MAK HILL Publications International Journal of Tropical Medicine

Research Article
doi: 10.36478/makijtm.2024.4.207.210

OPEN ACCESS

Key Words
Antibiotic sensitivity sputum samples, acute exacerbation, COPD to our hospital

Corresponding Author
Gavishiddesh Vishwanath Ronad, Department of General Medicine, Koppal Institute of Medical Sciences, Koppal, India

Author Designation
[1,2]Senior Resident
[3]Assistant Professor

Received: 20 November 2024
Accepted: 05 December 2024
Published: 31 December 2024

Citation: Nahil Najfi, H. Bhanuprathap and Gavishiddesh Vishwanath Ronad, 2024. Study Antibiotic Sensitivity in Sputum Samples of Patients Admitted with Acute Exacerbation of COPD to our Hospital. Int. J. Trop. Med., 19: 207-210, doi: 10.36478/makijtm. 2024.4.207.210

Study Antibiotic Sensitivity in Sputum Samples of Patients Admitted with Acute Exacerbation of COPD to our Hospital

[1]Nahil Najfi, [2]H. Bhanuprathap and [3]Gavishiddesh Vishwanath Ronad

[1,3]Department of General Medicine, Koppal Institute of Medical Sciences, Koppal, India
[2]Sri Jayadeva Institute of Cardiology Bangalore India

ABSTRACT
Prevalence of COPD among individuals between 5 and 29 years ranged from 0.1-0.9% whereas between 1.6-28.3% among the population aged 30 years or more. To study antibiotic sensitivity in sputum samples of patients admitted with acute exacerbation of COPD to our hospital. The cross-sectional study was conducted among all patients with Acute Exacerbation of Chronic Obstructive Pulmonary disease visiting at Departments of General Medicine, SDM Medical College, Dharwad. In association with Departments of Emergency Medicine and Pulmonology at SDM Medical College and Hospital, Dharwad. Duration of study was September 2019-June 2021. Colistin had sensitivity in 47(42.7%) of the isolates followed by Imipenemin about 44 (40%) and Tigecycline in 43 (39.1%) of the 110 patients. Also, Azithromycin, Cefixime, Cefoxitin and Clarithromycin resistance was seen in few tested samples. There was no difference in culture and sensitivity between the patients with DM, HTN and with no comorbid conditions. As we observed resistance for even the new antimicrobial agents, it is always better to treat the patients based on sensitivity reports.

INTRODUCTION

COPD is characterized by airflow limitation that is not fully reversible and is usually progressive and associated with abnormal inflammatory response of the lungs tonoxious particles or gases caused by significant exposure[1]. The chronic airflow limitation is characteristic of COPD and is a mixture of small airway disease (e.g, obstructive bronchiolitis) and parenchymal destruction (emphysema). COPD includes Emphysema, Chronic Bronchitis and Small airway disease. COPD is commonly seen among older people aged 65 years and older. WHO estimated its rise from being the fourth to the third leading cause of death by 2030. The prevalence of COPD in the US is around 14%. Prevalence of COPD is highest in the Americas and lowest in the South-East Asia, Western Pacific regions as reported by World Health Organization data. The pooled global prevalence is around15.7% and 9.93% among men and women respectively.

AECOPD (Acute Exacerbation of COPD): Defined as sustained worsening of the patient's condition from the stable state (in the patient's baseline dyspnea, cough or sputum or both and beyond normal day to day variation, that is acute in onset and requires a change in regular medication in a patient with underlying COPD as per Gold guidelines[2]. Choosing antibiotics should be based on the local pattern of antibiotic susceptibility of the above pathogens as well as the patient's clinical condition[3]. As a prophylaxis vaccination against H. influenza and Streptococcus pneumoniae is done. Treatment includes bronchodilators, inhaled corticosteroids to dilate the bronchial airway and enhance free flow of oxygen to the tertiary bronchi[4]. Antibiotics for infective cause and mucolytic agents to break down the thick mucus and improve the secretion. Long-term oxygen therapy might be required in few patients to improve survival in severe forms of COPD[7]. So, in this study patients admitted with acute exacerbation of COPD will be tested for culture sensitivity patterns of bacteria found in their sputum so as to establish a baseline anti biogram which may be useful for empirical treatment at the admission of future patients.

MATERIALS AND METHODS

The cross-sectional study was conducted among all patients with Acute Exacerbation of Chronic Obstructive Pulmonary disease visiting at Departments of General Medicine , SDM Medical College, Dharwad. In association with Departments of Emergency Medicine and Pulmonology at SDM Medical College and Hospital, Dharwad. Duration of study was September 2019-June 2021.

Inclusion Criteria: All admitted patients of more than 18 years of age diagnosed as Acute Exacerbation of COPD.

Exclusion Criteria:

- Patients having Bronchiectasis, Tuberculosis.
- Patients who are diagnosed with broncho genic carcinoma.

Sample Size Calculation: Approximately 95 are the samples But we found 110 cases of COPD exacerbation during our study period. Hence have recruited all the patients for better analysis.

Method of Sampling: Convenience sampling.

Data Collection: Data was collected from patients who satisfied the inclusion criteria, using a preformed questionnaire. Demographic details like name, age sex, address, date of admission, clinical data like complaints, personal history, past medical history, chest x-ray, examination findings and details of clinical diagnosis were noted. Blood investigation such as Hemoglobin, TLC, GRBS, Blood urea and S. creatinine levels were noted.

Sample: Sputum-expectorated or induced.

Sample Collection: Sputum samples will be obtained from patients that are clinically diagnosed as acute exacerbation of chronic obstructive pulmonary disease. Patients will be instructed to collect sputum into a sterile wide mouth container with a screw cap. Deeply coughed sample and they were told to brush their teeth and rinse their mouth with water, just before collecting the sample. Early morning sputum was collected under direct supervision and before any food intake. Samples taken to the laboratory within 1 hour of collection. Induced sputum-after patients inhale aerosolized droplets of 3% NACL for 10 minutes or until a strong cough reflex is induced. The samples will be transported to the department of microbiology SDM College and Hospital for analysis. Samples will be labeled and numbered after their receipt in the laboratory and processed by conventional methods.

Statistical Analysis: Cross-sectional study of all data will be entered in SPSS software and data will be analyzed using frequencies and percentage.

RESULTS AND DISCUSSIONS

Colistin had the highest proportion of sensitivity i.e. 46 (41.82%) in 110 of the patients, followed by Imipenemi.e. 44(40%) samples were sensitive and

Table 1: Distribution of Sensitivity Patterns for the Different Antimicrobial Agents

Variables	Sensitive	Resistance	%S Strain	%R Strain
Colistin	46	0	41.82%	0.00%
Imipenem	44	14	40.00%	12.73%
Tigecycline	44	4	40.00%	3.64%
Gentamicin	39	15	35.45%	13.64%
Meropenem	36	11	32.73%	10.00%
Ciprofloxacin	33	20	30.00%	18.18%
Ceftriaxone	33	30	30.00%	27.27%
Cefotaxime	31	20	28.18%	18.18%
Amikacin	29	11	26.36%	10.00%
Cefepime	28	30	25.45%	27.27%
Cefoperazone	28	19	25.45%	17.27%
Levofloxacin	28	16	25.45%	14.55%
Piperacillin-Tazobactam	26	19	23.64%	17.27%
Amoxicillin- Clavulanicacid	27	30	24.55%	27.27%
Linezolid	26	0	23.64%	0.00%
Vancomycin	24	0	21.82%	0.00%
CLindamycin	18	7	16.36%	6.36%
Cefuroximeaxetil	15	17	13.64%	15.45%
Ceftazidime	7	5	6.36%	4.55%
Clarithromycin	0	6	0.00%	5.45%
Azithromycin	0	6	0.00%	5.45%

Table 2 : Distribution of Antimicrobial Sensitivity Pattern of Gram Positive Organism

Antibiotics	Sensitive	Resistant	%S Strain	%R Strain
Linezolid	26	0	96.30%	0.00%
Vancomycin	24	0	88.89%	0.00%
Clindamycin	18	0	66.67%	0.00%
Ceftriaxone	15	3	55.56%	11.11%
Cefotaxime	14	4	51.85%	14.81%
Levofloxacin	13	7	48.15%	25.93%
Co-trimoxazole	11	8	40.74%	29.63%
Teicoplanin	9	0	33.33%	0.00%
Amoxicillin/clavulanic	9	12	33.33%	44.44%
Cefuroxime	9	4	33.33%	14.81%
Tigecycline	8	0	29.63%	0.00%
Gentamicin	8	4	29.63%	14.81%
Tetracycline	8	1	29.63%	3.70%
Erythromycin	7	0	25.93%	0.00%
Ciprofloxacin	5	8	18.52%	29.63%
Rifampicin	5	0	18.52%	0.00%
Daptomycin	2	0	7.41%	0.00%
Oxacillin	0	4	0.00%	14.81%

Table 3:Distribution of Antimicrobial Sensitivity Pattern of Gram Negative Organism

Antibiotics	Sensitive	Resistant	%S Strain	%R Strain
Colistin	46	0	82.14%	0.00%
Tigecycline	34	4	60.71%	7.14%
Meropenem	34	9	60.71%	16.07%
Imipenem	30	12	53.57%	21.43%
Gentamicin	31	11	55.36%	19.64%
Amikacin	29	7	51.79%	12.50%
Ciprofloxacin	28	23	50.00%	41.07%
Cefoperazone	26	13	46.43%	23.21%
Piperacillin/tazobacta M	23	17	41.07%	30.36%
Cefepime	22	19	39.29%	33.93%
Ceftriaxone	18	17	32.14%	30.36%
Amoxicillin/Clavulanic	18	18	32.14%	32.14%
Cefotaxime	17	16	30.36%	28.57%
Levofloxacin	15	9	26.79%	16.07%
Cotrimoxazole	13	13	23.21%	23.21%
Ceftazidime	8	6	14.29%	10.71%
Cefuroxime	6	13	10.71%	23.21%
Ertapenem	4	0	7.14%	0.00%
Nitrofurantoin	2	6	3.57%	10.71%
Ampicillin	1	11	1.79%	19.64%
Aztreonam	1	3	1.79%	5.36%

Tigecycline in 44 (40%) of the 110 patients. Also, Azithromycin, Cefixime, Cefoxitin and Clarithromycin resistance was seen in all the samples which were tested. >50% of the organisms were sensitive to Linezolid, Vancomycin, Clindamycin, Ceftriaxone and Cefotaxime. Of which the 96.3% sensitivity was found for Linezolid. Few gram positive organisms were sensitive to Levofloxacin, Cotrimoxazole, Erythromycin, Ciprofloxacin, Rifampicin, Daptomycin and Oxacillin Overall gram positive isolates grown were 27, for

which the sensitivity pattern is obtained as follows, Overall gram negative organisms were 56, out of which the sensitivity pattern were found as follows, More than 50% of the gram negative strains were positive for Colistin, Tigecycline, Meropenem, Imipenem, Gentamicin and Amikacin. Of which, 82.14% of the strains were sensitive to colistin.

In our study, all the isolates were sensitive to Colistin (41.82%) followed by Imipenem i.e. 44 (40%) and Tigecycline in 44 (40%). And most of the microbes were sensitive to Gentamicin, Meropenem, Ciprofloxacin, Ceftriaxone, Cefotaxime with >30% of the prevalence. Even Sharma P *et al* also observed all the isolates being sensitive for Colistin[5]. Also, Azithromycin, Cefixime, Cefoxitin and Clarithromycin resistance was seen in all the samples which were tested. Similar to our study, the antibiogram of Larsen MV *et al* showed that the majority of the obtained isolates were resistant to penicillin[5]. But Sobhy KE *et al,* found Imipenem being the commonest sensitive anti-microbial agent. Raveendra K *et al* found many MDR strains in their study. Resistance to newer antibiotics were also noted and required change in medication[6,7]. We observed distribution of organisms grown from the isolates of DM and HTN patients same as the other organisms. Also the sensitivity pattern was also similar to otherisolates.ThisfindingisconsistentwithLinLetalbutt heyobserved littlelower PaO2 in the newly diagnosed T2DM and HTN group had a longer hospital stay and higher tropon in level compared to non-diabetic group[8]. Emergence and spread of drug-resistant pathogens lead to antimicrobial resistance, so it is wise to choose the antimicrobial agents based on the sensitivity pattern obtained by the sputum and blood cultures. This will reduce the resistance and the reserve of higher antimicrobial agents for further treatment. Duration of hospital stay, recovery of patient and response to treatment should have been followed. Due to covid pandemic and patient presenting in acute exacerbation spirometry was not performed.

CONCLUSION

There was no difference in culture and sensitivity between the patients with DM, HTN and with no comorbid conditions. As we observed resistance for even the new antimicrobial agents, it is always better to treat the patients based on sensitivity reports.

REFERENCES

1. Vogelmeier, C.F., G.J. Criner, F.J. Martinez, A. Anzueto and P.J. Barnes *et al.,* 2017. Global Strategy for the Diagnosis, Management and Prevention of Chronic Obstructive Lung Disease 2017 Report. GOLD Executive Summary. Am. J. Respir. Crit. Care Med., 195: 557-582.
2. Soriano, J.B., B. Lamprecht, A.S. Ramírez, P. Martinez-Camblor and B. Kaiser et al., 2015. Mortality prediction in chronic obstructive pulmonary disease comparing the GOLD 2007 and 2011 staging systems: A pooled analysis of individual patient data. Lancet Respir. Med., 3: 443-450.
3. Miravitlles, M. and A. Anzueto, 2017. Chronic Respiratory Infection in Patients with Chronic Obstructive Pulmonary Disease: What Is the Role of Antibiotics? Int. J. Mol. Sci., Vol. 18 .10.3390/ijms18071344.
4. Varkey, J.B., A.B. Varkey and B. Varkey, 2009. Prophylactic vaccinations in chronic obstructive pulmonary disease: Current status. Curr. Opin. Pulm. Med., 15: 90-99.
5. Sharma, P., S. Narula, K. Sharma, N. Kumar, K. Lohchab and N. Kumar, 2017. Sputum bacteriology and antibiotic sensitivity pattern in COPD exacerbation in India. Egypt. J. Chest Dis. Tuberculosis, 66: 593-597.
6. R.K.R., D. Rejeev and N. Kodur, 2019. Study of microbial pattern and antibiotic sensitivity pattern in hospitalised acute exacerbation of COPD patients. Int. J. Adv. Med., 6: 1652-1656.
7. Sobhy, K.E., A.M.A. El-Hafeez, F.A. Shoukry and E.S. Refaai, 2015. Pattern of sputum bacteriology in acute exacerbations of chronic obstructive pulmonary disease. Egypt. J. Bronchology, 9: 170-177.
8. Lin, L., J. Shi, J. Kang and Q. Wang, 2021. Analysis of prevalence and prognosis of type 2 diabetes mellitus in patients with acute exacerbation of COPD. BMC Pulm. Med., Vol. 21 .10.1186/s12890 -020-01371-9.