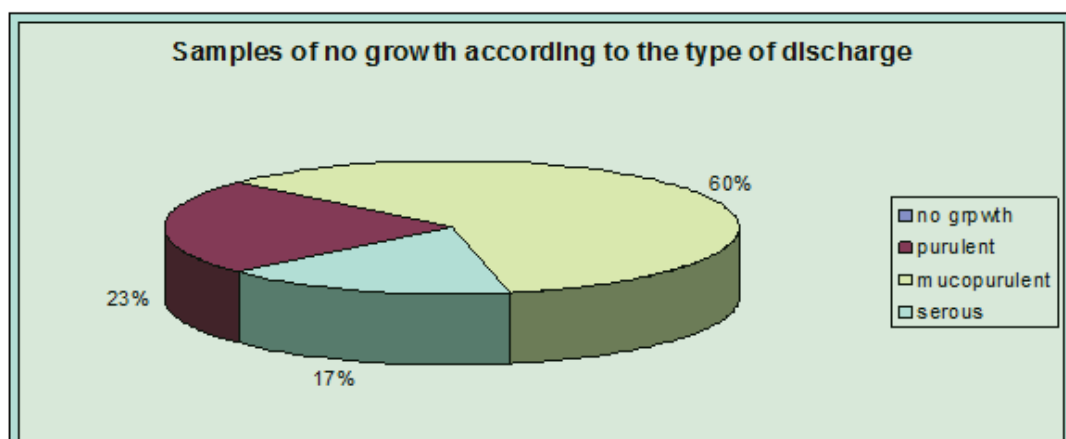
**Figure (2): Distribution of otitis media according to gender.**

In Fig. (3) showed the most common type of discharge in chronic otitis media is mucopurulent 105 ears (68%), followed by purulent 48 ears (31%), then the serous type of discharge which was 1 ear (1%). While in acute otitis media the most common type of discharge was serous 38 ears (83%), followed by purulent 6 ears (13%), then mucopurulent 2 ears (4%).



**Figure (3): Relation between type of otitis media and ear discharge .**

Of the 200 ears 30 samples (15%) present as a no growth, of those 18 ears (60%) the discharge was mucopurulent, 7 ears (23%) the discharge was purulent, and in 5 ears (17%) the discharge was serous Fig. (4).



**Figure (4): relationship between type of growth and type of discharge.**

Table (1) showed the most common type of bacteria in case of purulent ear discharge is pseudomonas 19 culture (35%), and the least types were *strep.pneumonia*, *citrobacter* and *E.coli* (0%). While in case of mucopurulent discharge *staph.epidermidis* was the most common type 19 culture results (18%), followed by *klebsiella* sp. 16 culture (15%), and *pseudomonas* 12 culture (11%),

And the least one was *strep.pneumonia* (0%). And in case of serous discharge the most common bacteria that found was *staph. aureus* 12 cultures (31%), followed by *staph. epidermidis* 7 cultures (18%), while *citrobacter* & *E.coli* were not isolated from serous discharge.

**Table (1): Bacterial isolated According to types of Ear Discharge**

Bacterial isolation	Types			Total
	Purulent	Mucopurulent	Serous	
Pseudomonas	19	12	2	33
Pseudomonas+ staph. aureus	2	2	0	4
Pseudomonas+ staph.epidermidis	0	1	1	2
Staph.aureus	8	11	12	31
Staph.aureus+ E.coli	0	2	0	2
Staph.epidermidis	5	19	7	31
Staph.epidermidis+ klebsiella sp.	0	1	0	1
Klebsiella sp.	2	16	4	22
Klebsiella sp.+ Ecoli	1	0	0	1
Strep.pneumoniae	0	0	3	3
Enterobacter	7	14	4	25
Proteus	3	5	1	9
Citrobacter	0	3	0	3
E.coli	0	3	0	3
No growth	7	18	5	30
Total	54	107	39	200

According to the sensitivity tests, table (2) showed the amikacin & gentamycin are nearly had a similar potent effect against most of the isolated bacteria, except in *staph. sp.* & *strep.pneumonia* infections.

Ciprofloxacin was active against most of the isolated types of bacteria. Chloramphenicol mostly active *staph. aureus* then against proteus. Ceftriaxone active against most of the isolated bacteria.

**Table (2): patten of sensitivity antibiotics**

	Amikacin	Ciprofloxacin	gentamycin	chloramphenicol	Cephalixin	Ceftriaxone	Total isolate
Staph.aureus	24	90	85	90	90	80	31
Klebsiella sp.	95	85	92	0	70	90	22
p.aerogenosa	92	90	92	45	30	85	33
Enterobacter sps	90	85	90	80	0	85	25
Esch.coli	95	90	95	70	70	85	3
Citrobacter	90	85	90	75	0	NT	3
Proteus sps	95	85	94	88	80	90	9
Staph.epidermidis	20	78	20	80	90	70	31
Streptococcus. Pneumonia	NT	75	NT	60	95	60	

## Discussion

Microbial organism responsible for discharging ear and the antibiotic sensitivity pattern of commonly isolated organism. It is important in the management of ear infections to know the bacterial etiology so that antimicrobial treatment can be properly directed<sup>(5)</sup>.

The study deal with the microbial analysis of ear discharge isolates and identification of different boundaries and antibiotic sensitivity pattern of the isolates.

It is widely accepted that bacteria play a major role in acute and chronic suppurative otitis media.

In the study described here, specimens were taken with particular attention to avoid contamination from the external ear and examined and cultured with minimal delay.

Our study revealed that the maximum presenting age for discharging ear was >40 years (31%) as shown in figure (1), while study done by Anil, 1998 revealed that the maximum presenting age for ear discharge were the age group 1-10 years, this difference returns to the fact that most of the children were received by paediatrician who may prescribe a treatment for them before they reach an otolarygologists<sup>(6)</sup>

From the sum of 200 patients, 102 cases were male (51%), and 98 (49%) were female, which give a ratio of male: female about 1.01:1 as shown in Figure (2, and this is similar to findings reported from Ethiopia, which showed males were more affected than females<sup>(7)</sup>, So Findings in a study done in Iraq indicated that male 26(54.16%) more than female 22 (45.84%)<sup>(8)</sup>, This could result from social factors (since male are more subjected to life stress, and delay in medical management).

Our Study it was found that most of the cases 107 culture results (53%) were mucopurulent discharge, while serous type of discharge was found in 39 of cases of ear discharges, as shown in Figure (3), a fact which could be due to that most of our cases were of chronic otitis media. In this series the no growth cases were 30 (15%), as shown in figure (4). In a study done by <sup>(9)</sup> Mark A, Del Beccaro *et al.*, 1992. The negative cultures were (30%). This could be due to culturing technique, or could be due antibiotics that had been already taken by some patients.

Our study elicited that *staph.epidermidis* is the most common bacteria in mucopurulent type of discharge, as shown in Table (1) was 19 culture results (18%). While in purulent type it was *pseudomonas.aerogenosa* 19 culture (35%), while in serous type of discharge, staph aureus is the most common pathogen 12 culture (11%).

Results of Kilpi *et al.*, 2001 there was a predominance of *Streptococcus pneumoniae* is considered the most common bacterial pathogen, followed by *Haemophilus influenzae* and *Moraxella catarrhalis*.

In current study showed that most of gram-negative types of bacteria were highly sensitive to amikacin, while ciprofloxacin active against most types of cultured bacteria. As shown in table (2). This result is in agreement with a study done by Anil *et al.*, 2001 <sup>(5)</sup> which stated that reveal that amikacin is active against most types of bacteria followed by ciprofloxacin.

### Conclusion

Most common cause of ear discharge is otitis media (chronic and acute), which can be appropriately managed by suitable antibiotics directed according to culture and sensitivity results, most common type of discharge in COM was mucopurulent while in acute otitis media it was serous, so the most common type of bacteria in case of mucopurulent discharge is *staph.epidermidis*, in purulent discharge is *pseudomonas aeruginosa*. And in serous type is *staph.aures*. Amikacin is the most potent antibiotic against gram +ve bacteria, while ciprofloxacin moderately potent against all of the cultured microorganisms.

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**Conflict of Interest:** None

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