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RISK OF PNEUMONIA IN OBSTRUCTIVE LUNG DISEASE

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Abstract:
Objectives of the study: *The main objective of the study is to analyze the risk of pneumonia in obstructive lung disease.* ***Methodology of the study:*** *This cross-sectional study was conducted at Mayo Hospital, Lahore during March 2019 to December 2019. For this purpose, we select 100 patients of pneumonia for further analysis. The patients of both genders were selected for this study. Diagnosis of pneumonia: (i) unconfirmed i.e. all unique patients with codes for pneumonia and, (ii) confirmed by chest radiograph or resulting in hospitalization within one month of pneumonia diagnosis.* ***Result:*** *Significant differences were observed between patients who received extra-fine versus fine-particle COPD in the demographics and baseline characteristics, as shown in Table 1. The COPD treatments prescribed to patients before and at step-up are shown in S1 Table in the supporting information.* ***Conclusion:*** *In conclusion, the COPD exacerbation rate was higher among the patients who had a history of pneumonia or a high rate of COPD exacerbation in the preceding period of 1 year.*

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INTRODUCTION:

Inhaled corticosteroids (ICS) are widely used in high doses in the management of obstructive lung diseases such as asthma and chronic obstructive pulmonary disease (COPD). Current asthma treatment guidelines recommend stepping up the ICS dose if lack of control persists. Alternatively, the combination of low-dose ICS with long-acting β2-agonist (LABA) has been shown to achieve better asthma control, sparing patients higher doses of ICS[1]. In patients with COPD, low-dose ICS/LABA combination has been shown to reduce exacerbations, improve quality of life and lung function, through an underlying complementary anti-inflammatory cellular action. However there continues to be significant concern regarding inappropriate prescribing of high-dose ICS in patients with obstructive lung diseases, with untoward consequences for patients[2].

The first laboratory based observational study was conducted in Rawalpindi between 2002 and 2003. The study demonstrates a low diagnostic yield for isolated pathogens 88 out of 510 specimens (17.25%). Most commonly identified pathogen was Haemophilus influenzae (HI) with a strikingly high relative frequency (64 out of 88) among isolates[3]. However, this yield is reported in a majority of paediatric population (41 out of 64) with 33 being less than five years of age. These figures therefore will not be in any way reflective of adult CAP status. The most comprehensive study was The Active Study. This study was conducted as a part of an international survey that included nine countries from all over the world. This contribution from Pakistan comprised of 200 samples. SP and HI were almost equally identified in CAP cases (90 and 87 respectively)[4]. Macrolide showed poor sensitivity against SP with 28% being resistant to erythromycin and clarithromycin. Resistance to levofloxacin was detected in 3% of SP tested in this study. All were sensitive to beta lactams. Fluoroquinolones and cephalosporins were found to be consistently active against HI tested in this study. Although beta lactamase producing HI is an emerging problem all over the world the results of this study suggest that beta lactamase producing strains of HI are less prevalent in Pakistan as all the isolates were sensitive to beta lactams, macrolides and cephalosporins with a very low-level resistance to ampicillin (3%)[5].

Indeed, regular use of ICS has been linked to several systemic effects, including a higher risk of pneumonia, where it is thought that ICS exert an anti-inflammatory and immunosuppressive effect that could affect the pathogenesis of pneumonia[6].

Objectives of the study

The main objective of the study is to analyze the risk of pneumonia in obstructive lung disease among local population of Pakistan.

METHODOLOGY OF THE STUDY:

This cross-sectional study was conducted at Mayo Hospital, Lahore during March 2019 to December 2019. For this purpose, we select 100 patients of pneumonia for further analysis. The patients of both genders were selected for this study. Diagnosis of pneumonia: (i) unconfirmed i.e. all unique patients with codes for pneumonia and, (ii) confirmed by chest radiograph or resulting in hospitalization within one month of pneumonia diagnosis.

Statistical analyses

The data was collected and analyzed using SPS version 17.0. All the values were expressed in mean and standard deviation.

RESULT:

Significant differences were observed between patients who received extra-fine versus fine-particle COPD in the demographics and baseline characteristics, as shown in Table 1. The COPD treatments prescribed to patients before and at step-up are shown in S1 Table in the supporting information.

Table 01: Baseline and clinical characteristics of pneumonia patients with obstructive lung diseases

Demographic and clinical baseline characteristics		COPD		P-value[a]
		Patients (n = 50)		
		Fine-particle	Extra-fine particle	
Demographics				
Sex, female		9046 (61)	4871 (59)	0.004
Age		44 (17)	44 (18)	0.018
Baseline weight BMI (kg/m^2), mean (SD)		28 (7)	29 (7)	0.001
Smoking[b]	Non-smokers	8679 (59)	4873 (59)	0.024
	Current smokers	3474 (24)	1904 (23)	
	Ex-smokers	2476 (17)	1392 (17)	
Respiratory diagnosis	None	174 (1.2)	114 (1.4)	NA
	Asthma/ no COPD	11516 (77.9)	7171 (87.2)	
	COPD/ no asthma	197 (1.3)	93 (1.1)	
	Asthma and COPD	2901 (19.6)	847 (10.3)	
Comorbidities and Therapy				
Rhinitis diagnosis and/or therapy[c]		6175 (42)	2754 (34)	<0.001
GERD diagnosis and/or drugs[d]		3827 (26)	2115 (26)	0.784
Ischaemic heart disease diagnosis[e]		1084 (7)	433 (5)	<0.001
Coding for pneumonia[f]		73 (0.5)	22 (0.3)	0.010
Confirmed coding for pneumonia[g]		25 (0.2)	12 (0.1)	0.674
Baseline characteristics				
Acute oral corticosteroid courses[h]	0	8542 (58)	6008 (73)	<0.001
	1	3103 (21)	1420 (17)	
	2+	3143 (21)	797 (10)	
Antibiotics prescribed with lower respiratory consultation[i]	0	9027 (61)	5440 (66)	<0.001
	1	3060 (21)	1667 (20)	
	2+	2701 (18)	118 (14)	

Patients stepping-up their ICS therapy to extra-fine particle ICS were significantly less likely to be coded for pneumonia compared to those stepping-up to fine-particle ICS, having adjusted for confounders (table 2).

Table 2: Pneumonia diagnosis by treatment group.

Pneumonia diagnosis	By treatment group		Total	P-value[a]
	Fine-particle	Extra-fine particle		
Yes, n (%)	73 (0.5)	22 (0.3)	95 (0.4)	0.011
No, n (%)	14715 (99.5)	8203 (99.7)	22918 (99.6)	
Total, n (%)	14788 (100)	8225 (100)	23013 (100)	
Odds ratio adjusted for baseline confounders[b]	1.00	0.60 (0.37, 0.97)		

DISCUSSION:

The pathophysiological mechanisms that contribute to an increased susceptibility to pneumonia in patients treated with ICS are unclear[6]. In murine models, ICS have been shown to significantly increase alveolar macrophage efferocytosis (uptake of apoptotic cells by alveolar macrophages), thereby reducing their ability to combat microbes[7], including *Streptococcus pneumoniae*, the most common cause of community acquired pneumonia in patients with COPD[8]. A recent study in a cohort of children with persistent asthma taking daily ICS showed nearly four times greater oropharyngeal colonization with *Streptococcus pneumoniae* compared to children not receiving ICS, which may increase the risk of having pneumococcal respiratory infections. Several studies have demonstrated an intra-class difference between both mono-component ICS and fixed combinations of ICS/LABA with regard to the risk

of pneumonia and pneumonia related events in COPD patients[9]. The risk of patients with COPD developing serious pneumonia is particularly elevated and dose related with fluticasone use and much lower with budesonide. Although there have been no studies directly comparing the effects of fluticasone and budesonide on host defence, differences are likely related to their contrasting pharmacokinetic and pharmacodynamic properties[10].

CONCLUSION:

In conclusion, the COPD exacerbation rate was higher among the patients who had a history of pneumonia or a high rate of COPD exacerbation in the preceding period of 1 year.

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