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Microbial Pattern of Acute Exacerbation of Chronic Obstructive Airway Disease –A South Indian Hospital Based Study.

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Abstract:
Background: *Chronic Obstructive Pulmonary Disease (COPD) is a chronic disease which is characterized by persistent airflow limitation and enhanced chronic inflammatory response in the airway of lungs with frequent exacerbation. The etiology and antibiotic sensitivity have been changing over the years. This study determines the microbiological pattern of sputum and antibiotic sensitivity among COPD patients admitted in a tertiary care Hospital.*
Materials and methods: *In this cross sectional study, 60 patients admitted with acute exacerbation of COPD were included and sputum culture and sensitivity studied for most common pathogen and antibiotic sensitivity.*
Results: *Klebsiella pneumoniae was the most common organism isolated. Meropenem was the most sensitive antibiotic and most resistant antibiotic is Ampicillin. Males were more commonly affected (66.7%) of which 58.5% were smokers and 41 % were non-smokers, females were 33.3%, majority due to biofuel exposure. These results were found to be statistically significant.*
Conclusion: *Klebsiella pneumonia was the most common organism isolated, followed by pseudomonas. Both the organisms were maximally sensitive for meropenem and imipenam; and were more resistant to ampicillin . Selection of antibiotics should be based on local prevalence of bacterial organisms and their sensitivity by sputum culture for faster recovery and decrease in the mortality and morbidity.*
Keywords: *COPD, ACUTE exacerbation, antibiotic resistance, most common organism.*

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I. Introduction:

Acute exacerbation of COPD (AECOPD) is sustained worsening of the patient's condition, from the stable and beyond normal day-to-day variations, that is acute in onset and necessitates a change in regular medication in a patient with underlying COPD (Rodriguez-Roisin 2000). AECOPD is associated with decline in health related quality of life , major cause of mortality and also of decrease in Forced expiratory volume in 1 second (FEV1), 7ml/yr for mild and 40 ml/yr for moderate to severe disease.(4)

COPD is the third leading cause of death. Infective etiology is the major cause of exacerbation in COPD patients presenting to hospital, among the causative agents 40% are bacterial(1). Empirical antibiotic treatment leads to resistance to frequently used antibiotic and necessitates use of higher antibiotics. The choice of antibiotic should be based on local bacterial sensitivity pattern.

II. Materials and Methods

A hospital based cross sectional study was conducted in department of General medicine and Respiratory Medicine department in a tertiary care centre, Pondicherry from for a period of 3 months from May 2019 to July 2019. A total of 60 (both male and female) of age > 18 years were included in this study.
Study Location: This was a tertiary care teaching hospital based study done in Department of General Medicine and Respiratory Medicine, Sri Manakula Vinayagar Medical College and Hospital, Pondicherry.
Study design: Hospital based cross-sectional study.
Study Duration: May 2019 to July 2019.
Sample size: 60 patients**.**

Sample size calculation: Sample size was calculated to be 60 using software Open Epi info version 3. and analysed using SPSS version 24.0.

Inclusion Criteria:

All patients above 18 years of age, diagnosed as AECOPD were included in the study

Exclusion Criteria:

Patients with Heart disease, Bronchial Asthma, Pneumonia, Pulmonary tuberculosis, Bronchial carcinoma were excluded from the study

III. Results

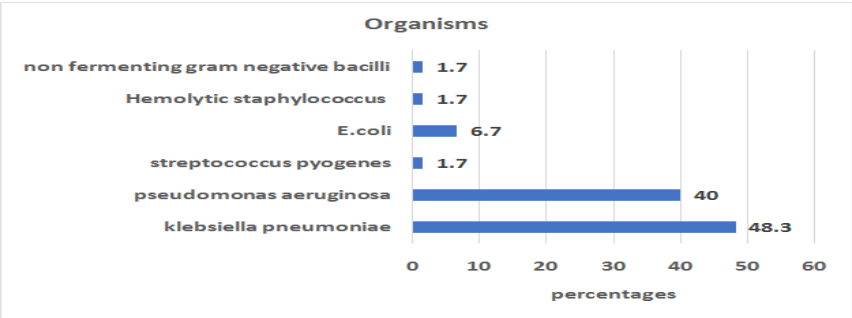
Sixty patients of AECOPD were included in this study. The highest number of patients were in the age group of 59-74 years; with a median of 69 years and mean of 65.4 years (11.9%). the minimum age of presentation was 35 years and maximum of 86 years. Males were more commonly affected (66.7%) of which 58.5% smokers and 41% non-smokers, females constituted 33.3%, majority due to biomass exposure. Out of 60 patients, 48 patients belonged to group C and D, 8 patients came under group B, 4 patients belonged to group A. Co-morbid conditions at presentation included Diabetes (66.7%) and hypertension (51.7%) .

Table no 1: Shows demographic characteristics of participants (n=60).

Character	Number	Percentage
Gender		
Male	40	66.7
Female	20	33.3
Diabetes Melitus		
Present	40	66.7
Absent	20	33.3
Hypertension		
Present	29	48.3
Absent	31	51.7
H/O Smoking		
Yes	34	58.6
No	24	41.4
H/O Alcohol		
Yes	12	21.4
No	44	78.6

The sputum culture grew klesiella pneumoniae (48.3%); pseudomonas aeruginosa (40%); E.Coli (6.7%); streptococcus pyogens (1.7%); haemolytic streptococcus (1.7%); non fermenting gram negative bacilli (1.7%).

Figure-1: Bar diagram showing organism distribution in the study.



Among the organisms isolated klebsiella pneumoniae developed maximum resistance to ampicillin(94.4%), amikacin(66.7%), and least resistance to imipenam(9.5%). Pseudomonas developed maximum resistance for ampicilin, and minimal resitance to ceftazidime. E.Coli was most resistant to ciprofloxacin and tobramycin and least resistant to imipenam. Gram negative bacilli was most resistant to ampicillin, ceftriaxone an gentamycin.

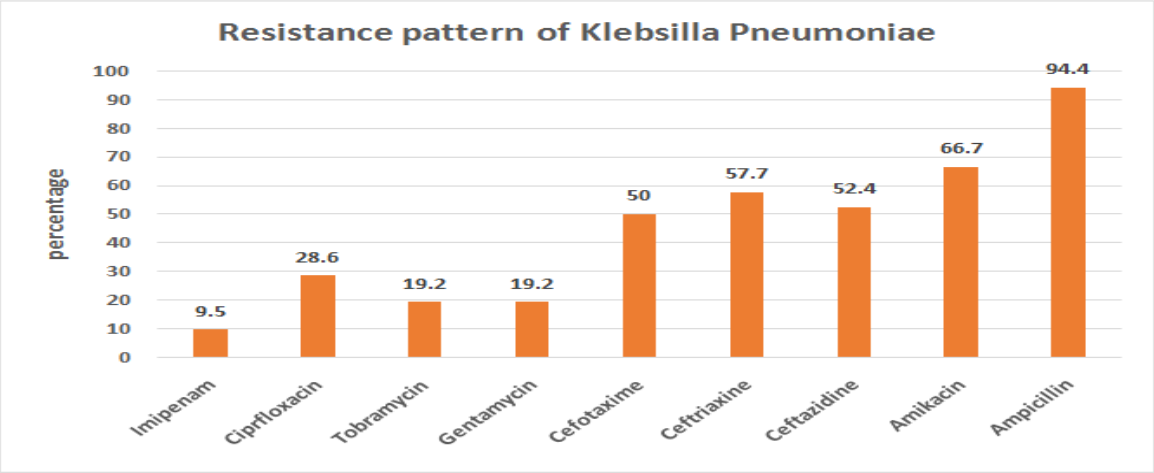


Figure 2 – Resistance pattern of klebsiella pneumonia.

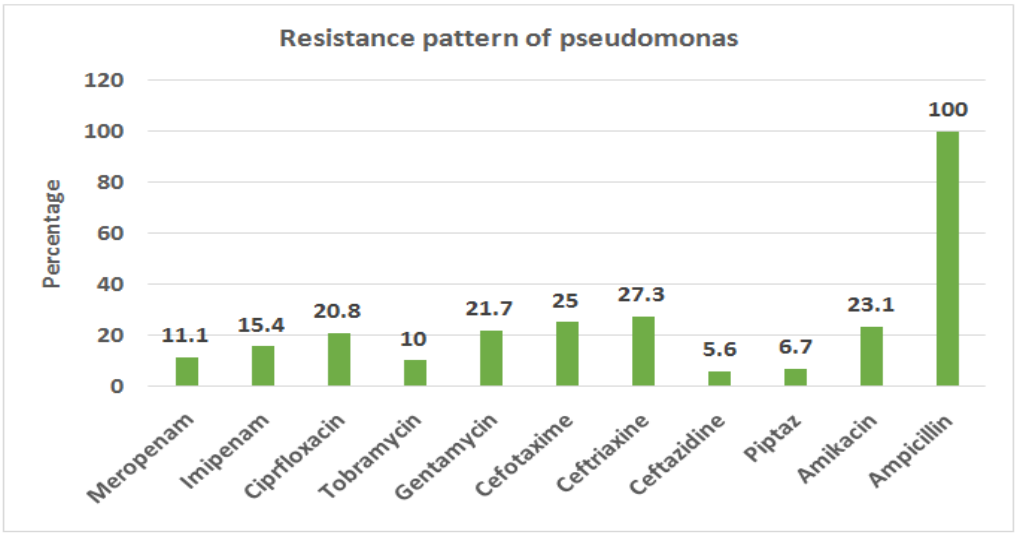


Figure 3 – Resistance pattern of pseudomonas.

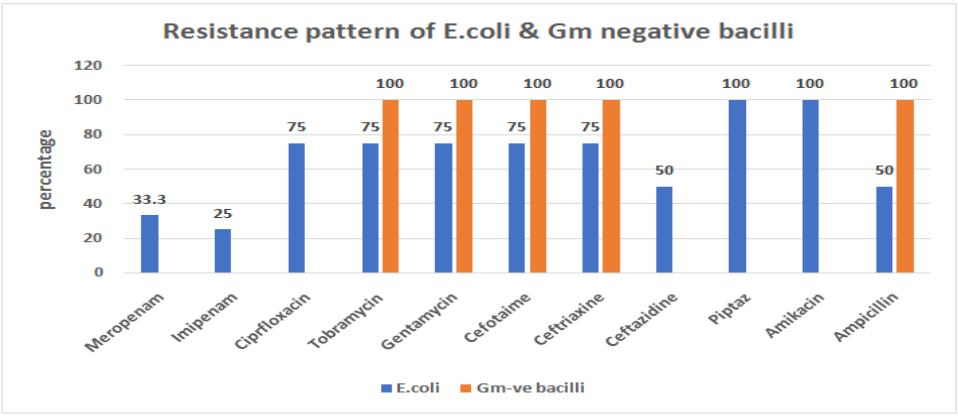


Figure 4- Resistance pattern of gram negative bacilli

Table no 2: Antibiotic sensitivity and resistance among the organisms isolated.

Drug	Resistant		Sensitive	
	count	percentage	count	Percentage
Meropenam	2	6.1	31	93.9
Imipenam	5	12.8	34	87.2
ciprofloxacin	16	27.6	42	72.4
Tobramycin	11	21.6	40	78.4
Gentamycin	14	25.9	40	74.1
Cefotaxime	17	51.5	16	48.5
ceftriaxine	25	47.2	28	52.8
Ceftazidine	13	31.0	29	69.0
Amikacin	6	35.3	11	64.7
Ampicillin	25	92.6	2	7.4
Piptaz	2	10.5	17	89.5

Table no 3: Distribution of organisms according to gold criteria classification of AECOPD.

Gold criteria	Total number of patients	Klebsiella pneumonia	Pseudomonas	E.Coli	Haemolytic streptococcus	Non fermenting gram negative bacilli
Group A	4	0	0	2	0	2
Group B	8	0	4	3	1	0
Group C&D	48	30	15	3	0	0

IV. Discussion

Among the included patients, 59-74 years constituted the maximum age of presentation. Males were more commonly affected because they were more involved in smoking. In women who are non smokers, biomass exposure is the most common reason.

In our study, klebsiella pneumonia(48.3%) was the most common pathogen isolated in sputum culture followed by pseudomonas(40%), E.coli (6.7%), streptococcus pyogens. These results were consistent with the study conducted by *Narayanagowda et al*, which showed 38.46% were klebsiella[3]. Pseudomonas was the most common organism isolated in a study by Priya et al and Streptococcus pneumoniae (32%) is the predominant organism in the study by Anand et al.

It was found that Meropenam(93.9%) was the most sensitive antibiotic which is concordant with the results of study by rashed et al[(2)] ,followed by piperacillin –tazobactum (89.5%), imipenam(87.2%), ciprofloxacin(72.4%), tobramycin (78.4%), gentamycin(74.1%), ceftazidime (69%).

On analysis of resistance pattern, Ampicillin(92.6%), cefotaxime(51.5%) and ceftriaxone(31%) had the most resistance by organisms like klebsiella and pseudomonas. In our study, most of the patient with severe symptoms and admitted in ICU needing non invasive ventilation fell under class C and D (Gold classification).

V. Conclusion

Klebsiella pneumonia was the most common organism isolated, followed by pseudomonas. Both the organisms were maximally sensitivity for meropenem and imipenam and the resistance was maximum to ampicillin . In AECOPD empirical antibiotic therapy leads to high resistance for commonly used antibiotics. Selection of antibiotic should be based on local prevalence of bacterial organisms and their sensitivity by sputum culture for faster recovery and decreasing the mortality and morbidity.

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