



## BACTERIOLOGICAL AND MICROBIOLOGICAL STUDY OF CHRONIC MAXILLARY SINUSITIS

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### ABSTRACT

Sinusitis is a common problem worldwide. In the present study conducted on 50 adult patients who attended the ENT Department at Rajah Muthiah Medical College and Hospital, we analyzed pre-operative bacterial and fungus flora in chronic maxillary sinusitis. We reviewed the microbiology of chronic sinusitis in the local population and the antibiotic sensitivity of the organisms, studied the incidence of fungal infection in chronic maxillary sinusitis and analyzed the antibiotic sensitivity of bacteria for proper administration of antibiotics. Our results proved that rational and scientific management of chronic maxillary sinusitis based on bacteriological and mycological study of aspirates from the maxillary antrum alleviates patients of chronic maxillary sinusitis.

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### INTRODUCTION

Sinusitis is the inflammation of the paranasal sinus mucosa. It is a common problem worldwide. In India there are no proper statistics regarding the magnitude of the condition. Despite its prevalence, sinusitis remains one of the most over looked and misunderstood problems in clinical medicine. The microbiology of chronic sinusitis has been well documented, but much of the literature relates to the European and North American continents. Fungal sinusitis has emerged as a more vital health problem in modern times because of the rising incidence of immune deficient states such as AIDS, uncontrolled diabetics and patients who are undergoing broad spectrum antibiotic therapy. Thus this study aims to review the microbiology of chronic sinusitis in the local population and the antibiotic sensitivity of the organisms, study the incidence of fungal infection in chronic maxillary sinusitis and analyze the antibiotic sensitivity of bacteria for proper administration of antibiotics.

#### Aims and Objectives

1. To study the incidence of aerobic and anaerobic bacteria in chronic maxillary sinusitis.

2. To study the incidence of fungal infection in chronic maxillary sinusitis.
3. To find out the antibiotic sensitivity of bacteria for proper administration of antibiotics.

### MATERIALS AND METHODS

The present study of pre-operative bacterial flora and fungus in chronic maxillary sinusitis was conducted on 50 adult patients who attended the ENT Department at Rajah Muthiah Medical College and Hospital between Jan 2014-Dec.2016.

#### Patient Selection

Patients presenting with recurrent (more than 4 acute episodes per year) or persistent (more than 12 weeks) sinus complaints, including nasal discharge, nasal obstruct, cough, headache, facial fullness, were evaluated for chronic sinusitis. Evaluation included otorhinological examination and conventional radiograph (X-ray paranasal sinuses- Water's view). Antral lavage, intranasal antrostomy and Caldwell-luc were the three surgical procedures employed.

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### Collection of the Specimen

**Antral lavage-** The inferior meatus was anaesthetized by keeping a cotton wick soaked in 4 % xylocaine for 10 minutes. The antrum was then aspirated with the help of syringe fixed to the cannula, if no aspirate was obtained then 5-10 ml of normal saline was injected into the antrum through the cannula and was aspirated back into the syringe, sent immediately to the microbiological lab where it was processed aerobically and anaerobically and for fungal growth.

### Microbiological Analysis

For aerobic organisms, the specimens were inoculated on to sheep blood, chocolate and MacConkey's agar plates, incubated at 37°C in air (macconkey's agar) or in air with carbon dioxide 5% (blood and chocolate agar), and examined after 24 and 48 hours. For anaerobes the material was plated onto pre-reduced vitamin K<sub>1</sub>-enriched Brucella blood agar, a blood agar plate containing Kanamycin sulfate and vancomycin hydrochloride and a blood agar plate containing colistin and nalixidic acid and inoculated into enriched thioglycate broth. Fungal examination was done by two methods. (i) KOH smear, (ii) Culture of fungus. For the culture of fungus the specimen was inoculated on two sets of sabarauds dextrose agar, containing 0.05mg/ml of chloramphenicol and 20 mg/ml of Gentamycin at 37° and 22° C.

### Observations

Observations in the present study of Bacteriological and mycological study in chronic maxillary sinusitis were as follows.

**Table 1** Durations of illness

| Duration of illness | No of cases | Percentage |
|---------------------|-------------|------------|
| 3-5 months          | 25          | 50%        |
| 6-8 months          | 13          | 26%        |
| 9-12 months         | 11          | 22%        |
| 13-24 months        | 1           | 2%         |

Maximum number of cases presented with 3-5 month duration of illness.

**Table 2** Clinical symptoms

| Symptom              | No of cases | Percentage |
|----------------------|-------------|------------|
| Headache             | 50          | 100%       |
| Nasal discharge      | 30          | 60%        |
| Nasal obstruction    | 26          | 52%        |
| Heaviness over cheek | 14          | 28%        |
| Sneezing             | 9           | 18%        |
| Disorder of smell    | 7           | 14%        |
| Ear pain             | 2           | 4%         |
| Toothache            | 1           | 2%         |
| Fever                | 1           | 2%         |

In the present study headache was the commonest symptom-100%

**Table 3** Clinical signs

| Signs                            | No of cases | Percentage |
|----------------------------------|-------------|------------|
| Pus in the middle meatus         | 28          | 56%        |
| Tenderness over maxillary antrum | 26          | 52%        |
| Post nasal discharge             | 19          | 38%        |
| Deviated nasal septum            | 15          | 30%        |
| Congested nasal mucosa           | 6           | 12%        |
| Inferior turbinate hypertrophy   | 5           | 10%        |
| Dental caries                    | 1           | 2%         |

In the present study commonest finding was pus in the middle meatus- 56%.

**Table 4** Radiological findings

| X-Ray              | No of cases | Percentage |
|--------------------|-------------|------------|
| Fluid level        | 4           | 8%         |
| Complete opacity   | 27          | 54%        |
| Incomplete opacity | 19          | 38%        |

In the present study maximum number of cases show complete opacity-54%.

**Table 5** Bacteria

| Type           | No of cases | Percentage |
|----------------|-------------|------------|
| Total          | 42          | 84%        |
| Only Aerobic   | 25          | 50%        |
| Only Anaerobic | 2           | 4%         |
| Mixed          | 15          | 30%        |
| No growth      | 8           | 16%        |

Only aerobic bacteria was isolated in more number of cases i.e, 50% where as overall isolation of anaerobic bacteria was in 34% of cases.

**Table 6** Aerobic bacteria

| Type                     | No of samples | Percentage |
|--------------------------|---------------|------------|
| Proteus                  | 9             | 18%        |
| Escherichia. Coli        | 6             | 12%        |
| Klebsiella               | 7             | 14%        |
| Pseudomonas              | 7             | 14%        |
| Staphylococcus albus     | 7             | 14%        |
| Staphylococcus aureus    | 2             | 4%         |
| B-hemolytic streptococci | 2             | 4%         |
| Mixed                    | 1             | 2%         |

Proteus was isolated in more number of samples-18%

**Table-7** Anaerobic bacteria

| Type               | No of samples | Percentage |
|--------------------|---------------|------------|
| Bacteroides        | 8             | 16%        |
| Peptostreptococcus | 9             | 18%        |

Peptostreptococcus was isolated from 18% of samples.

**Table 8** Fungal growth

| Type                  | No of samples | Percentage |
|-----------------------|---------------|------------|
| Candida albicans      | 8             | 16%        |
| Aspergillus niger     | 6             | 12%        |
| Aspergillus fumigates | 1             | 2%         |

Maximum number of fungal isolates were candida albicans.

## DISCUSSION

The observations made in the study were analyzed and compared with the findings of other studies.

### Clinical Symptoms

In the present study as shown in table -2, symptom of headache was 100%, nasal discharge was 60 %, nasal obstruction was 52%, and heaviness over cheek was 28%. J.K.Thomas *et al.*, in their study in 1993<sup>(1)</sup> shows that nasal block is seen in 82 % of cases, nasal discharge in 95%, headache in 82 %, facial pain in 53% cases,

### **Clinical Signs**

In the present study as shown in table-3, pus in the middle meatus was seen in 56% of cases, tenderness was seen in 52% of cases, deviated nasal septum in 30 % of cases. J.K.Thomas *et al.*, in their study in 1993<sup>(1)</sup> shows that sinus tenderness is seen in 62% and pus in the middle meatus in 22% cases. S. Prabakar *et al.*, in their study in 1992<sup>(2)</sup> shows that tenderness of maxillary sinus is seen in 64% of cases, septal deviation in 51% cases, pus in the middle meatus is seen in 47% of cases.

### **Bacteriology**

The present study shows that bacteria was grown in 84% of all samples. Only aerobic bacteria is seen in 50 % of cases, only anaerobic in 4% of cases and mixed in 30% of cases. Proteus is the aerobicis bactria isolated in maximum number of cases (18%) followed by klebsiella (14%), pseudomonas (14%), staphylococcus albus (14%). In aerobic bacteria Bacteroides is seen in 16% of cases and peptostreptococcus in 18% of cases.

### **Mycology**

In the present study fungus was isolated in 30% of the specimens. Candida albicans was isolated in 16% of cases. Aspergillus niger from 12% of cells and Aspergillus fumigatus from 2 % samples (table-8).

### **CONCLUSION**

- Proper correlation of clinical features and radiological abnormalities give a high degree of prediction in diagnosing maxillary sinusitis.
- Due to the development of multiple drug resistance among the bacterial isolates, antibiotic susceptibility testing is mandatory for choosing the drug of choice.
- Antral aspirates should be sent for culture of fungi especially in cases who are not responding to antibiotic therapy, keeping in view of higher incidence of fungi in the present study.

- Sinus inflammations that persists despite appropriate and adequate medical therapy, and documented recurrent sinusitis with identifiable and related abnormalities in the osteomeatal complex. Septum and maxillary sinus are considered potential indications for surgical intervention.
- Rational and scientific management of chronic maxillary sinusitis based on bacteriological and mycological study of aspirates from the maxillary antrum alleviates patients of chronic maxillary sinusitis.

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