Bacterial Flora and Antibiotics Sensitivity Pattern in Chronic Rhinosinusitis Outpatient Cases in Tertiary Care Hospital

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ABSTRACT

Background

Chronic rhinosinusitis is a disease that afflicts a significant percentage of the population and causes considerable long-term morbidity. The initial treatment is clinical evaluation followed by starting empirical antibiotics. With the use of empirical antibiotics there is a possibility of aggravating the disease and leading to the persistence of chronic sinusitis. In order to start a protocol for rational use of antibiotics, we need to have the bacteriological profile in cases of chronic rhinosinusitis along with the sensitive group of antibiotics.

Objective

To determine the bacterial flora in nasal swab of patients with chronic rhinosinusitis and identify the sensitive antibiotics for the bacterial isolate.

Method

A prospective, cross-sectional study was conducted in ENT Head and Neck Department of tertiary care hospital. The study population was the patients with clinical diagnosis of chronic rhinosinusitis whose nasal swabs were taken during nasal endoscopy and sent for culture and sensitivity. The data were entered in Microsoft Excel and analyzed using statistical computer program Statistical Package for the Social Sciences (SPSS). The ethical approval for the study was taken from Ethical Committee of Kathmandu Medical College.

Result

There were 60 (87%) bacterial isolate growths out of 69 samples of which 49 (82%) were gram positive and 11 (18%) were gram negative. The most common bacteria isolated was *S aureus* (42%) followed by *Cogaulase neagative Staphylococcus* (25%).

Conclusion

Among gram positive isolates, amoxycillin was the most sensitive antibiotic and among gram negative isolates, ceftriaxone, levofloxacin, imipenem, meropenem and piperacillin were most sensitive antibiotics. In this study, we have determined the bacterial flora from endoscopic nasal swab of the sinuses in chronic rhinosinusitis patients and identified the sensitive antibiotics. This study would help us prescribe rational antibiotics in cases of chronic rhinosinusitis.

KEY WORDS

Antibiotics, Bacteria, Chronic rhinosinusitis, Sensitivity

INTRODUCTION

Chronic rhinosinusitis is a common disease presenting in ENT outpatients clinic in tertiary care hospital. In 2003, a task force was convened by the Sinus and Allergy Health Partnership which defined Chronic rhinosinusitis as a group of disorders characterized by inflammation of the mucosa of the nose and paranasal sinuses of at least 12 weeks duration.[1] This definition of chronic rhinosinusitis has been endorsed by the American Academy of Otolaryngology-Head and Neck Surgery, the American Academy of Otolaryngic Allergy, the American Rhinologic Society, and the Sinus and Allergy Health Partnership.

The mainstay of treatment in chronic rhinosinusitis is antibiotics. The current practice is to start empirical antibiotics once the diagnosis of chronic rhinosinusitis is established. There is no study describing the bacterial isolates in chronic rhinosinusitis in our institution. The empiric use of broad-spectrum oral antibiotics would increase the possibility of emergence of resistant bacterial strain. This failure of use of sensitive antibiotics would aggravate the disease and lead to the persistence of chronic sinusitis. This would add on to the long term morbidity to the patients with chronic rhinosinusitis.

The aim of this study is to identify the bacterial flora of the sinuses and antibiotics sensitivity pattern in chronic rhinosinusitis patients in ENT outpatient clinic in tertiary care hospital.

METHODS

A prospective, cross-sectional study was conducted in ENT Head and Neck Department of tertiary care hospital, Kathmandu, Nepal from May 2019 to March 2021. The study population was the patients with clinical diagnosis of chronic rhinosinusitis presenting to ENT Head and neck OPD in tertiary care hospital and convenience sampling was used. The inclusion criteria were patients with clinical diagnosis of chronic rhinosinusitis presenting to ENT OPD, age more than 12 years and patients with recurrent history of chronic rhinosinusitis. The exclusion criteria were patients with clinical diagnosis of chronic rhinosinusitis with use of antibiotics 30 days prior, patients admitted in hospital and patient denying consent to participate in the study. The nasal swabs were taken during nasal endoscopy from recruited study participants and the swabs were sent for culture and sensitivity. The ethical approval for the study was taken from Institutional Review Committee of Kathmandu Medical College. (Reference number- 200520198). The data on bacterial isolate growths and antibiotic sensitivity profiles were collected in a proforma designed for the study. The data were entered in Microsoft Excel and analyzed using statistical computer program (SPSS).

RESULTS

A total of 69 nasal swab samples were taken with nasal endoscopy from the study participants with chronic rhinosinusitis. Of the sixty nine swabs, 60 (87%) had bacterial isolate growth out of which 49 (82%) were gram positive and 11 (18%) were gram negative (Fig. 1). The most common bacteria isolated was *S aureus* (42%) followed by *Cogaulase neagative Staphylococcus* (25%) (Fig. 2).
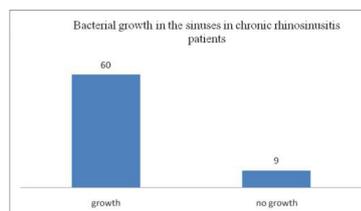

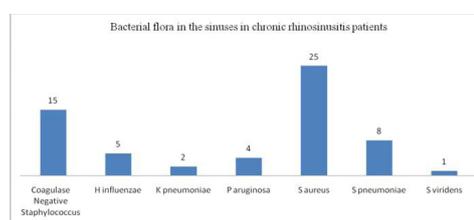**Figure 1.** Bacterial isolates in chronic rhinosinusitis

Figure 2. The gram positive and gram negative bacteria isolated from nasal swabs taken with nasal endoscopy in patients with chronic rhinosinusitis

In gram positive bacterial isolates, the most sensitive antibiotic was amoxicillin for *S pneumoniae, S aureus and Coagulase negative Staphylococcus* (Fig. 3). Among gram negative isolates, ceftriaxone and levofloxacin were the most sensitive antibiotics for *H influenzae,* impipenem was the most sensitive for *K pneumoniae* and piperacillin and meropenem were most sensitive for *Pseudomonas* (Fig. 4).
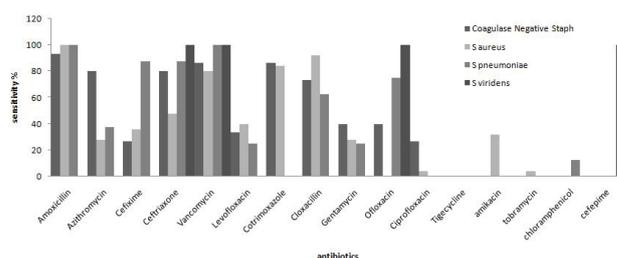

Figure 3. Antibiotic sensitivity patterns of gram positive bacterial isolates in chronic rhinosinusitis patients
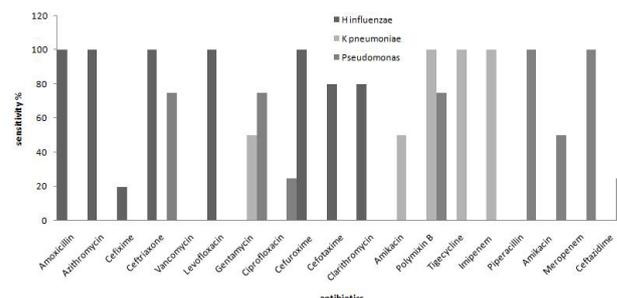

Figure 4. Antibiotic sensitivity patterns of gram negative bacterial isolates in chronic rhinosinusitis patients

DISCUSSION

A study determining antimicrobial utilization pattern in out patient services of ENT department of tertiary care hospital of Eastern Nepal from BP Koirala Institute of Health Sciences showed that sinusitis comprised of 6.28% of the diseases in which antibiotics were prescribed.[2] The study illustrated that an improvement is required in the prescribing patterns in the management of dominant ENT infections to depreciate use of antimicrobials.In a study by Brown et al. from Minneapolis, *Coagulase negative Staphylococcus* was the most common isolate (37%) followed by *Staphylococcus aureus* (25%) in two hundred and seventy four isolates.[3] The study further demonstrated that aerobic rather than anaerobic bacteria were the more common pathogens in chronic sinusitis. Musa et al. from a district hospital in Nigeria showed that the most common bacterial isolate in chronic rhinosinusitis was *Staphylococcus aureus* (35.1%) followed by *Haemophilus influenza* (12.1%).[4] Both Musa et al. and our study showed that the most common gram positive bacteria was *Staphylococcus aureus* (35% vs 42%) and the most common gram negative bacteria was *Haemophilus influenza* (12% vs 8%).[4] In our study, most of the gram positive organisms were sensitive to Amoxycillin whereas the study by Musa et al. showed most of the bacterial isolates were resistant to Amoxycillin.[4] Nadel et al. reported that *Staphylococcus aureus* followed by *Coagulase negative Staphylococcus* were the common bacterial flora in swabs taken from spenoethmoid recess using nasal endoscopy.[5] Lux et al. from New Zealand also concluded that *Staphylococcus* was a dominant bacterial genus in chronic rhinosinusitis and showed that the overall effect of antibiotics was minimal for patient symptom scores and did not support preoperative antibiotics treatment for chronic rhinosinusitis.[6] A study of bacterial flora in nose and paranasal sinuses of chronic rhinosinusititis patients more than 65 years showed that *Proteus spp.* and *Pseudomonas* had frequent occurrence.[7]

Pokharel et al showed that Pseudomonas aeruginosa isolated from various clinical specimens were sensitive to Piperacillin/Tazobactam and Meropenem.[8] In our study,

the *Pseudomonas aeruginosa* isolated from nasal swab in chronic rhinosinusitis were 100% sensitive to Meropenem and Piperacillin.

The Infectious Diseases Society of America (IDSA) clinical guidelines for bacterial rhinosinusitis has recommended Amoxycillin-Clavulanate and has not recommended routine antibiotics for *Staphylococcus*.[9] Rezai et al. from Iran have shown the increasing trend of MRSA (*Methicillin Resistant Staphylococcus*) and ESBL (*Extended spectrum Betalactamase*) producing bacteria in chronic sinusitis.[10] A study from India also showed that the most common bacteria isolated from nasal swabs under endoscopic guidance of chronic rhinosinusitis patients was *Methicillin Resistant Staphylococcus aureus* - MRSA (58.3%).[11] This is an alarming state which can affect our existing antibiotics armamentarium for chronic sinusitis. Dodeja et al. concluded that there is a rise in *Methicillin Sensitive Staphylococcus aureus* (49%) and gram negative rods- *Pseudomonas aeruginosa* (11%) and *Klebsiella* (5%).[12] A study by Malik et al. from India concluded that *Staphylococcus aureus* was most common gram positive bacteria (64%) and *Pseudomonas* was the most common gram negative bacteria (47.6%) and were sensitive to commonly used antibiotics.[13] Xiao et al. from China concluded that fluoroquinolones should be preferred for chronic rhinosinusitis.[14] These are consistent with the findings of this study.

As this is a single institution study, this study has determined the bacterial flora from endoscopic nasal swab of the sinuses in chronic rhinosinusitis and identified the sensitive antibiotics in our institution.

CONCLUSION

The empirical use of antibiotics in chronic rhinosinusitis can lead to treatment failure and development of resistant bacterial strain. This study would help us prescribe rational antibiotics in cases of chronic rhinosinusitis.

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