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Research Article

**ANALYSIS OF RISK OF OBSTRUCTIVE LUNG DISEASE IN  
CHILDHOOD PNEUMONIA AMONG LOCAL POPULATION  
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**Abstract:**

**Introduction:** Pneumonia is a common pediatric diagnosis that poses a significant risk for future respiratory disease. Multiple investigations have found an association between pneumonia in childhood and decreased adult lung function, raising the question of whether childhood pneumonia is a risk factor for chronic obstructive pulmonary disease (COPD).

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

**Methodology of the study:** This study was conducted at Sharif Medical and dental college during February 2018 to November 2018. This study was done with the permission of ethical committee. For this purpose we select 50 patients of pneumonia (age 1 to 15 years) for further analysis. The patients of both gender were selected for this study. Childhood pneumonia was defined by subject self-report.

**Result:** Significant differences were observed between patients who received extra-fine versus fine-particle COPD in the demographics and baseline characteristics. The COPD treatments prescribed to patients before and at step-up are shown in SI 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.

**Key words:** Pneumonia, fever, COPD, Lungs.

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**INTRODUCTION:**

Pneumonia is a common pediatric diagnosis that poses a significant risk for future respiratory disease. Multiple investigations have found an association between pneumonia in childhood and decreased adult lung function, raising the question of whether childhood pneumonia is a risk factor for chronic obstructive pulmonary disease (COPD). Prior studies are limited by small sample sizes, short-term follow-up, absence of post-bronchodilator lung function, differing definitions of respiratory illness, sampling bias, and recall bias [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 [4].

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 [5]. Most randomized controlled trials (RCTs), observational studies and meta-analysis, in patients with COPD suggest an increased risk of pneumonia with a dose-response relationship between ICS and pneumonia, although there is some evidence suggesting to the contrary [6].

Despite the fact that free vaccination is available in Pakistan, pneumonia is killing around 92,000 children annually under-five years of age, health experts said

Tuesday during a press briefing to mark upcoming World Pneumonia Day on November 12. According to the World Health Organisation (WHO) estimates, pneumonia accounts for 16 percent of the total child deaths making it the leading killer of children less than 5 years of age globally. Pneumonia is a form acute respiratory infection that affects lungs [7].

**Objectives of the study**

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

**METHODOLOGY OF THE STUDY**

This study was conducted at Sharif Medical and dental college during February 2018 to November 2018. This study was done with the permission of ethical committee. For this purpose we select 50 patients of pneumonia (age 1 to 15 years) for further analysis. The patients of both gender were selected for this study. Childhood pneumonia was defined by subject self-report. The questionnaire asked: "Have you ever had pneumonia or bronchopneumonia?" and their age at the first episode. Subjects were classified as childhood pneumonia if they reported an age of first pneumonia at < 16 years or "As a child; age not known." Patients with any other chronic respiratory disease, at any time were excluded from the study.

**Statistical analyses**

Baseline characteristics of unmatched and matched patients prescribed either fine- or extra-fine particle ICS are described using summary statistics and compared using  $\chi^2$  or Mann-Whitney *U* tests as appropriate.

**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

	Childhood Pneumonia		No Childhood Pneumonia		p Value <sup>b</sup>
<b>DEMOGRAPHIC</b>					
Male gender (%)	437	(51.2 %)	4990	(53.6 %)	0.18
Mean age, years (SD)	61.7	(8.9)	59.4	(9.0)	<0.001 <sup>c</sup>
Non-Hispanic white (%)	693	(81.1 %)	6073	(65.3 %)	<0.001
<b>SMOKE EXPOSURE</b>					
In-utero smoke exposure (%) <sup>a</sup>	206	(33.0 %)	2082	(30.2 %)	0.18
Lived with smoker in childhood (%) <sup>a</sup>	732	(85.7 %)	7618	(81.9 %)	0.006
Mean age started smoking, years (SD)	16.5	(4.4)	16.9	(4.7)	0.06
Pack-years of smoking (SD)	49.8	(28.4)	43.7	(24.6)	<0.001
Current smoking (%)	379	(44.4 %)	5011	(53.9 %)	<0.001
<b>PNEUMONIA HISTORY</b>					
Ever had pneumonia (%)	854	(100.0 %)	2979	(33.9 %)	<0.001
Diagnosed with pneumonia by healthcare provider (%) <sup>a</sup>	821	(96.1 %)	2920	(31.4 %)	<0.001
Pneumonia childhood age unknown (%)	378	(44.3 %)	0	(0.0 %)	<0.001
Age first pneumonia in years, mean (SD) <sup>a</sup>	7.7	(4.5)	42.5	(15.6)	<0.001
Lifetime pneumonia episodes (SD) <sup>a</sup>	3.9	(4.9)			

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.

	Childhood Pneumonia		No Childhood Pneumonia		Impact of Childhood Pneumonia <sup>a</sup>		
					OR	(95 % CI)	p Value <sup>b</sup>
COPD, GOLD 2-4	405	(59.0 %)	3267	(44.4 %)	1.40	(1.17, 1.66)	<0.001
COPD, GOLD 2-4 + adjusted for childhood asthma					1.30	(1.09, 1.55)	0.003

### DISCUSSION:

The role of childhood pneumonia in COPD development has been investigated for over sixty years. Oswald surveyed 1000 adults with chronic bronchitis in London from 1951-53, finding 14.3 % reported childhood pneumonia compared to 6 % of controls. The pathophysiological mechanisms that contribute to an increased susceptibility to pneumonia in patients treated with ICS are unclear [8]. 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, including *Streptococcus pneumoniae*, the most common cause of community acquired pneumonia in patients with COPD [9]. 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 [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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