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INCIDENCE OF HEMOPHILUS INFLUENZA AND STREPTOCOCCUS PNEUMONIA IN ACUTE CHRONIC OBSTRUCTIVE AIRWAY DISEASE EXACERBATION AND ITS SENSITIVITY TO LEVOFLOXACIN

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Abstract:

Aim: *To determine the incidence of Streptococcus pneumoniae and Hemophilus influenzae in the acute exacerbation of chronic obstructive pulmonary disease and their sensitivity to levofloxacin.*

Methods: *A cross-sectional study was conducted at the Medicine Unit II of Jinnah Hospital Lahore for one-year duration from April 2019 to April 2020. The study included patients who had already been diagnosed with chronic obstructive pulmonary disease and had symptoms of acute exacerbation and sputum. samples were sent for microbiological evaluation. SPSS 16 was used for statistical analysis.*

Results: *Of the 105 patients in the study, 90 (85.17%) were male. The overall mean age at reporting was 62 ± 10.2 years. S. pneumoniae was isolated from the sputum culture of 33 (31.4%) patients, while 13 (12.4%) patients showed an increase in H. influenzae. Of the 33 S. pneumoniae sputum specimens, 32 (97.0%) were sensitive to levofloxacin and 1 (3.0%) were resistant. All 13 H. influenzae isolates were sensitive to levofloxacin.*

Conclusion: *S. pneumoniae and H. influenzae are still the most common organisms isolated in the acute exacerbation of chronic obstructive pulmonary disease in our population. Levofloxacin is still considered a highly sensitive antibiotic to these common microorganisms in our population, but S. pneumoniae has begun to develop resistance to levofloxacin. Therefore, periodic surveillance of the development of the resistance pattern of common microorganisms to commonly prescribed antibiotics is required.*

Keywords: *COPD, Culture and sensitivity, Sputum, Bacteria.*

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INTRODUCTION:

Chronic obstructive pulmonary disease (COPD) is the fourth leading cause of mortality worldwide and an important cause of the overall burden of disease. According to research, the prevalence of COPD in the world is 9.34 / 1000 in men and 7.33 / 1000 in women [1]. In Europe, the incidence among adults is 4-6% and is the leading cause of death. In people aged 25-75 in the US, the estimated incidence of the disease is 6.6%. The estimated annual expenditure on the disease is $ 24 billion, 70% of which is related to exacerbations requiring hospitalization [2]. COPD is characterized by a slowly progressive, irreversible restriction of airflow caused by chronic bronchitis. The disease is associated with periodic exacerbations characterized by a sharp deterioration in symptoms, lung function, and quality of life [3]. The main identified causes of COPD exacerbations are bacterial and viral infections, contamination events, cold weather, and discontinuation of regular treatment [4]. At least half of COPD exacerbations are caused by pathogenic microbes. An international study shows that 32.5% of Hemophilus influenzae and 20.3% of Streptococcus pneumoniae were isolated from sputum cultures in patients with acute exacerbation of chronic obstructive pulmonary disease (AECOPD) [5]. Local studies indicate the presence of S. pneumoniae 48.7% and H. influenzae 14.6%. In an infectious exacerbation, immediate antibiotic therapy shortens the duration of exacerbations and can prevent admission to hospital and further lung damage. Numerous clinical studies confirm the clinical efficacy of fluoroquinolones in the exacerbation phase. The sensitivity of organisms to antimicrobial agents has changed dramatically over the past decade [4]. Tracking resistance in the United States today (TRUST) indicates that the vulnerability pattern continues to change and also shows geographic variation [6, 7]. The aim of this study was to determine the sensitivity of levofloxacin to S. pneumoniae and H. influenza in our population with the aim of optimizing the use of antibiotics, avoiding emerging resistance and thus reducing the economic burden.

PATIENTS AND METHODS:

The cross-sectional study was conducted at the Medicine Unit II of Jinnah Hospital Lahore for one-year duration from April 2019 to April 2020. Patients 50-70 years of age, already diagnosed from pulmonary function tests, with symptoms of acute exacerbation of cough, increased sputum, change in sputum color, increased dyspnea and fever, and positive sputum culture. Patients with other comorbid chest conditions such as tuberculosis, bronchiectasis, pneumonia, and lung abscess on chest X-ray and who were already on antibiotics or taking antibiotics 3 weeks before the exacerbation were excluded. After the interview and examination, patients or their caregivers gave informed consent. A fresh sputum sample was collected into a sterile container and sent for culture and susceptibility. All relevant information has been filled in with a proforma. Data were analyzed using SPSS version 16. The continuous variable, patient age, was expressed as mean ± standard deviation. Qualitative variables such as gender, sputum culture, sensitivity and pattern of levofloxacin resistance are expressed as frequencies and percentages.

RESULTS:

Of the 105 patients in the study, 90 (85.7%) were male and 15 (14.3%) were female. The male to female ratio was 6: 1. The overall mean age was 62 ± 10.2 years and the age range was 50-70 years (table). S. pneumoniae was isolated from sputum cultures in 33 (31.4%) patients, and H. influenzae in 13 (12.4%) patients. In addition, other organisms were found in the sputum samples of 59 (56.2%) patients. Of the 33 cases of S. pneumoniae, 32 (97.0%) were susceptible to levofloxacin and only 1 (3.0%) were resistant to it. All 13 (100%) cultures of H. influenzae were sensitive to levofloxacin. The cumulative susceptibility of S. pneumoniae and H. influenzae was 97.8% and the cumulative resistance was 2.2%.

Table: General characteristics and frequency of organisms of patients with AECOPD.

General characteristics	Number	Percent
Gender		
Male	90	85.7
Female	15	14.3
M: F ratio	6: 1	
Age (years)		
50 - 59	28	26.7
60 & above	77	73.3
Mean ± S. D	62 ± 10.2	
Frequency		
Streptococcus pneumoniae	33	31.4
Hemophilus influenzae	13	12.4
Others	59	56.2

DISCUSSION:

In this study, 85.7% were men and 14.6% were women, which is in line with the results of an international study that also showed an advantage of men with 83.1% of men and 15.8% of women. However, a Canadian study found that out of 150 patients, there were 59 (39%) men and 91 (61%) women. In the present study, the age range was 50–70 years, and the mean age was 62 ± 10.2 years, which is consistent with the study by China CL et al., in which the mean age was 64.8 ± 2 years. Sputum bacteriology in patients in this study showed an incidence of S. pneumoniae of 31.4% and H. influenza of 12.4%, which is consistent with studies previously performed in a third-degree hospital in Karachi showing 48.7% S. pneumoniae and 14.6%. H. Influenzae [8, 9]. Contrary to these results, however, ongoing international research shows that the prevalence of common bacteria isolated in AECOPD is now changing rapidly, and also varies with geographic changes [10]. The study found that H. influenza was relatively more common (13-50%) followed by S. pneumonia (7-26%) in COPD AE. Since bacterial infection is considered a major factor in the etiology of AECOPD, several studies have been conducted on antimicrobial treatment in these patients [11]. Many placebo-controlled studies of antibiotics have been published suggesting a beneficial effect of antibiotics, but unfortunately there are significant differences in the results of these individual studies [12, 13]. The role of a specific agent remains unclear, and antibiotics are still prescribed based on empirical evidence. Some researchers have suggested a faster relief of symptoms seen with quinolones, in contrast to the comparator drugs, which is associated with a longer disease-free period. The sensitivity of S. pneumoniae and H. influenzae to antimicrobial agents has changed dramatically over the past decade. However, resistance of S. pneumoniae and H. influenzae to levofloxacin is still low. Results from various studies show that resistance rates to fluoroquinolones remain low in S. pneumoniae in most countries [14, 15]. In our series, the susceptibility of S. pneumoniae and H. influenza to levofloxacin was 97.0% and 100%, respectively, in contrast to a previous study in which no resistance to levofloxacin was observed. 1 The lack of local data suggests that new research is needed to determine the prevalence of various organisms and their sensitivity to various antibiotics in our society so that we can effectively treat patients with minimal drug side effects and minimize the development of resistance to these drugs and can effectively reduce the burden of economic [16, 17]. In addition, periodic surveillance is needed to see the pattern of resistance to commonly prescribed antibiotics, as previously levofloxacin was considered highly sensitive to these microbial pathogens, but now, according to this study, S. pneumoniae has begun to develop resistance to levofloxacin.

CONCLUSION:

Microbial infection plays an important role in the etiology of AECOPD. In the case of infections with microorganisms, S. pneumoniae and H. influenzae have a high prevalence rate in our geographical region. As antibiotics are prescribed for the treatment of this disease, the emerging resistance of common pathogenic organisms to these antibiotics is a major concern. Quinolones still have a low rate of resistance to these organisms, but S. pneumoniae has already begun to develop resistance to levofloxacin. Therefore, periodic surveillance is needed to monitor the pattern of resistance to commonly prescribed antibiotics against these organisms. Therefore, in treating AECOPD, it is important to know the prevalence of different bacteria and their sensitivity to commonly

prescribed antibiotics according to geographic location so that we can effectively treat the patient and reduce side effects, pharmacy costs, economic burden, and antibiotic resistance.

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