



## TO STUDY DIFFERENCES IN BACTERIOLOGICAL PROFILE IN SPUTUM SAMPLE OF SMOKER AND NON-SMOKER PATIENTS OF ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASES (AECOPD)

<b>Dr. Soniya Saxena</b>	Assistant Professor , Department of microbiology , LNMC & RC, Bhopal
<b>Dr. Nishant Srivastava*</b>	Associate Professor, Department of TB & Chest, GMC, Bhopal *Corresponding Author
<b>Dr Vijay Kumar Ramnani</b>	Professor and Head, Department of microbiology , LNMC & RC, Bhopal
<b>Dr Lokendra Dave</b>	Professor and Head, Department of TB & Chest, GMC, Bhopal

### ABSTRACT

**Introduction-** COPD is a leading cause of worldwide mortality and disability. Almost all forms of smoking products such as cigarettes and bidies used in different states were found to be associated with COPD. In non-smokers, especially women, exposures to indoor air pollution from domestic combustion of solid fuels is an important factor. **Aim-** To study differences in bacteriological profile in sputum sample of smoker and non-smoker patients of (AECOPD). **Material and Methods-** 200 clinically diagnosed cases of AECOPD of age  $\geq 45$  years were recruited. Their sputum samples each were processed by conventional methods. Preparation of media, reagents, Gram staining, identification of culture isolates, different tests, including antibiotic sensitivity tests were carried out following standard laboratory methods. **Results-** In our study Gram negative bacilli were predominant in smoker COPD cases, as Gram positive cocci and Gram negative bacilli were isolated in 23 and 9 cases respectively in smokers and non-smoker COPD cases. Only Gram positive cocci were isolated in all nine cases. There was no gram negative organism isolated in non smoker COPD group. **Conclusion-** Gram negative bacilli were predominant in smoker COPD cases ,where as Gram positive organisms were predominant in non-smoker COPD population.

**KEYWORDS :** bacteriological profile , smoker and non-smoker, AECOPD

### Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a spectrum of disorders that results in airflow obstruction. By definition, Chronic Obstructive Pulmonary Disease (COPD) is a common preventable and treatable disease, characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases<sup>1</sup>.

Acute exacerbation of COPD (AECOPD) is defined as a sustained worsening of the patient's condition, from the stable state 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<sup>2</sup>.

COPD is a leading cause of worldwide mortality and disability. On average 5-15% of adults in industrialized countries have COPD. COPD is rare before age of 35 years. This disease is increasingly common after age of 45 years<sup>3</sup>. Almost all forms of smoking products such as cigarettes and bidies used in different states were found to be associated with COPD In non-smokers, especially women, exposures to indoor air pollution from domestic combustion of solid fuels was an important factor. More significantly the exposure to environmental tobacco smoke was an established cause for COPD<sup>4</sup>. Atmospheric pollution reflecting in terms of rise in the atmospheric levels of sulphur dioxide, ozone, nitrogen dioxide and particulates are important non infective agents in causation of AECOPD<sup>5</sup>. In many developing countries, indoor air pollution from cooking fire smoke (often using biomass fuels such as wood and animal dung) is a common cause of COPD, especially in women. This is a common method of cooking and heating for nearly three billion people globally<sup>4</sup>. Birth factors such as low birth weight may also play a role as do a number of infectious diseases including HIV/AIDS and tuberculosis<sup>5</sup>.

**Aim-** to study differences in bacteriological profile in sputum sample of smoker and non-smoker patients of Acute Exacerbation of Chronic Obstructive Pulmonary Diseases (AECOPD)

### Material and Method

Permission of institutional ethical committee was taken for this cross-sectional analytical study. 200 clinically diagnosed cases of AECOPD of age  $\geq 45$  years were recruited from of department of medicine and department of TB Chest of L N Medical College and research centre, Bhopal. The exclusion criteria were patients on maintenance treatment of oral steroids or taken recent antibiotic therapy within 7 days, patient having bronchial Asthma, lung abscesses or lung cancer, known case of Pulmonary Koch's, diabetes mellitus or HIV and AECOPD patient on ventilatory support. Two sputum samples after an oral gargle with water was collected directly into a sterile and wide mouthed disposable universal container. After proper collection Sputum, samples were transported to Microbiology laboratory for further processing by conventional methods. Murray and Washington's [6] grading system was followed for assessing the quality of sputum sample of stained smear. Sputum sample was inoculated on 5% Sheep Blood agar, Chocolate agar and MacConkey's agar. These inoculated plates were then incubated for a period of 18-24 hours after which they were examined for evidence of bacterial growth. A single well separated colony was identified. Grams staining of the colony, Hanging drop preparation, Catalase test and Cytochrome oxidase test were done. Biochemical tests like Indole test, Methyl red test, Voges proskauer test, Citrate utilization test, Urease test, Triple sugar iron agar, Nitrate reduction test, Hugh-Leifson's oxidation fermentation test, coagulase production ,Optochin Sensitivity were performed. Sugar fermentation tests with sugars viz: Glucose, Lactose, Sucrose, Maltose, Mannitol, Xylose, Arabinose and Dulcitol, inositols were done. These tests were performed according to standard methods. [6] Antibiotic sensitivity test of the isolates were performed by Kirby Bauer Disc Diffusion method using Mueller Hinton agar and antibiotic discs, as described by Clinical Laboratory Standard Institute guidelines was followed to perform antibiotic sensitivity test . Antibiogram was read, that is zones of inhibition were measured and sensitivities to various antibiotics were determined using CLSI guidelines, for each antibiotic. [6]

### Results

A total of two hundred (200) patients, clinically diagnosed as cases

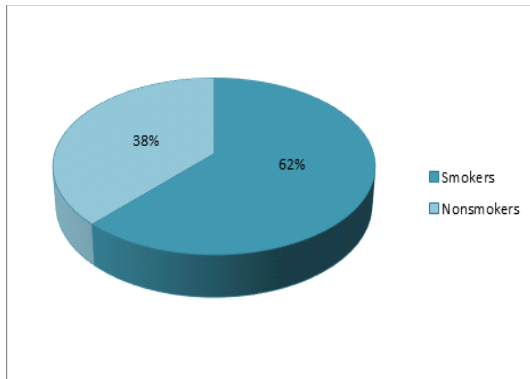
of AECOPD, admitted to the Medicine & TB and chest ward of L.N. Medical College and research centre were studied. The individual bacterial isolates were recorded and allocated into smoker and nonsmoker group separately.

Distribution of smokers and non-smokers among AECOPD cases:

**TABLE 1: distribution of smokers and non-smokers among AECOPD cases:**

	Number	Percentage (%)
Smokers	124	62
Non-Smoker	76	38
Total	200	100

**GRAPH 1: smoking association in AECOPD cases**



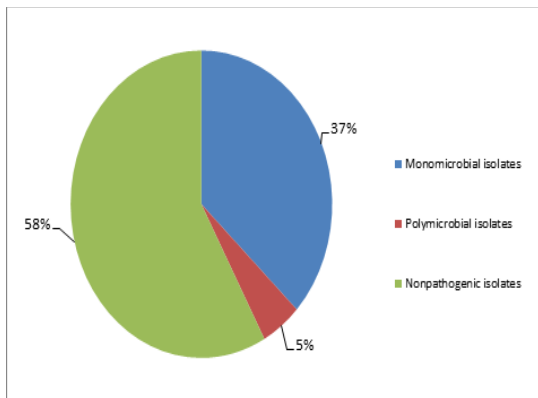
Out of 200 patients, 124(62%) were smokers and 76(38%) were non-smoker (Table 1 / Graph 1).

**Bacteriological profile:**

**TABLE 2: distribution of bacterial isolates in AECOPD**

Growth	Number	Percentage (%)
Monomicrobial isolate	74	37
polymicrobial isolates	10	5
Non pathogenic	116	58
Total	200	100

**GRAPH 2: distribution of isolates in AECOPD**



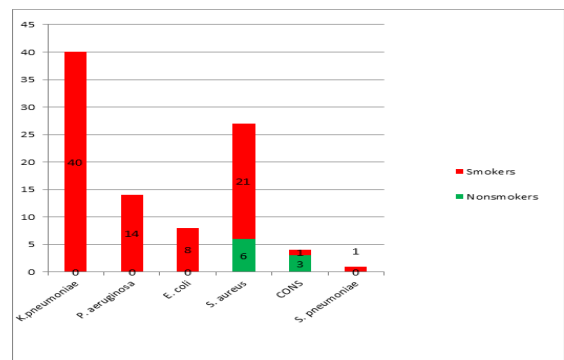
Out of a total of 200 cases 84 yielded positive sputum cultures giving a success rate of 42%. Out of 200, monomicrobial isolates were 74 (37%) , polymicrobial isolates were 10 (5%) and non pathogenic growth was 116 (58%) (Table No.2 /Graph No. 2).

Distribution of bacterial isolates among smoker and nonsmoker aecopd cases

**TABLE 03 : microbiological pattern in smoker and nonsmoker AECOPD cases**

S.No	Gram negative bacilli(GNB)	Smoker	Non smoker	Total (percentage %)
1	K. pneumoniae	40	0	40 (42.55)
2	P. aeruginosa	14	0	14 (14.89)
3	E. coli	8	0	8 (8.51)
	Total GNB	62	0	65.95
	Gram positive cocci(GPC)			
5	S. aureus	21	6	27 (28.73)
6	CONS	1	3	4 (4.26)
7	S. pneumoniae	1	0	1 (1.06)
	Total GPC	23	9	32(34.05)
	Total no. of isolates	85	9	94 (100)

**GRAPH 03 : microbiological pattern in smoker and nonsmoker AECOPD cases**



Gram positive cocci were isolated in 9 cases of nonsmoker AECOPD . Among smokers AECOPD cases, 23 isolates were gram positive cocci and 62 isolates were gram negative bacilli.

**Discussion**

In our study Gram negative bacilli were predominant in smoker COPD cases, as Gram positive cocci and Gram negative bacilli were isolated in 23 and 9 cases respectively in smokers and non-smoker COPD cases. Only Gram positive cocci were isolated in all nine cases. There was no gram negative organism isolated in non smoker COPD group.

In smokers COPD both Gram positive cocci and Gram negative bacilli were isolated in 23 and 9 cases respectively. Gram negative bacilli were predominant in smoker COPD cases. In non-smoker COPD cases only Gram positive cocci were isolated in all 9 cases. In a study done by Victor Fainstein et al [7] they observed they various patterns of adherence among the different groups of subjects were found. Young healthy smokers had increased adherence of Streptococcus pneumoniae type I and, to a lesser extent, S. pneumoniae type III and Staphylococcus aureus when compared with non-smokers. Middle-aged smokers with a long history of chronic bronchitis had significantly increased adherence only of untypable Haemophilus influenzae when compared with age-matched non-smokers. The acquisition of pneumococcal pneumonia by smokers and the role of nontypable Haemophilus species in chronic bronchitis may be determined, in part, by bacterial adherence to pharyngeal cells 8 . So our clinical study had findings, which strengthen the above hypothesis. Conclusion

In our study Gram negative bacilli were predominant in smoker COPD cases ,where as Gram positive organisms were predominant in non-smoker COPD population. This might help the clinician to decide empirical antibiotic therapy. More elaborative studies with bigger sample size would be required in future to ascertain the facts

described here.

**Reference-**

1. GOLD (Global initiative for obstructive lung disease) report 2015:20-21
2. Roberto Rodriguez- Roisin; Toward consensus definition for COPD exacerbations;; Chest2000; 117;398-401.
3. Surinder K, Jindal; Emergence of COPD as an epidemic in India;; Ind J Med Res; 124; dec 2006619-630.
4. BR Celli and P J Barnes; Exacerbation of COPD; Eur Resp Journal 2007; 29; 1224-1238.
5. Surinder K Jindal. Emergence of COPD as an epidemic in India. Ind J Med Res 124 Dec 2006; 619-630.
6. Mackie & McCartney Practical Medical Microbiology; 14th Edition; 452-453. 131-149
7. Victor Fainstein and Daniel M. Musher. Bacterial Adherence to Pharyngeal Cells in Smokers, Nonsmokers, and Chronic Bronchitis infection and immunity, Oct. 1979, p. 178-182 Vol. 26, No. 1 Antoni Torres
8. Francesco Blasi, Nathalie Dartois, and Murat Akova ;Which individuals are at increased risk of pneumococcal disease and why? Impact of COPD, asthma, smoking, diabetes, and/or chronic heart disease on community-acquired pneumonia and invasive pneumococcal disease, Thorax. 2015 Oct; 70(10): 984-989.