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Microbiology of active chronic otitis media: in comparison with abroad studies

Article Information

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Abstract

Background: Chronic otitis media (COM) of mucosal or squamous type is a common problem in otolaryngology practice, the active form of COM is characterized by discharge of pus and is treated by antibiotics to start with, the appropriate antibiotic should be prescribed to avoid antibiotic abuse and guarantee good outcome.

Objectives: The objective of this study is to identify the causative organisms of active chronic active otitis media both (mucosal, squamous) type and test their sensitivity to various anti- microbial agents & compare with abroad studies.

Methods: A prospective study was done on eighty patients, different ages and sexes were taken and careful history and examination was done, examination under microscope was done with careful suction to ensure absence of cholesteatoma, ear swabs were collected from middle ear discharge, bacteria identified by gram-staining and biochemical tests and antibiotic sensitivity were tested by using disc-perfusion method.

Results: The culture results of eighty patients with chronic active otitis media, showed Pseudomonas aeruginosa from 26 patients (32.5%) and Proteus species from 18 patients (22.5%) and Staphylococcus aureus from 12 patients (15%), Providentia from 8 patients (10%) and Serratia from 6 patients. (7.5%), mixed gram-ve bacteria isolated from 7.5% of patients, Klebsiella Ozaenae from 5%. of patients. no anaerobic bacteria were isolated in this study (table 1, 2). Antibiotic susceptibility showed sensitivity of Ps. Aeruginosa to menepem, third generation cephalosporin, ciproflaxacillin and resistance to gentamicin. Klebsiella Ozaenae showed resistant to many antibiotic also Serratia as shown in table 3.

Conclusions: the microbial study of middle ear discharge is very important because the medical treatment is still a main part in treatment of chronic active otitis media so identifying the type of microorganisms and its sensitivity to antibiotics is give a good chance to successful control of the infection.

Introduction: The diagnosis of chronic otitis media (COM) implies a permanent abnormality of pars tensa or pars flaccida, most likely a result of;

Earlier acute otitis media.

Negative middle ear pressure.

Otitis media with effusion.

Chronic otitis media equates with classic term chronic suppurative otitis media that no longer advocated, chronic otitis media (COM) is not necessarily a result of gathering of pus. However, the distinction remain between active chronic otitis media, where there is inflammation and production of pus and inactive chronic otitis media, where this is not

the case, though there is potential for the ear to become active. The active chronic otitis media is either mucosal, that mean the defect in pars tensa with an inflamed middle ear mucosa which produce mucopus that may discharge. The other type is active squamous chronic otitis media (cholesteatoma) where there is retraction of pars flaccida or tensa that has retained squamous epithelial debris and is associated with inflammation and production of pus, often from adjacent mucosa, other clinical entity is healed chronic otitis media which applied to tympanosclerosis, healed perforation and the end result of successful surgical treatment. Inactive chronic otitis media

is permanent perforation of pars tensa, but middle ear mucosa is not inflamed. The inactive sequamous type applied to retraction of pars flaccida or tensa usually posterosuperior which has potential to become active with retained debris ⁽¹⁾.

Methods: Eighty (80) patients with active chronic otitis media were selected and included in this study, which met one of the following criteria;

1- Patients who gave history of persistent ear discharge for more than three months.
2- Patients gave history of recurrent ear discharge with persistent tympanic membrane perforation.

3- We Selected patients not received antibiotics for at least five days. ⁽²⁾.

4- All patients with chronic debilitating diseases were excluded from the study.

The specimens were taken from the middle ear by a sterile cotton swab after cleaning the external auditory canal with sterile swab moistened in 30% alcohol to avoid contamination from the skin.

Swabs included in the following Medias:

1- Blood and MacConkeys agar.
2- Blood and chocolate agar for anaerobic bacteria.
3- Saboured media.

Identification:

1. Morphological:

(a). direct smear; all specimens are stained by Gram's stain and examined under microscope to identified Gram positive and Gram negative bacteria.

(b). cultural characteristic; different media were inoculated with ear swab and kept at 37C for 24 hrs, plates which showed no growth kept for further 48hrs before regarded as negative.

2. Biochemical tests:

1- Idol test.
2- Citrate test.
3- Oxidase test.
4- Erase test.
5- Sugar fermentation.
6- Coagulase test.
7- Swarming phenomena.

3. Antimicrobial sensitivity test:

In this study disc diffusion methods used to evaluate susceptibility of microorganisms to various antibiotics ^(2, 3).

Results:

in this study the result of culture of ear discharge from eighty patients with active chronic otitis media showed the predominance of *Pseudomonas aeruginosa* which was isolated from twenty six patients(32.5%) followed by *Proteus* species isolated from eighteen patients(22.5%), *Staphylococcus aureus* isolated from twelve patients which represents(15%) , *Providentia* isolated from eight patients (10%), *Sarratia* isolated from six patients (7.5%) and mixed isolate from six patients (7.5%) and *Klebseilla* from four patients represents (5%) of cases. No anaerobic bacteria were isolated in this study (table 1).

Table 1: showing number and percent of isolated bacteria from 80 patients with discharging ears.

Bacteria	number of isolate	%
<i>Pseudomonas aeruginosa</i>	26	32.5 %
<i>Proteus</i> species	18	22.5 %
<i>Staphylococcus aureus</i>	12	15%
<i>Providential rettgeri</i>	8	10%
<i>Sarratia</i> species	6	7.5%
Mixed bacteria	6	7.5%
<i>Klebsiella ozanae</i>	4	5%
Total	80	100 %

Microbiological findings in our study

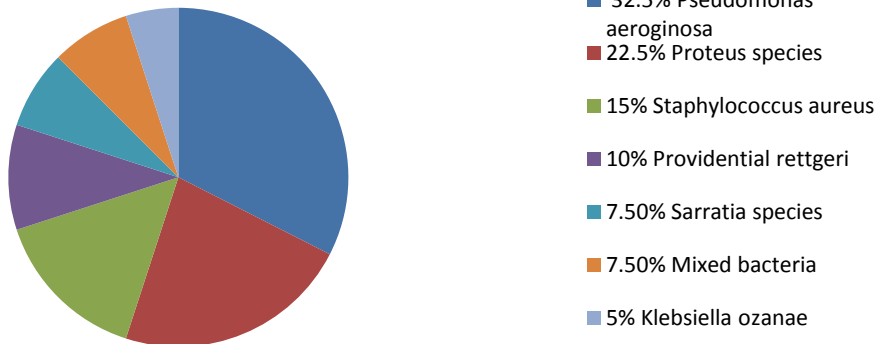


Table 2: show types of bacteria isolated in mixed cultures.

Types of bacteria	Number	percent
Proteus, candida albicans	3	3.57%
Staph. aureus, E. coli	2	2.5%
Staph. aureus, proteus, Candida albicans	1	1.25%
Total	6	7.5%

Mixed bacteria which was isolated in this study showed combination of *Proteus* and *Candida albicans* in three patients, *Staphylococcus aureus* and *E.coli* in two patients and *Proteus* and *Candida albicans* in one patients as shown in table⁽²⁾.

All microorganisms isolated in our study were tested for antibiotic sensitivity, that showed *Pseudomonas aeruginosa* is susceptible to piperacillin and imipenem in 100% of cases followed by ciprofloxacin in 90 % and ceftazidim and ceftriaxone in 80% and showed partial resistance to tobramycin and carbapenem and resistance to gentamicin table(3). *Proteus* showed sensitivity to gentamicin, tobramycin, 3rd generation cephalosporin, trimethoprim sulfazazole,

chloramphenicol in 100% of cases, and partial resistance to amoxicillin. *Staphylococcus aureus* showed sensitivity to amoxiclavate, cefotaxime and carbapenem in 100% of cases, and to ciprofloxacin in 90% and ceftriaxone in 80% and sensitive to amoxicillin in 66% of cases table3. *Providentia* is sensitive to aminoglycosides, third generation cephalosporin and ciprofloxacin, as shown in table (3). *Serratia* and *klebsiella* showed resistance to many antibacterial agents, as shown in table3, sensitive to imipenem, gentamicin, tobramycin, ceftazidim and cefotaxime, in table (3).

Table 3: illustrates the isolated bacteria and its sensitivity to anti biotics

Bacteria	Amoxicillin	Carbapenem	Tobramycin	Tobramycin	Ceftriaxone	Ceftazidime	Cefotaxime	Piperacillin	Methoprine	Carbencillin	Ciprofloxacin	Chloramphenicol	Impenem
<i>Ps.aeruginosa</i>	R	R	S23% R77%	S78% R22%	S79% R21%	S89% R20%	R	S100%	R	S58% R42%	S90% R10%	R	S100%
<i>Proteus</i>	S66% R34%	-	S100%	S100%	S	S	S	-	S100%	S58% R42%	-	S100%	-
<i>Staph.aureus</i>	S66% R34%	S100%	R	R	S80% R20%	-	100%	-	-	100%	S90% R10%	-	-
<i>Providentia</i>	R	R	S	S	S	S	S	R	S	R	S	R	-
<i>Serratia</i>	R	-	S	S	R	S	S	R	R	-	R	-	S
<i>Kl. Ozanae</i>	R	-	R	S	R	S	S	S	-	-	R	-	S

Discussion:

Chronic active otitis media is characterized by its consistent and repetitive inflammatory conditions, although exact pathophysiologic mechanism of chronic state is not clearly established yet. The middle ear show increase in mucosal edema and secretory capacity of mucosal gland and this block the normal ventilation of the middle ear, also mucosal fibrosis reduce the blood flow resulting in alteration of microbial flora, more over, repeat empirical prescription of antibiotics over long period due to repeated active infection can possibly induce multi drug resistance⁽⁴⁾. In our study of 80 patients with chronic active otitis media to recognized causative micro organisms and their sensitivity to anti biotic, *Pseudomonas aeruginosa*, *Proteus* species and *Staphylococcus aureus* are isolated in 32.5%, 22.5%, 15% respectively, this result is going with many studies over the world, that showing *Pseudomonas* as a common isolated bacteria, as in study of 108 patients, the *Pseudomonas* isolated in 50% of cases and *Staphylococcus aureus* in 23%⁽⁵⁾. A study done in Singapore showed *Pseudomonas* in 33.2%, *Staph.aureus* in 33% of cases⁽²⁾. Although the results of this study are very close to our results in case of *Pseudomonas*, but the isolation of *Staph. Aureus* is higher than our study and this variation in the results pointed the importance of culture in treatment of chronic otitis media. Other study by Gul (ET, al) showed that *Pseudomonas* isolated in 23%, *Staph.aureus* in 18% and *Proteus* 17% of cases⁽⁶⁾. All microbiological studies of active chronic otitis media showed that *Pseudomonas aeruginosa* is the most common isolate, because the primary habitant of *Pseudomonas* is the environment, it is found in water, soil and various type of vegetation throughout the world. *Pseudomonas* isolated from throat and stool in 2-10% of healthy persons. The ability of *pseudomonas* to survive and proliferate in water with minimal nutrients can lead to heavy contamination of many non sterile fluids⁽⁷⁾. Mixed isolates in our study is 7.5%, while in other studies are variable from 23%-50% (5, 8). Most of the mixed isolates are anaerobic bacteria with various aerobes⁽⁹⁾. In our study anaerobes were not isolated may be due to technical error that the swab taken through the perforation not from mastoid cavity⁽¹⁰⁾. All isolated bacteria in our study are subjected to antibiotic sensitivity test because medical treatment is still an important part in management of active chronic otitis media especially mucosal type⁽¹¹⁾. In our study *Pseudomonas aeruginosa* showed sensitivity to impenem, piperacillin 100%, ciproflaxacillin 90% and third generation cephalo sporin (ceftriaxone, ceftazidim) in 80% of cases and showed sensitivity to tobramicin in 78% while showed resistance to gentamicine. *Proteus* showed sensitivity to gentamicine, tobramicine and third generation cephalosporin, chloramphenicol and showed partial resistance to amoxicillin (table 3).

Staphylococcus aureus showed high sensitivity to 3rd generation cephalosporin, amoxi-clav and ciproflaxacillin (table 3). Our result goes with a study that showed *Pseudomonas* sensitive to ciproflaxacillin, ceftazidim and gentamicin⁽¹²⁾. In our study *Pseudomonas* resist gentamicin and that confirm the importance of culture and sensitivity in the treatment of active chronic otitis media. *Proteus* in our study showed sensitivity to antibiotics same in other studies⁽⁶⁾, while *serratia* and *klozaenae* showed resistant to many antibiotics. So the microbial culture and its sensitivity to antibiotics are of prime importance in management of active chronic otitis media. Antibiotic drops were used when it is available together with systemic antibiotic treatment and here another study should be done to asses the role of topical antibiotic therapy versus systemic therapy.

CONCLUSION

- 1- Microbiological study should be done in every patient with active chronic otitis media (com) to identify the causative microorganism.
- 2- Antibiotic sensitivity test should be performed to identify the appropriate antibiotic treatment.
- 3- Nearly the same results were found on our microbiological study as on abroad studies.

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