

Clinical vs Bacteriological and Mycological Evaluation in Chronic Suppurative Otitis Media

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ABSTRACT

Introduction: Chronic suppurative otitis media is defined as an infection of the middle ear that lasts more than 3 months and is accompanied by tympanic membrane perforation. The disease is more common in children belonging to lower socioeconomic group. Most common microorganisms found in chronic suppurative otitis media are *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus mirabilis*, *Klebsiella pneumoniae*, *Escherichia coli*, *Aspergillus* species and *Candida* species. The aim of our study is to evaluate the prevalence of CSOM, to evaluate the different type of bacteria and their relative percentage, to evaluate different fungal element and relative percentage, to evaluate the clinical manifestations and correlate them with causative organism.

Material and methods: 90 cases with ear complaints taken and from them clinically diagnosed cases separated which includes safe and unsafe type. All patients undergone for pus culture and sensitivity testing, fungal identification and associated pathology of nose and throat.

Result: On the basis of study of 90 patients we concluded that maximum age of incidence between age group of 20-29 years 34.4%. Male patients were found to be more than female patients. Cases of safe CSOM are more than unsafe CSOM. Commonest organism to be isolated was found to be staph aureus in both safe and unsafe organism. *Aeromonas* was isolated from unsafe CSOM. There was only a single isolate. Commonest fungus to be isolated was *Aspergillus niger*.

Conclusion: Mixed flora organism are associated with chronic suppurative otitis media and they were closely related to the diseases of nose and nasopharynx.

Keywords: bacteria, fungus, safe and unsafe CSOM

INTRODUCTION

Chronic suppurative otitis media is defined as chronic or persistent inflammation of middle ear mucosa (>3 month in duration). On otoscopic examination there may be persistent fluid behind perforated tympanic membrane. Incidence of chronic suppurative otitis media (CSOM) is more common in Eskimos, American Indians and Indigenous population of Alaska, poor living conditions, overcrowding and poor hygiene and nutrition. The infection of middle ear mucosa is caused by different bacteria and fungi. In pre-antibiotic era conditions were associated with fatal complications. More understanding pathophysiology proved role of immunity and eustachian tube dysfunction in CSOM. In immunocompromised individuals problems with more atypical organism is common.

It is often mentioned that a culture of the discharge from an infected ear reveals usually a mixed infection. Culture from CSOM rarely gives a single organism. One fluid may contain so many organisms that it is often difficult to pick out the original offender (Fowler 1948)¹ Ersner and Alexander²

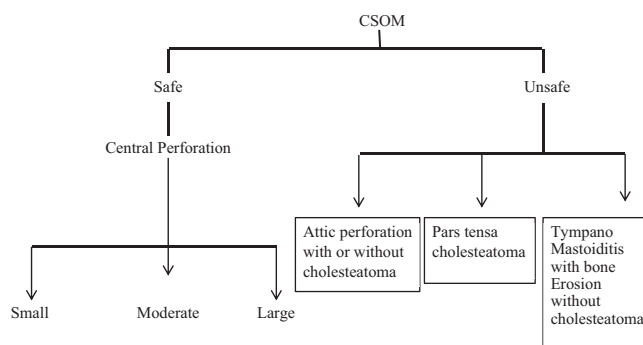
also subscribe to the view of the effect. In (Lakshampati et al³) large variety of organism could be cultured from the suppurating ears. But 46.2% yielded a single organism, 53.8% showed multiple organisms. Fowler (1948 stated that culture from CSOM rarely gives a single organism. One finds so many organisms that it is often difficult to pick out the original offender.¹

Interestingly the incidence of otomycosis was found significantly higher in females in a study in North Iraq. The common factor among these house wives was mainly attributable to fungal spores being present in house dust (Yehia et al 1950⁴)

MATERIAL AND METHODS

Study population: From the total patient attending ENT OPD of MLB Medical College, Jhansi between February 2014 to December 2015, all cases with ear complaints were taken and from them clinically diagnosed cases of CSOM were separated, which includes both safe and unsafe type. From total CSOM cases 90 patients were randomly selected for study. After taking detail informed consent and ethical approval by ethical committee, detailed history regarding patient's name, age, sex and nature of discharge was taken. All the patients were taken with discharging ears of more than 3 months of duration. After collection of ear swab a local examination was done regarding the type of ear pathology and associated pathology in nose and throat. Examination of ear, nose and throat by otoscopy, otomicroscopy, diagnostic nasal endoscopy, laryngoscopy.

All cases of CSOM were divided into safe and unsafe.



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Criteria for adenoid hypertrophy

- + Midline in nasopharynx
- ++ Midline+Extend to fossa of rosenmuller
- +++ Midline+extend to fossa of rosenmuller +50% obstruction of posterior nasal airway
- ++++ Midline+extend of fossa of rosenmuller+>50% obstruction of posterior nasal airway + Eustachian tube block

Criteria for tonsillar hypertrophy (Brotsky, Moore⁵)

tonsil do not impinge an airway

- 1+ <25% of airway obstruction
- 2+ 25% to 50% airway obstruction
- 3+ 50% to 75% airway obstruction
- 4+ >75% of airway obstruction

Criteria for amount of ear discharge- Scanty (mild)

-When swab is introduced close to tympanic membrane and becomes wet, Moderate - Pus can be seen in deep ear canal, Severe (profuse) -When pus is coming out of ear canal, soiling of pillow or running down on the neck.

Criteria for hearing loss (Quantitative)

- 0-25dB - Normal hearing for all practical purposes
- 26-40dB - Mild deafness
- 41-55dB - Moderate deafness
- 56-70dB - Moderate severe deafness
- 71-90dB - Very severe deafness
- >90dB - Profound

Processing of samples: The swab so collected were immediately inoculated into sturats transport medium and were transfered to the department of microbiology (MLB Medical College, Jhansi) for further processing. In the laboratory subcultures were made from the sturats medium into blood agar, MacConkey's medium and glucose both. All these were inoculated over night at 37°C in atmosphere of 5-10% CO₂ for 24-28 hours. The plates were observed for type and extent of growth (scanty, moderate and heavy). The bacteria were identified by colonial morphology, grams staining, catalase test, oxidase test and other biochemical reactions. The tests were done only for aerobic bacteria.

For the fungal isolate aseptic precaution were to collect debris and scraping sample from out ear, either by sterile swab, by sterile forceps, or by syringing with sterile saline. Direct microscopic 10% KOH examination of specimen was preformed to determine the presence or absence of fungal element (hyphae, spores and blastospores). Specimens were also cultures on Saborisaud's dextrose agar (SDA) plain and SDA with chloramphenicol (0.05mg/ml) and incubated at 25°C and 37°C. The media was checked as long as 4 weeks before no growth was declared.

RESULTS

The study consists of total CSOM cases seen in ENT OPD of MLB Medical College, Jhansi between February 2014 to December 2015. Total no of patients with ear complaint was 44% and out of them prevalence of CSOM case are 11.2%. Out of them 90 cases were randomly taken for further study as described under materials and methods.

In the present study no of males affected were found to be more than the females. Over all male to female ratio was

found to be 1.4:1. Total no of cases with safe CSOM were 1484 (80%) and total no unsafe CSOM were 364 (20%) (Table-1)

In our study maximum no of patients were in age group of 20-29 and 30 to 39 years.(Table-2)

In present study out of 90 patients taken 52 males and 38 females with clinical difference of 60 safe CSOM 30 unsafe CSOM. This show that cases of safe CSOM were found to be more than cases of unsafe CSOM. The overall male and female ratio of the patient under study was 1.42:1 (table-3 and 4).

Commonest organism identified in this study was staph aureus followed by Proteus mirabilis. (Table-5)

Commonest fungi found in the study were A. niger 44% followed by A. fumigatus 28%. 8% case of Rhizopus, candida and in about 4% cases A. flavus, Cladosporium and Mucor were isolated.(Table-6).

Most of the cases showed pure culture that is single bacterium. In the case of no growth cases containments were also included (Table-7).

Out of 90 cases 54 case of CSOM were associated with DNS, sinusitis, tonsillar hypertrophy and adenoid hypertrophy which were 60% of total cases taken for study (Table-8).

Hearing loss is associated with 79 patients i.e. 87% cases and 11 cases did not have any hearing loss. In our study hearing loss were mostly associated with Staph aureus infection (Table-9).

No specific bacteria seen with type of perforation, polyp, granulation tissue and ossicular chain disruption in our study.

Sex	Safe		Unsafe		Total	
	No.	%	No.	%	No.	%
No. of Male	878	47.5	201	10.8	1079	58.38
No. of Female	606	32.8	163	8.8	769	41.6

Table-1: Sex incidence with clinical difference

Age range (In years)	Total No. of patients
1-9	7
11-19	11
20-29	31
30-39	25
40-49	11
50-59	3
60-69	2
70-79	-

Table-2: Age distribution of cases under study

Sex	No of cases	Percentage
Males	52	57.7%
Females	38	42.2%
Total	90	100%

Table -3: sex distribution of cases under study

Type of CSOM	No	Percentage
Safe CSOM	60	66.6%
Unsafe CSOM	30	33.3%
Total no. of patients	90%	100%

Table-4: Differentiation of CSOM patient

Bacteria isolate	No. of safe CSOM	%	No. of unsafe CSOM	%
Staph aureus	21	35%	8	26.6%
Proteus mirabilis	16	23%	4	13.3%
Pseudomonas aeruginosa	11	18%	4	13.3%
Pseudomonas putida	7	12%	2	6.6%
Klebsiella	2	3%	1	3.3%
beta Haemolytic streptococci	4	6.6%	-	0%
Alkaligenefaecalis	1	1%	2	6.6%
E. coli	2	3%	1	3.3%
Aeromonas	-	0%	1	3.3%

Table-5: Different bacteria in CSOM patient

Fungi	Number	Percentage
Aspergillus niger	11	44%
Aspergillus fumigatus	7	28%
Aspergillus flavus	1	4%
Rhizopus	2	8%
Mucor	1	4%
Cladosporium	1	4%
Candida	2	8%
Total	25	100

Table-6: Fungal isolates from CSOM patients under study

No of bacterial and fungal isolate	No of patients
1 bacterium	72
more than 1 bacterium	8
without any bacterium	10
only fungus	6
fungus and single bacterium	18
fungus and more than 1 bacterium	1

Table-7: No of bacterial and fungal isolates per patient

DISCUSSION

Mawson (1963) described that *B. proteus* and *Pseudomonas pyocyanous* do not normally inhabit the upper respiratory tract and their emergence in chronic infection of middle ear can't be ascribed to a primary derivation from Eustachian route.⁶ It seems certain that they are predominantly secondary invaders from external auditory meatus gaining access to middle ear via a defect in tympanic membrane resulting from an acute episode of otitis media. Interestingly the incidence of otomycosis was found significantly higher in females in a study in North Iraq. The common factor among these house wives was mainly attributable to fungal spores being present in house dust (yehia et al 1990).⁴ Factor present in external auditory canal such as moisture, warmth and some protein and carbohydrates fulfill the requirement of many fungi and bacteria to grown and flourish (Conley 1948).⁷

Sengupta et al in their study of 125 cases of otomycosis found a significant increased due to the use of antibiotics ear drops. Poor living conditions, overcrowding and poor hygiene and nutrition's have been suggested for widespread of prevalence of CSOM in developing countries. In our study maximum no of patients were in age group of 20-29 and 30-39 years. In study conducted by Indudharan et al⁸, 69.3% of patients were less than 20 years and patient's age ranged from from 6 month to 78 years (table-2). Okafar et al⁹ studied 386 patients in which 33.2% patients were age group 11-20 years a sharp fall in incidence was observed after the age of 20. Gulati et al¹¹ showed that incidence of CSOM was maximum in age group of 0-10 years.

In the present study no of males affected were found to be more than the females. Over all male to female ratio was found to be 1.4:1. In India male and female ratio is more in favour of male gender discrimination at early age prevent from medical attention. This could be due to reason that male are more outgoing and travels more than females and may

that repeated URTI and so on CSOM. Gulati et al¹⁰ showed that 96.3% had central perforation and rest of patient had unsafe variety.

In the present study out of 90 cases a total no of 87 bacterial isolates found from 80 (88.8%) cases and 10 (11.1%) cases did not show any growth and 68 (75.5%) had pure culture in which single bacterium seen, 12 (13.3%) cases had mixed culture (table-7). Obeck we et al (1999) studied 111 isolates 49 were pure culture (44%), 34 were mixed (33.3%) and 19 (18.6%) no growth was recorded. Aslam et al 2004 studied 142 samples out of which 108 (76%) were pure cultures and 34 were mixed, the high rate of pure culture in our study may be due to anaerobic culture not done.

In the present study the commonest bacterials isolated was staph aureus 36% followed by proteus mirabilis 25%, *Pseudomas aeruginosa* 15% *Pseudomonas putida* 11%, *Klebseilla* 4%, alfa Hemolytic streptococci 5 %, Alkaline faecalis 4% and *Aeromonas* 1 %. Commonest fungi found in the study were *A. niger* 44% followed by *A. fumigatus* 28%. 8% case of *Rhizopus*, candida and in about 4% cases *A. flavus*, *Cladosporium* and *Mucor* were isolated (Table-6). Table 8 shows that 54 (60%) patients were associated with DNS, 28.8% with chronic sinusitis, 20% with adenotonsillar hypertrophy and 4.4% with chronic tonsillitis. Most common organism associated with this pathology was Staph aureus followed by *Pseudomonas aeruginosa*, proteus, alfa haemolytic streptococcus, *Klebsiella*, *E. coli* in decreasing order.

Table 9 shows that 87.7% patients have conductive hearing loss irrespective of bacterial isolates. Khan et al suggest hearing loss is not associated with any bacteria but with duration of disease and its complications. Table 10 in our study shows that patients also presents with other symptoms like otalgia 22%, vertigo 10%, tinnitus 9%, headache 10% and facial palsy in 1% cases there are no specific bacteria significantly related. These symptoms were generally seen patients with discharge of longer duration or associated with the fungal infection or cholesteatoma. Facial palsy seen in

Bacterias	DNS	Sinusitis	Chronic tonsillitis	Adeno tonsillar hypertrophy	Total	%
Staph aureus	8	6	2	3	19	21.1%
Proteus mirabilis	4	3	—	1	8	8.8%
Pseudomonas aeruginosa	6	3	1	1	11	12.2%
Pseudomonas putida	3	2	—	—	5	5.5%
Alfa haemolytic streptococci	2	2	1	1	6	6.6%
Klebseilla	1	1	—	—	2	2.2%
E. coli	2	1	—	—	3	3.3%
Total	26	18	4	6	54	

Table-8: Relation of bacterial isolates from CSOM with associated pathology of nose, nasopharynx, sinuses and oropharynx

Bacteria	Hearing loss				
	Mild	Moderate	Severe	V severe	Profound
Staph aureus	7	16	2	2	-
Proteus mirabilis	3	8	3	1	1
Pseudomonas aeruginosa	4	6	1	2	1
Pseudomonas putida	2	4	2	1	2
Klebseilla	-	1	1	-	-
Alfa haemolytic streptococci	1	1	1	-	-
Alkaline facalis	-	1	-	-	-
E. coli	1	2	-	-	-
Aeromonas	-	1	-	-	-

Table-9: Degree hearing loss vs different bacterial isolate.

Bacteria	Clinical symptoms					
	Otalgia	Vertigo	Tinnitus	Headache	Facial palsy	Itching
Staph aureus	3	4	2	3	-	3
Proteus mirabilis	-	1	-	2	-	-
Pseudomonas aeruginosa	1	2	-	2	-	2
Pseudomonas putida	-	-	2	1	-	-
Klebseilla	1	-	-	-	-	1
Alfa haemolytic streptococci	1	-	1	-	-	-
Alkaline facalis	-	-	-	-	-	-
E. coli	-	-	-	-	-	-
Aeromonas	-	1	-	-	-	-
Aspergillus niger	7	-	2	-	-	10
Aspergillus fumigatus	6	-	-	-	-	6
Candida	1	-	-	-	-	1
Sterile	-	1	1	1	1	-
Total	20	9	8	9	1	23
Percentage (%)	22	10	9	10	1.1	25.5

Table-10: Different bacteria and fungus with rest of clinical symptoms

Author	Year	No. of isolates	Staphylococcus (%)	Proteus Sp (%)	Pseudomonas Aeruginosa	Escherichia Coli (%)	Klebsiella
Palva and Hallstorm ¹¹	1965	100	13	8	24	4	ND
Jokippi et al ¹²	1977	70	19	8	4	7	ND
Ojala et al ¹³	1981	806	22	12.9	19	6.8	3.7
Ibekwa and okafar ¹⁴	1983	62	29	12.9	45.2	ND	ND
Sugita et al	1981	62	6.3	21.1	7.8	ND	1.6
Fliss et al ¹⁵	1992	170	20	ND	84	ND	ND
Zain et al sharreef et al	1997	102	20.7	3.6	22.5	ND	2.7
Mustafa et al ¹⁶	1994	259	16.6	8.4	26.3	5	15
Indudharam et al	1999	497	23.7	7.4	27.8	0.6	3.2
Juen et al	2002	177	43.5	2	28.8	3.4	
Sharma et al ¹⁷	2004	324	30	ND	36.4	ND	ND
Present study	2015	97	36	25	18	4	4

Table-11: Types of aerobic isolate from various studies compared with present study.

1 case and culture was found sterile Fungal infection mostly presents with itching. Bacterial isolates in our study as compared to other study were given in table 11.

CONCLUSION

The current study shows that maximum incidence of CSOM occurs between age group of 20-29 years (34.4%). Male patients were found to be more than female patients with male: female ratio 1.4:1. Cases of safe CSOM are more than unsafe CSOM. Commonest organism to be isolated was found to be staph aureus in both safe and unsafe organism. Aeromonas was associated with unsafe CSOM. No specificity of any clinical presentation can be associated with specific bacteria. Commonest fungus associated with csom was aspergillus niger.

REFERENCE

1. Fowler, E.P, Jr. Medicine of the year, Nelson, New York 1948.
2. Ersner, MS and Alexender, M.H. Otolaryngology, Inor, Maryland 1957.
3. Lakshmipati, G. bhaskar, G.C. Bacteriology of CSOM, J. Indian M.D. 1965;45:436-440.
4. Yehia M Habib H,M Shehab NM. Otomycosis a common problem in North Iraq. J Laryngol Otol. 1990;104:387-389.
5. Moore G.G. Jaciow. DM. First edition) mycology for clinical laboratory London Co.Inc Virginia 1979.
6. Mawson S.R. Diseases of ear 1st edition; Edward Arnold, London p (273-294), 2nd edition 1963;293-4,967.
7. Conley JC. Evaluation of fungus disease of the external auditory canal. Arch otolaryngol. 1948;47:721-745.
8. Indudharan R, Haq JA, Aiyar S. Antibiotics in chronic suppurative otitis media: a bacteriologic study. Ann Otol Rhinol Laryngol. 1999;108:440-444.
9. Okafor, B.C. The chronic discharging ears in Nigerians. J. Laryngol. Otol. 1984;98:113-119.
10. Gulati and Tandon P.A.L, singh and bias, A.S. Indian J Otolaryngol Gregson disease. 1969;21:19.
11. Palva T, Hällström O. Bacteriology of chronic otitis media. Arch Otolaryngol. 1965;82:359-364.
12. Jokipii AMM, Karma P, Ojaka K, Jokipii L. Anaerobic bacteria in chronic otitis media. Arch Otolaryngol. 1977;103:278-280.
13. Ojala K, Sorri M, Riihikangas P, Sipilä P: Comparison of pre- and post-operative bacteriology of chronic ears. J Laryngol Otol. 1981;95:1023-9.
14. Ibekwe, A.O. and Okafor, J.I. Pathogenic organisms in chronic suppurative otitis media in Enugu.Nig. Trop. Geogr. Med. 1983;35:389-391.
15. Fliss, D. M., Danga, R., Meidan, N. and Lieberman. A. Aerobic bacteriology of chronic suppurative otitis media without Cholesteatoma in children. Ann. Otol. Rhinol-Laryngol.1992;101:866-869.
16. Erkan Mustafa et al. Bacteriology of Chronic suppurative otitis media. Ann. Otol. Rhinol. Laryngol. 1994:771-74.
17. Sharma S, Rehan HS, Goyal A, Jha AK, Upadhyaya S, Mishra SC. Bacteriological profile in chronic suppurative otitis media in Eastern Nepal. Trop Doct. 2004;34:102-4.

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