



Gram Positive Bacterial Pathogens in Acute Exacerbation of Copd And Antibiotic Sensitivity Pattern of These Organisms

KEYWORDS

AECOPD, Gram positive bacterial infections, Antibiotic sensitivity pattern, Empirical antibiotic therapy.

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ABSTRACT *Introduction: Knowledge of common bacterial pathogens and their sensitivity pattern to antibiotics will help in early proper institution of appropriate antibiotic therapy in AECOPD.*

Materials and methods: Sputum culture and sensitivity was done in 90 patients admitted with AECOPD. Those patients with gram positive bacterial infection on sputum culture were analysed for antibiotic sensitivity pattern.

Results: Gram positive organisms were isolated in 29 cases. Most common was streptococcus pneumoniae (45%), followed by streptococcus pyogenes (34%). 100% of Streptococcus pneumoniae were sensitive to 3rd generation cephalosporins ($p=0.0001$ CI 95) and Piperazillin+ Tazobactam, 89% were susceptible to Levofloxacin. 80% were susceptible to ciprofloxacin. Streptococcus pyogenes was susceptible for both Ciprofloxacin & Levofloxacin.

Conclusions: The most common gram positive organism in our study causing AECOPD was streptococcus pneumoniae followed by streptococcus pyogenes. Initial empirical antibiotic therapy can be started with a 3rd generation cephalosporin or ciprofloxacin.

INTRODUCTION:

Exacerbations of COPD have considerable impact on health care system as exacerbation is the major reason for antibiotic use and admissions in COPD patients. COPD exacerbations also lead to indirect costs because of days lost from work¹.

The role of infection in exacerbations of COPD remains controversial and incompletely understood. Although some investigators believe that bacteria are not important for patients with exacerbation, we disagree and believe that patients with at least two of the three cardinal symptoms of exacerbation should receive antibiotic therapy. Still, many questions remain and future studies will be needed to better define the mechanisms of bacterial invasion in the COPD patients and to develop effective vaccines to prevent exacerbation. In the meantime, we must rely on antibiotic therapy and we will need prospective studies to corroborate preliminary findings showing that different patients may require different therapies; thus, patient sub setting may be vital in the selection of antibiotic therapy for exacerbations of COPD.

Studies performed using specific invasive techniques have shown that both the number of patients with pathogenic bacteria in their respiratory secretions and

the number of colony-forming units of such bacteria increase during AECOPD. Furthermore, the local inflammatory response of the host increases with increasing airway bacterial load². Current knowledge indicates that the presence of purulent sputum is one of the best and easiest methods of predicting the need for antibiotic therapy³. The production of purulent sputum is a surrogate marker for exaggerated bronchial inflammation associated with the presence of bacterial pathogens in increasing concentrations⁴.

In a cohort of 1,016 severe COPD patients, infection was the cause of 51% of exacerbations, however, in as much as 30% of cases, the cause was unknown⁵. Environmental factors such as low temperature⁶ and air pollution⁷ also lead to AECOPD.

MATERIALS AND METHODS

This is a hospital based cross sectional study comprising of 90 patients diagnosed with AECOPD from A.J. Institute of Medical Sciences Hospital Mangalore done on patients admitted with acute exacerbation of COPD. Sputum culture and sensitivity was sent prior to starting the antibiotic treatment. Patients with Pulmonary tuberculosis, those who had evidence of pneumonia or bronchiectasis, bronchial asthma, lung abscess, lung cancer, patients who were al-

ready taking antibiotics before selection, patients with Ischemic heart disease, patients with AECOPD not yielding organisms on culture were excluded from the study.

Two early morning sputum samples were collected in sterile containers from all patients after rinsing the mouth twice with plain water and nebulising with bronchodilator. Patients were instructed to collect deep coughed sputum into a sterile wide mouth container with a screw cap. After culture depending on the organism isolated sensitivity testing was done

Sensitivity of following Antibiotics was tested:

ciprofloxacin, levofloxacin, ceftriaxone, cefotaxime, ceftazidime, cefepime, amoxicillin+ clavulnate, piperacillin+ tazobactam, cefoperazone+sulbactam, gentamicin, amikacin, erythromycin, azithromycin ,amoxicillin, penicillin

STATISTICAL ANALYSIS

The data was entered into the Microsoft Office Excel 2007 and analysis was done using Statistical Package for Social Sciences (SPSS) version 17. value of ≤ 0.05 was considered statistically significant.

RESULTS

A total of ninety (90) patients, diagnosed as cases of acute exacerbation of chronic obstructive pulmonary disease admitted were studied. Bacterial infections of AECOPD were analyzed. The individual bacterial isolates and their culture & sensitivity patterns to various antibiotics were also recorded.

BACTERIOLOGICAL PROFILE

Out of ninety (90) pathogenic bacteria isolated, eighty six (86) had single microbial infections and four (4) had polymicrobial infections. Total number of Gram positive organisms isolated were 29 .Most commonest was streptococcus pneumoniae 45%. The next commonest organism isolated was streptococcus pyogenes 34%. Commonest organisms isolated were Pseudomonas(26), Klebsiella pneumonia(14), Streptococcus pneumonia (13), Streptococcus pyogenes(10), Acinetobacter(7), Staphylococcus aureus(6),

Moraxella(5), E.coli(5)

Table1: Antibiotic sensitivity pattern of streptococcus pneumoniae

ANTIBIOTICS	SENSITIVE	RESISTANT	TOTAL
CEFOTAXIME	13(100%)	0	13
CEFTRIAX-ONE	13(100%)	0	13
CEFTAZIDIME	1(100%)	0	1
CEFEPIME	3(100%)	0	3
LEVOFLOXACIN	8(89%)	1(11%)	9
CIPROFLOXACIN	8(80%)	2(10%)	10
AMOXYCLAV	10(77%)	3(23%)	13
PIPZO	9(100%)	0	9
CEF_SULBAC	10(100%)	0	10
GENTAMICIN	12(93%)	1(7%)	13

AMIKACIN	9(100%)	0	9
AZITHROMY-CIN	6(55%)	4(45%)	10
PENICILLIN	2(15%)	11(85%)	13
ERYTHROMY-CINN	3(37%)	5(63%)	8
AMOXYCILLIN	8(61%)	5(39%)	13

Streptococcus pneumoniae was isolated in a total of 13 subjects. 100% of Streptococcus pneumoniae were sensitive to 3rd generation cephalosporins (p=0.0001 CI 95). 89% were susceptible to Levofloxacin. 80% were susceptible to ciprofloxacin. 77% were susceptible to Amoxyclav. 100% were susceptible to Piperazillin+ Tazobactam. 93% of were susceptible to Amino glycosides. 61% of were susceptible to Amoxicillin.

Table 2: Antibiotic sensitivity pattern of streptococcus pyogenes

ANTIBIOTICS	SENSITIVITY	RESISTANT	TOTAL
CEFOTAXIME	10(100%)	0	10
CEFTRIAX-ONE	10(100%)	0	10
CEFTAZIDIME	10(100%)	0	10
CEFEPIME	7(100%)	0	7
LEVOFLOXACIN	9(100%)	0	9
CIPROFLOXACIN	6(100%)	0	6
AMOXYCLAV	8(80%)	2(20%)	10
PIPZO	6(100%)	0	6
CEF_SULBAC	4(100%)	0	4
GENTAMICIN	7(87%)	1(13%)	8
AMIKACIN	6(75%)	2(25%)	8
AZITHROMY-CIN	8(100%)	0	8

Streptococcus pyogenes was isolated in a total of 10 subjects. The susceptibility for both Ciprofloxacin & Levofloxacin was 100%. The susceptibility for Azithromycin was 100%. The susceptibility for Amoxyclav was 80%.

DISCUSSION:

Among the gram positive organisms isolated streptococcus pneumoniae was the most commonest with 45% in a study by Gompertz S, et al⁸ streptococcus pneumoniae and H.influenza were predominant. In a study by Eller Jorg, Anja Ede et al⁴ shows that the predominant organism causing AECOPD include strept.pneumonia, non typable H.influenza and to some extent Moraxella. In a study by Miravittles Marc, Cristina Espinosa et al⁵ shows H.influenza, pseudomonas and streptococcus pneumonia as the most common organisms causing AECOPD.

In contrast to western literature Indian Literature review shows no isolates of H. influenza in AECOPD patients³. In a study by Madhavi S et al⁹ showed staphylococcus aureus, streptococcus pneumoniae, and Streptococcus pyogenes were most common gram positive organisms. A study conducted by Arora usha et al³ shows the predominant organism isolated in AECOPD were staphylococcus aureus, pseudomonas, streptococcus pneumoniae and klebsiella.

In our study of 90 patients most predominant organisms causing AECOPD were gram negative pseu-

domonas, most common among gram positive organisms was streptococcus. Pneumoniae there were no isolates of H.influenza. Antibiotics have to be started empirically to treat the presumed bacterial infection in AECOPD.

Bacterial isolates in acute exacerbation of COPD may vary depending on the geographical area, prevalence of bacteria in the community and hospital setting [10]. So it is important to carry out community based as well as hospital based studies to determine the empirical antibiotic therapy as appropriate early antibiotic therapy in acute exacerbation of COPD will decrease the morbidity and mortality in these patients.

Aminopenicillins like ampicillin and amoxicillin were formerly the standard treatment in AECOPD¹¹. Due to emergence of resistance among respiratory pathogens their utility had been limited. Aminopenicillins with beta lactamase inhibitor is a better choice. Cephalosporins demonstrated clinical efficacy and tolerability that can surpass the standard aminopenicillins sensitivity of 91%¹². In a study done by Moellering, R. C they found that Aminopenicillins with beta-lactamase inhibitors were better than aminopenicillins alone but were not effective in controlling severe infection in AECOPD due to beta lactamse producing strains¹³

A study done by Vogel, F Cephalosporins have demonstrated clinical efficacy and tolerability that compare well with or surpass those of the standard aminopenicillins with or without a beta-lactamase inhibitor¹⁴

In our study 100% of Streptococcus were sensitive to 3rd generation cephalosporins either cefotaxime or ceftriaxone (p=0.0001 CI 95). 89% of streptococci were susceptible to Levofloxacin. 80% of streptococci were susceptible to ciprofloxacin. 77% of streptococci were susceptible to Amoxycylav. 100% of streptococci were susceptible to Pipzo. 93% of streptococci were susceptible to Aminoglycosides. 61% of streptococci were susceptible to Amoxicillin.

CONCLUSION:

The most common gram positive organism in our study causing AECOPD is streptococcus pneumoniae followed by streptococcus pyogenes. They were sensitive to 3rd generation cephalosporins and levofloxacin, or ciprofloxacin. Therefore initial empirical antibiotic therapy can be started with a 3rd generation cephalosporin or ciprofloxacin.

In our study most of the gram positive organisms were resistant to either amoxacillin, ampicillin, amoxycylav or macrolides. Hence these antibiotics may be avoided in the initial empirical therapy.

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