



## “Evaluation of Bacteriological and Mycological Profile in Chronic Suppurative Otitis Media : A Hospital Based study”

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### ABSTRACT

Otitis media is an inflammation of the middle ear and mastoid process which could be acute otitis media (AOM), otitis media with effusion (OME) and chronic suppurative otitis media (CSOM). The discharging pus was collected under aseptic conditions with the help of sterile swabs in triplicate by dipping into deep meatus through which it drains. The pus samples from each patient were analyzed in the department of Microbiology. The material of the first swab was used for making smears and for KOH preparation for microscopic examination. These finding suggest that the chronic suppurative otitis media has become a disease of public health importance in the present days in developing countries like India.

**KEYWORDS :** CSOM, bacteria & fungal infection and antibiotics.

### Introduction:

Otitis media is an inflammation of the middle ear and mastoid process which could be acute otitis media (AOM), otitis media with effusion (OME) and chronic suppurative otitis media (CSOM)<sup>1</sup>. Chronic suppurative otitis media is a disease of multiple etiology and well known for its recurrence and persistence. The widespread, irregular and irrational usage of antibiotics, systemic and local, antibiotics has precipitated the fungal infection secondary to bacterial infection. As a result the prevalence of fungal infection is high among the chronic otitis media patients. Infection may occur at any age groups with a peak at 2 years of age. Generally patients with tympanic perforation which continue to discharge for periods from 6 week to 3 months are recognized as chronic suppurative otitis media (CSOM) cases.<sup>2</sup>Chronic suppurative otitis media is observed more frequently in the developing world with a prevalence rate ranging from 6-46% in different geographical areas and population.<sup>3</sup> Chronicity of ear discharge is an important factor in the cause of fungal infection of otitis media. It causes a humid condition in the ear and alters the pH to alkaline, epithelial debris which eventually helps the growth of fungus. Topical use of steroid and antibiotics cause the fungal infection in the middle ear.<sup>4,5</sup> Chronic suppurative otitis media is known to be one of the most common childhood infection and leading reasons for antibiotic prescription in the developing world.<sup>6</sup> It is estimated that about 90% of the people have at least one episode of otitis media by their second birthday. In clinical practice, frequently CSOM diagnosis is made. Among children less than 15 years old.<sup>7</sup> Patient with discharging ears is very common in the world, particularly in hot, humid, dusty areas of the tropic and subtropic.<sup>8,9,10</sup> The recurrent episode of discharge occurs due to superimposed fungal infection in chronic suppurative otitis media patients.<sup>5</sup> My aim was to find out the predominant organisms in the locality and the antibiotic susceptibility of the bacteria.

### Material And Methods:

This present study was conducted in the Department of Microbiology, -MLB Medical College, Jhansi. A total number of 90 patients (out of 106 patients) with clinical diagnosis of CSOM attending ENT OP department during the period from 6<sup>th</sup> July 2016 to 25<sup>th</sup> February 2017. All these were not having recent treatment with antibiotics either locally or systemically. These cases included are individuals of both sexes and all age groups. Clinical evaluation of the disease was done by presence of perforation of tympanic membrane and otorrhoea which are the two presenting symptoms of patients. The discharging pus was collected under aseptic conditions with the help of sterile swabs in triplicate by dipping into deep meatus through which it drains. The pus samples from each patient were analyzed in the department of Microbiology. The material of the first swab was used for making smears and for KOH preparation for microscopic examination. The second swab was used to inoculate on two Sabourad's Dextrose agar slopes and incubated at 37°C and another at 25°C. The third swab was used for

bacteriological cultures on Blood agar and MacConkey agar. The bacterial strains isolated were identified according to standard procedures given in Mackie MacCartney 14<sup>th</sup> edition.<sup>11</sup> Bacterial isolates were subjected to antibiotic susceptibility test using disc diffusion method by Kirby-Bauer. Fungal growth on SDA were identified by standard identification methods.<sup>12</sup>

### Results and Discussion:

A total of 90 patients out of 106 patients had been selected from the Out-patient department of ENT in a MLB Medical College. Out of 90 patients, 55(61.1%) were male and 35(38.9%) were female. fig-3 shows both unilateral and bilateral ear discharge cases were present. Of these, 42 (46.6%) cases had discharge from Right ear, 44 (48.9%) cases from left ear, and 04 (4.4%) cases from both ears. Out of 90 specimens, 75 (83.3%) were positive for bacteria and 15 (16.6%) were positive for fungi. (Table-2). The bacteria and fungi isolates had been depicted in Table-2. The Otitis media is one of the most common ear diseases which is encountered in day-to-day practice. If left untreated, it may cause destruction of middle ear structures leading to hearing loss and may also cause complications like mastoiditis, periostitis, facial paralysis, labyrinthitis, brain abscess, meningitis, lateral sinus thrombophlebitis etc. Aural toileting with meticulous antimicrobial treatment is essential to prevent complications.

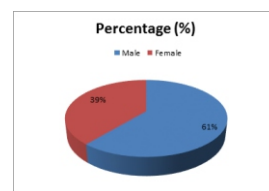


Fig.1-Shows the Sex Distribution of Cases

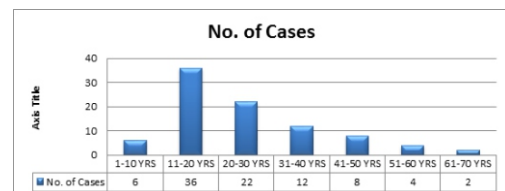
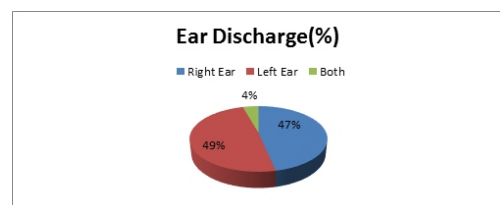


Fig.2: Showing age distribution:



**Fig.3-Shows the Predominant side of Chronic Suppurative otitis Media**

**Table-1: Bacterial and Fungal Culture Positive Results:**

| RESULTS  | Bacteria  |           | Fungi     |           |
|----------|-----------|-----------|-----------|-----------|
|          | Male      | Female    | Male      | Female    |
| Positive | 43(47.7%) | 32(35.5%) | 08(8.8%)  | 07(7.7%)  |
| Negative | 07(7.7%)  | 08(8.8%)  | 32(35.5%) | 43(47.7%) |
| Total    | 50(55.5%) | 40(44.4%) | 40(44.4%) | 50(55.4%) |

**Table-2: Bacteria and fungi isolated from specimen:**

| Type of Organism                    | No of Isolates | Percent (%) |
|-------------------------------------|----------------|-------------|
| <b>Bacteria</b>                     |                |             |
| Staphylococcus aureus               | 12             | 13.3        |
| Pseudomonas aeruginosa              | 29             | 32.2        |
| Proteus mirabilis                   | 10             | 11.1        |
| Klebsiella aerogenes                | 8              | 8.9         |
| Escherichia coli                    | 6              | 6.7         |
| Nonfermenting Gram Negative Bacilli | 3              | 3.3         |
| Klebsiella oxytoca                  | 2              | 2.2         |
| <b>fungi</b>                        |                |             |
| Aspergillus fumigatus               | 11             | 12.2        |
| Aspergillus niger                   | 4              | 4.4         |

**Table 3: Antibiotic Sensitivity of Bacteria isolated from ear discharge of patients with Chronic Suppurative Otitis Media:**

| Antibiotic profile | Organism               |                       |                      |                   |                  |                                     |                    |  |
|--------------------|------------------------|-----------------------|----------------------|-------------------|------------------|-------------------------------------|--------------------|--|
|                    | Pseudomonas aeruginosa | Staphylococcus aureus | Klebsiella aerogenes | Proteus mirabilis | Escherichia coli | Nonfermenting Gram Negative Bacilli | Klebsiella oxytoca |  |
| N                  | 17                     | 29                    | 8                    | 10                | 6                | 3                                   | 2                  |  |
| AMC                | 14(82.3%)              | 23(79.3%)             | 7(87.5%)             | 9(90%)            | 5(83.3%)         | 3(100%)                             | 2(100%)            |  |
| AK                 | 13(76.5%)              | 22(75.9%)             | 4(50%)               | 6(60%)            | 6(100%)          | 2(66.7%)                            | 1(50%)             |  |
| CAZ                | 10(58.8%)              | 20(68.9%)             | -                    | 7(70%)            | -                | -                                   | -                  |  |
| CX                 | 9(52.9%)               | 3(10.3%)              | -                    | 5(50%)            | -                | 2(66.7%)                            | 2(100%)            |  |
| CIP                | 14(82.3%)              | 24(82.7%)             | 7(87.5%)             | 4(40%)            | 3(50%)           | 1(33.3%)                            | 1(50%)             |  |
| COT                | 7(41.2%)               | 7(24.1%)              | 5(62.5%)             | -                 | 4(66.7%)         | 2(66.7%)                            | 2(100%)            |  |
| E                  | 5(29.4%)               | 6(20.7%)              | -                    | -                 | 6(100%)          | 3(100%)                             | -                  |  |
| I                  | 12(70.6%)              | 23(79.3%)             | 3(37.5%)             | 6(60%)            | -                | -                                   | 2(100%)            |  |
| LZ                 | -                      | -                     | -                    | -                 | -                | 3(100%)                             | 1(50%)             |  |
| P                  | -                      | -                     | -                    | -                 | -                | 2(66.7%)                            | -                  |  |
| PI                 | 12(70.6%)              | 15(51.7%)             | 2(25%)               | 5(50%)            | 4(66.7%)         | 1(33.3%)                            | 2(100%)            |  |
| PIT                | 13(76.5%)              | 18(62.0%)             | 3(37.5%)             | 3(30%)            | 2(33.3%)         | 2(66.7%)                            | -                  |  |
| VAN                | -                      | 16(55.1%)             | -                    | -                 | -                | -                                   | -                  |  |

(Note: AK – Amikacin; AMC – Amoxicillin-clavulanate; CAZ – Cefazidime; CX – Cefotaxime; CIP – Ciprofloxacin; COT – Cotrimoxazole; E – Erythromycin; I – Imipenem; LZ – Linezolid; P – Penicillin; PI – Piperacillin; PIT – Piperacillin tazobactam; VAN – Vancomycin)

In this study, Chronic Suppurative Otitis Media was more common in males compared to females. This study correlates with the study report of Iqbal et al.,<sup>2</sup> Nwasbuisi et al.<sup>5</sup> and Kumar et al.<sup>7</sup> In contrast to this result, Mansoor et al.<sup>3</sup> and Shrestha et al.<sup>8</sup> study revealed a higher female preponderance. In this study, the peak incidence was found in the age group between 10 and 20 years. This was in concordance with the study Arya et al.<sup>10</sup> which reported that the highest incidence was among 11 – 20 years. In contrast to my study, Iqbal et al.<sup>2</sup> and Shymala et al.<sup>9</sup> showed that peak incidence was occurring in infants and young children. Children are more prone to the development of Otitis media because their Eustachian tubes are shorter and more horizontal than adults and are made of more flaccid cartilage which causes impaired opening of the tube. It is also related to forced feeding, improper positioning of infants during breast feeding and bottle feeding. In the present study, unilateral infection was predominant. Left ear was more commonly affected than right ear. This was in contrast to the study of Shrestha et al.<sup>8</sup> and Shymala et al.<sup>9</sup> in which right ear was commonly affected. About 84.9% of cases yielded positive result. Because of variation in climate, community and patient characteristics, the pattern of microbiological distribution varies in Chronic Suppurative Otitis Media. Majority of bacterial isolates of in our study were *Pseudomonas aeruginosa* (32.2%), followed by *Staphylococcus aureus* (13.3%), *Klebsiella aerogenes* (8.9%), *Proteus mirabilis* (11.1%), *Escherichia coli* (6.7%), Non fermenting Gram negative bacilli (3.3%) and *Klebsiella oxytoca* (2.2%). These results were in concordance with the studies of Mansoor et al.,<sup>3</sup> Kumar et al.<sup>7</sup> and Al-Snafi et al.<sup>13</sup> Whereas Mann et al.<sup>14</sup> reported *Staphylococcus aureus* as the most predominant organism in Chronic Suppurative Otitis Media. Only 15% of specimens were positive for fungal culture. The fungi isolated were *Aspergillus fumigatus* and *Aspergillus niger*. Study of Iqbal et al.<sup>2</sup> also had same results (i.e) all of the fungal species isolated were of *Aspergillus spp.* They are commensals and do not require treatment. The sensitivity patterns of microorganisms to antibiotics are changing from time to time. The organisms are becoming more resistant to antibiotics. In my study, Ciprofloxacin and Amikacin had been found as most effective drug followed by Amoxicillin-Clavulante and Ceftazidime for many organisms. This may be due to their mode of action. Aminoglycoside antibiotics were used either systemically or locally but significant side effects especially their ototoxicities have limited its usage. Ciprofloxacin has been increasingly prescribed now.

**Conclusion:**

These findings suggest that the chronic suppurative otitis media has become a disease of public health importance in the present days in developing countries like India. It is a well-known disease of multiple etiology and its recurrence and persistence. Irregular, haphazard and indiscriminate use of antibiotics has precipitated the emergence of multi resistant bacteria. *Staphylococcus aureus* was the most common pathogen followed by *Pseudomonas aeruginosa* in Chronic Suppurative Otitis Media, Most of them were sensitive to Amikacin and Ciprofloxacin; and least sensitive to Erythromycin. Fungi isolated belonged to *Aspergillus spp.* The important factor responsible for development of resistance is inappropriate duration of treatment and dose of antibiotics. Judicial use of antibiotics is necessary for the prevention of development of antibiotic resistance.

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