Original Article

# MICROBIOLOGY OF CHRONIC MAXILLARY SINUSITIS

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**Objective:** To know the incidence of microorganisms present in culture of maxillary sinus secretion in patients of chronic maxillary sinusitis..

**Methods:** We selected 86 patients diagnosed with chronic maxillary sinusitis for our cross sectional study. Ages of patients were ranging from 20y to 55y.Mean age was 34 years. All patients with diagnosis of chronic maxillary sinusitis were included in this study. In all 86 patients proof puncture done through Lichwitz trocar and cannula and sinus secretion was collected for culture.

**Results:** In our study we collected sinus aspiration from 86 patients. We found 78 (90.7 % ) patients were positive for bacterial infection and 8 (9.3% ) patients were negative of any bacterial infection. In our study 38 (44%) patients were suffering from aerobic infection while 20 ( 23.25 %) were suffering from anaerobic infection. 20 (20.25%) patients were suffering from mixed bacterial infection. Among aerobes , staphylococcus aureus was the most common bacteria isolated from sinus secretion of 9 (10.4%) patients . Almostone quarter patients were suffering from anaerobic bacterial infection. Twenty patients (23.25 %) were suffering from both aerobic and anaerobic infections .

**Conclusions:** Chronic maxillary sinusitis is polymicrobial pathology. Various aerobes and anaerobes and mixed organisms are involved in its pathophysiology.

**Keywords:** Microorganisms, maxillary, sinusitis

## Introduction

Many studies have been done about Chronic Rhinosinusitis (CRS) but there is no clear understanding about its true pathogenic organisms and mechanism of pathogenicity.[1] Although there is much progress in medical field , but still we are not sure which agents are responsible for initiation and regulation of lymphocytic and eosinophilic activities which lead to CRS due to inflammatory events in mucosa of nose and sinuses.[2] According to current researches, infectious agents like bacteria and fungi are the main causative agents responsible for Chronic Rhinosinusitis. Several researches have done on microbiology of acute rhin osinisits but there is no definitive data on actual distribution of pathogens in the patients of CRS.[3] This variation may be due to variability in studies due to techniques and sample collection methods. Bacterial culture methods and antibiotics taken for long duration by patients are other factors which make it impossible to agree on a definitive diagnosis of pathogens.[4] Because of the aforementioned reasons, we decided to study the microbiology of chronic maxillary sinusitis and know its distribution in our society.

## Methods

This study was conducted in ENT Unit1 Mayo Hospital, Lahore. Current study duration is May 2014 to April 2015. The study design is clinical prospective study. After informed consent we selected 86 patients diagnosed with chronic maxillary sinusitis for our cross sectional study. Ages of patients were ranging from 20y to 55y.Mean age was 34 years. All patients with diagnosis of chronic maxillary sinusitis who are not responding to conventional treatment and did not take any antibiotics from last one month were included in this study. Patients younger than 20 years or suffering from acute maxillary sinusitis or under developed maxilla or maxillary fracture were excluded from the study. In all 86 patients proof puncture done through Lichwitz trocar and cannula .After apply local anesthetic spray and nasal decongestant a point 1.5 to 2 cm posterior to anterior end of inferior turbinate and near the attachment of concha was selected for puncture because the bone is very thin here to be punctured. Maxillary sinus was irrigated with 20ml of normal saline at $37^{0c}$ and sinus secretion was collected for culture and sent to Pathology Department of King Edward Medical University.

## Results

In our study we collected sinus aspiration from 86 patients. We found 78 (90.7 % ) patients were positive for bacterial infection and 8 (9.3% ) patients were negative of any bacterial infection. In our study 38 (44%) patients were suffering from aerobic

infection while 20 (23.25 %) were suffering from anaerobic infection. 20 (20.25%) patients were suffering from mixed bacterial infection **(Ttable 1).** Among aerobes, staphylococcus aurous was the most common bacteria isolated from sinus secretion of 9 (10.4%) patients.Streptococcus pneumoniae was present in 5 patients (5.8%) as shown in **Table 2.** Almostone quarter patients were suffering from anaerobic bacterial infection. Peptostrepto- cocucusspp was found to be present in 4 patients (4.65%). Prevotellamelaninogenica was also found in 4 patients(4.65%).Twenty patients (23.25 %) were suffering from both aerobic and anaerobic infections.

**Table-1:** status of microorganisms.

| Status of Microbes | No of patients | Percentage |
|---|---|---|
| Aerobes | 38 | 44.18605% |
| Anaerobes | 20 | 23.25581% |
| Mixed | 20 | 23.25581% |
| Negative | 8 | 9.302326% |
| Total | 86 | 100% |

**Table-2:** Details of microorganism.

| Organism | No of patients | Percentage |
|---|---|---|
| **Aerobes** | | |
| Staphylococcus Aureus | 9 | 10.46512% |
| Streptococcus pyogenes | 4 | 4.651163% |
| Escherichia coli | 3 | 3.488372% |
| Staphylococcus epidermidis | 2 | 2.325581% |
| Streptococcus Pneumoniae | 5 | 5.813953% |
| Haemophilusparain? Uenzae | 2 | 23.25581% |
| Streptococcus viridans | 1 | 1.162791% |
| Pseudomonas aeroginosa | 4 | 4.651163% |
| Proteus mirabilis | 1 | 1.162791% |
| Klebsiellapneumoniae | 1 | 1.162791% |
| Enterobacteraerogenes | 3 | 3.488372% |
| Haemophilusinfluenzae | 3 | 3.4488372% |
| **Anaerobes** | | |
| Peptostreptococusspp | 4 | 4.651163% |
| Fusobacteriumnucleatum | 1 | 1.162791% |
| Prevotellalamelaninogenica | 4 | 4.651163% |
| Prevotellainte media | 2 | 2.325581% |
| Eubact eriumspp | 3 | 3.488372% |
| Clostridumspp | 4 | 4.651163% |
| Bacteriodesspp | 2 | 2.325581% |
| **Mixed** | | |
| Mixed | 20 | 23.25581% |
| Negative | 8 | 9.302326% |
| Total | 86 | 100% |

## Discussion

The pathogenicity of chronic maxillary sinusitis is from a variety of microbes containing both aerobic and anaerobic bacteria.[5] Studies show anaerobic bacteria varies from 25 to 56% in different researches.[6,8] When using different methods , anaerobes can be isolated from more than half cases of chronic maxillary sinusitis. The prevalence of isolation of Gram-negative aerobic rods including Pseudomonas aeruginosa and Staphylococcusaureus also found in different range , from 1 to 29%.[9] Chronicmaxillary sinusitis is established of being caused by poor paranasal sinus ventilation and disorders of drainage due to obstruction of the ostiomeatal complex area in the middle nasal meatus.Nasal polyposis canalso block the sinus ostia which lead to acute sinusitis , recurrent sinusitis or chronic sinusiti.[10]Several studies show that most cases of chronic maxillary sinusitis with nasal polyposis are negative for bacterial infections in majority of cases. In some cases even PCR done which were negative.[11]After introduction of FESS, several studies published on microbiology of chronic maxillary sinusitis after aspiration of sample through middle meatus.[12]A study carried out shows a high association between chronic maxillary sinusitis and cultures results , taken from the secretion harvested from the middle meat us and maxillary sinus . Study suggest that it should be adopted as routine investigation for diagnosis and monitoring the patients with chronic maxillary sinusitis, in order to minimize treatment failure and increase the efficacy of antibiotics.[13]In our study we collected sinus aspiration from 86 patients. We found 78 (90.7 %) patients were positive for bacterial infection and 8 (9.3%) were negative of any bacterial infection. Most of patients in our study were

positive for bacterial infection thus showing the most common cause of chronic maxillary sinusitis is bacterial. This finding is in accordance to study done in other center.[14,15] Only 8 (9.3%) patients were negative for bacterial infections which is in accordance to a study.[16] In our study 38 (44%) patients were suffering from aerobic infection while 20 ( 23.25 %) were suffering from anaerobic infection. 20 (20.25%) patients were suffering from mixed bacterial infection .Aerobic and anaerobic bacterial infections are very common causes of chronic bacterial sinusitis also reported by other studies.[17,18] Only 8 (9.3% ) patients were negative for bacterial sinusitis among 86 patients . Same sterile chronic maxillary sinusitis observed by other researchers.[19] Among aerobes, staphylococcus aureus was the most common bacteria isolated from sinus secretion of 9 (10.4%) patients. Increased incidence of staphylococcus aureus also reported in a study.[20] Streptococcus pneumonia was second most common aerobic bacteria diagnosed in 5 (5.82%) patients. Streptococcus pyogenes and Pseudomonas aeruginosaisolated from maxillary sinus secretion o each(4.65%) patients. Enterobacteraerogene- sisolated from 3 (3.4%) samples, same for Haemophilus influenza. Staphylococcus epidermidis and Haemophiluspara influenzae diagnosed in 2 (2.3%) patients each .Streptococcus viridans, Proteus mirabilis and Klebsiella pneumonia were least pathogenic aerobic organisms, found in only 1 (1.16%) patient each. Aerobic infection of chronic maxillary sinusitis also observed in another study.[21] Almost one quarter patients were suffering from anaerobic bacterial infection. 4 (4.6%) patients were suffering from Peptostreptococucusspp, Prevotellamela- ninogenica and clostridium sppeach. These anaerobic bacteria found in another study to cause chronic maxillary sinusitis.[22] second most anerobic infection was Eubacteriumspp in 3 (3.4%) patients. Prevotellaintermedia and Bacteroidesspp found in 2 (2.3 %)samples each. Fusobacteriumnucleatum was least pathogenic anaerobe found in 1 (1.16 %) patient only. Anaerobes are also found to be cause of chronic maxillary sinusitis in an another study.[21] Twenty patients (23.25 %) were suffering from both aerobic and anaerobic infections .Eight patients (9.3 %) found negative for any bacterial infection among the series of 86 patients .In various studies it has been found that chronic maxillary sinusitis can be caused by mixed bacteriology.[1523]

## Conclusion

Chronic maxillary sinusitis is polymicro-bialpathology. Various aerobes, anaerobes and mixed organisms are involved in its patho- physiology.

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