Journal Homepage: - www.journalijar.com
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)
Article DOI: 10.21474/IJAR01/3721
DOI URL: http://dx.doi.org/10.21474/IJAR01/3721
ISSN NO. 2320-5407

RESEARCH ARTICLE

BACTERIAL SPECTRUM IN EXACERBATION COPD PATIENTS.

Tamar Didbaridze[1], Kakhaber Chelidze[2], Nino Gogokhia[3] and Khatia Mikaberidze[4].

1. Microbiologist. MD. PhD.TSMU the First University Clinic (Tbilisi, Georgia).
2. Head of Department of Internal Medicine. Professor. MD. PhD.TSMU the First University Clinic (Tbilisi, Georgia).
3. Head of Clinical Laboratory. Professor. MD. PhD.TSMU the First University Clinic (Tbilisi, Georgia).
4. Laborant Physician TSMU the First University Clinic (Tbilisi, Georgia).

Manuscript Info

Manuscript History

Received: 15 January 2017
Final Accepted: 07 February 2017
Published: March 2017

Key words:-
COPD, exacerbation, bacteria.

Abstract

The precise role of bacterial infection in the course of exacerbation COPD has been a source of controversy for decades.Chronic bacterial colonization of the lower airways contributes to airway inflammation; The course of COPD is characterized by intermittent exacerbacions of the disease.Approximately 40-50% acute exarbations are caused by bacteria, by viruses in 25%, and both viruses and bacteria in another 25%. Airway inflammation is increased during the exacerbation resulting in increased hyperinflation, reduced expiratory air flow and decreased gas exchange. Expectorated sputum is the most commonly used sample for diagnosis of lower respiratory tract infections(LRTI),which can be obtained easily and non-invasively.
The bacteria are very common in the lower respiratory tract of patients with COPD and cause inflammation. We have shown that among microorganisms causing acute exacerbations of COPD in our patients prevailed gram negative Enterobacteriaceae family and comparatively high resistance against cephalosporins and fluoroquinolones related to wide usage of antibiotics of this group for chemoprophilaxis.

Introduction:-

Chronic obstructive pulmonary disease(COPD) is a major cause of chronic morbidity and mortality worldwide. The World Health Organization predicts that COPD will become the third leading cause of death worldwide by 2030.(1,2).Exacerbation of COPD is redefined as a sustained worsening of a patient's condition from a stable state.The precise role of bacterial infection in the course of exacerbation COPD has been a source of controversy for decades.Chronic bacterial colonization of the lower airways contributes to airway inflammation; The course of COPD is characterized by intermittent exacerbacions of the disease.Approximately 40-50% acute exarbations are caused by bacteria, by viruses in 25%, and both viruses and bacteria in another 25%. Airway inflammation is increased during the exacerbation resulting in increased hyperinflation, reduced expiratory air flow and decreased gas exchange. (3,4,5).

Bacteria have established niches in the human body where they exist in symbiosis with their host. The term microbiome is used to refer to complex communities of microorganisms, termed the microbiota, that inhabit the body surfaces in symbiosis with the host. The most clearly defined microbiome occurs in the gastrointestinal tract in

Corresponding Author:- Tamar Didbaridze.
Address:- Microbiologist. MD. PhD.TSMU the First University Clinic (Tbilisi, Georgia).

which there are far more bacterial cells than in the whole human body (as bacteria are much smaller than human cells). Bacteria which form part of the normal flora of the microbiome, are tolerated by the local mucosal immune response with minimal activation of inflammatory cells, in particular T cells. The lower respiratory tract is directly connected to the upper respiratory tract with frequent micro-aspiration of secretions.(5,6,7).

Expectorated sputum is the most commonly used sample for diagnosis of lower respiratory tract infections(LRTI),which can be obtained easily and non-invasively.However, sputum may show a heavy growth of commensal organisms because of the necessity to traverse a highly contaminated oropharynx which may prevent the determination of true epidemiologic agent. A potentially-phatogenic microorganism(PPM) had to grow in significant counts to be considered a potential causative agent of an exacerbation. (8,9)

Major challenges remain in accurately defining the potential role of bacteria in the inflammatory process and how best to optimize the use of antibiotics without the overuse of this limited resource. The thresholds for positive cultures used in most of the recently published studies are as follows: $\geq 10^2$ or $\geq 10^5$ colony-forming units/millilitre (CFU/ml) for sputum, $\geq 10^2$ CFU/ml for bronchial lavage (BL)and $\geq 10^2$ or $\geq 10^3$ CFU/ml for bronchoscopic protected specimen brush (PSB) and bronchoalveolar lavage (BAL) samples. Considering bacterial exacerbations, Gram-negative bacteria such as *P. aeruginosa*, *Stenotrophomonas maltophilia* and members of the *Enterobacteriaceae* family are more often present in patients with a greater degree of functional impairment, recent antibiotic or systemic steroid therapy, and in those with severe exacerbations. The rates of positive cultures in COPD vary depending on the sampling technique .(10)

The aim of the study was the bacteriological examination of expectorated sputum taken from COPD patients during exacerbation, identification of microbes and studying their sensitivity to antibiotics for the purpose of optimization of antibiotic therapy.

Material and Methods:-

We retrospectively have studied the medical records of the 17 patients of the University Clinic at TSMU Department of Therapy and Cardiology from 2015 - until September 2016. Acute exacerbation was defined as the presence of an increase in at least two of the three following symptoms: dyspnea, cough and sputum production. At least one sample of spontaneously expectorated sputum for microbiological evaluation was obtained from all patients during admission for aerobic gram-positive and gram- negative bacteria. An early morning sample was preferred.Spesimens were collected according to standard guidelines(Baron and Thomas, 2012). Sputum samples were plated on 5% Sheep blood agar, Chocolate agar, Endo agar and Sabouraud dextrose agar and incubated at 37 °C for both 24 h and 48 h. All microorganisms isolated were identified through standard laboratory methods : isolation of poor culture, identifying microbes with rapid identification system(API20E, APIStaph, API haemo, API Strep,API 20NE, biomerieux).Sensitivity of microorganisms to antibiotics was defined with disc-diffusion method using standard discs(EUCAST guidelines).Rapid tests for identification of oxidase and catalase.

Results:-

In 12 patients monomicrobial growth has been documented by bacteriological investigation, among which gram-negative bacteria prevailed, namely Klebsiella pneumonia$\geq 10^5$ colony-forming units/millilitre (CFU/ml) in 5 patients, Escherichia coli $\geq 10^5$colony-forming units/millilitre (CFU/ml)– 2,Proteus mirabilis 10^8CFU/ml-1.Among gram positive bacteria Enterococcus spp $\geq 10^5$ colony-forming units/millilitre (CFU/ml) was in 2 patients, Staphylococcus aureus -1, Streptococcus pneumonia -1. Polymicrbial growth were observed in 5 cases:Klebsiella pneumonia 10^5CFU/ml and Candida albicans 10^8CFU/ml-3, Escherichia coli 10^4CFU/ml and Enterococcus spp 10^7CFU/ml-1, Staphylococcus aureus10^8CFU/ml and Enterococcus spp 10^7CFU/ml-1. By defining sensitivity on local antibiotics on strains isolate by us only 12% of gram-negative bacteria was resistant on quinolones, 19% to the third generation of cephalosporins, and among gram-positive bacteria methicillin-resistant Staphylococcus aureus and vancomycine-resistent Enterococci was not found. Comparatively high resistance against cephalosporins and quinolones related to wide usage of antibiotics of this group for chemoprophilaxis .

Conclusion:-

The bacteria are very common in the lower respiratory tract of patients with COPD and cause inflammation. We have shown that among microorganisms causing acute exacerbations of COPD in our patients prevailed gram

negative Enterobacteriaceae family and comparatively high resistance against cephalosporins and fluoroquinolones related to wide usage of antibiotics of this group for chemoprophilaxis .

Reference:-

1. Isenberg HD, Baron EJ, Damato RF, et al. Recommendations for isolation of bacteria from clinical specimens. In: Balows A, Hausler WJ Jr, Herrmann KL, et al., editors. Manual of Clinical Microbiology. Washington, DC: American Society for Microbiology; 2011;
2. Kanner RE, Anthonisen NR, Connett JE. Lower respiratory illnesses promote FEV1 decline in current smokers but not ex-smokers with mild chronic obstructive pulmonary disease. Results from the lung health study. Am J Respir Crit Care Med. 2010;
3. Karnak D, Beng Sun S, Beder S, et al. Chlamydia pneumoniae infection and acute exacerbation of chronic obstructive pulmonary disease (COPD) Respir Med. 2012;
4. Lieberman D, Lieberman D, Ben-Yaakov M, et al. Infectious etiologies in acute exacerbation of COPD. Diagn Microbiol Infect Dis. 2011;
5. Lieberman D, Lieberman D, Ben-Yaakov M, et al. Chlamydia pneumonia infection in acute exacerbations of chronic obstructive pulmonary disease: Analysis of 250 hospitalizations. Eur J Clin Microbial Infect Dis. 2011;
6. Lieberman D, Lieberman D, Shmarkov, et al. Serologic evidence of Legionella species infection in acute exacerbation of COPD. Eur Respir J. 2002;
7. Miravitlles M, Espinosa C, Fernandez-Laso E, et al. Relationship between bacterial flora in sputum and functional impairment in patients with acute exacerbations of COPD. Chest. 2013;
8. Mogulkoc N, Karakurt S, Isalska B, et al. Acute purulant exacerbations of chronic obstructive pulmonary disease and Chlamydia pneumonia infection. Am J Respir Crit Care Med. 2014;
9. Monso E, Ruiz J, Rosell A, et al. Bacterial infection in chronic obstructive pulmonary disease. A study of stable and exacerbated outpatients using the protected specimen brush. Am J Respir Crit Care Med. 2010;
10. Murray PR, Washington JA. Microscopic and bacteriologic analysis of expoctrated sputum. Mayo Clin Proc. 2012;