

## A STUDY OF MARKERS OF ALLERGY AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

*S.N.H. Bokhari and M.H. Zafar*

### SUMMARY

23 patients with established Chronic Obstructive Pulmonary Disease (COPD), age range 25-85 yr, were randomly selected; this included 16 smokers and 7 ex-smokers. Another 23 patients who were non-smoker and non-COPD were selected as control group.

Mean total leucocyte count (TLC) in smokers was  $10.26 \times 10^9/L$ , in ex-smokers 8.57, and in control group 8.06 and mean eosinophil count was 0.14, 0.12, 0.02 respectively. The percentage of prevalence of history of allergy in smokers was 25, ex-smokers 28.5 and control 13, and positive skin prick test was 56.3, 14.3 and 13 respectively.

Among COPD prevalence of allergy to house-dust (39%), feathers (30.4%), straw dust (21.7%), cow-hair (21.7%), sheep wool (21.7) and tree pollens (21.7%) was relatively higher than other allergens.

Eosinophil count and prevalence of skin allergic test is higher in patients with Chronic Obstructive Pulmonary Disease, who are active smokers as compared to ex-smokers. This is not related to the presence of history of allergy.

### INTRODUCTION

The relationship between smoking and Chronic Obstructive Pulmonary Disease is well-established, however, susceptibility among smokers to development of a progressive obstructive airway disease is variable. Twenty eight years ago workers in Netherland proposed that smokers with Chronic Obstructive Pulmonary Disease (COPD) and non-smoking asthmatics have a common allergic constitution and nonspecific bronchial hyper-reactivity. This has been named as "Dutch Hypothesis"<sup>1</sup>.

Patients who have been smokers and had established COPD do show hyper-reactivity but it is not clear whether this increased reactivity is inherent or an acquired phenomenon. Rate of decline in lung function tests has been found to be more rapid in smokers who had evidence of allergic constitution.<sup>2</sup> Smokers have shown to have high IgE and Leucocyte count than non-smokers.<sup>3</sup> In another study prevalence of positive skin test was more common among ex-smokers than active smokers.<sup>5</sup>

In the present study we tried to determine relationship between smoking habits, personal or family history of allergy, leucocyte count and prevalence of positive skin prick test for common inhaled allergens.

### METHODS

We selected 23 men, age range 25-85 yrs with established COPD (Chronic Bronchitis and Emphysema) who were mostly labourers or farmers by occupation. These

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From: Nishtar Hospital Multan.

SYED NAZIM HUSSAIN BOKHARI, MBBS,MCPS,MD(Pak) Deptt: of Clinical Medicine.

M. HAYAT ZAFAR, MRCP,FRCP(U.K), Professor: Deptt: of Clinical Medicine.

patients who had associated chest or cardiac disease, history of helminthiasis, a clear history of bronchial asthma or those who were already on steroids or antihistamines were excluded from the study. It was not possible to quantify smoking habits, as most of them were hooka smokers and others did not have consistent smoking habits. However, anyone who smoked, on average, more than one cigarette per day, for minimal of one year, was considered regular smoker.

As a control another 23 patients were selected who had no chest symptoms, no evidence of infection or malignancy and they were not taking antihistamines or any immunosuppressant.

Presence or absence of personal and family history of eczema, allergic rhinitis, urticaria and drug allergy or asthma was recorded.

Total and differential white cell count was checked at the departmental clinical laboratory. Skin Prick test was performed using ten common inhaled allergens (see Table-1) and control available in the form of "Bencard solutions". Wheal diameter was measured 15 minutes after intracutaneous injection as instructed by the manufacturer. The wheal was measured and interpreted negative if 1-2 mm and positive if 3 mm or more.

**TABLE - 1 SKIN PRICK TEST : LIST OF ALLERGENS TESTED**

Clad	Tree Pollens
Herbarum	Straw Dust
Sheep Wool	Aspergillus Fumigotus
Feathers	Cow Hair
House Dust	Wheat Grains

## RESULTS

Mean total leucocyte count (TLC) in COPD was in the upper limits of normal ( $9.410 \times 10^9/L$ ), whereas, in control group it was 8.1. Mean count for ex-smokers (8.6) is less than active smokers (10.3). Though no significant eosinophilia is observed in either group, yet active smokers have high mean eosinophil count (0.14) than ex-smokers (0.12); Table-2.

**TABLE - 2 DIFFERENTIAL CELL COUNT, PREVALENCE OF HISTORY OF ALLERGY AND POSITIVE SKIN TEST (n=46)**

		Personal or family history of allergy		Mean-TLC $\times 10^9/L$	Mean Eosin Count $\times 10^9/L$	Skin Prick Test	
		+ ve	- ve			+ ve	- ve
		%	%			%	%
COPD Group	Smokers (16)	25	75	10.3	0.14	56.3	43.8
	Ex-smokers (7)	28.5	71.5	8.6	0.12	14.3	85.7
CONTROL GROUP (23)		13	87	8.1	0.03	13	87

History of allergy was observed only in 25-28% of the COPD-group and 13% of the control. Prevalence of positive skin allergic test for smokers (56.3%) is much higher than ex-smokers (14.3%). Among the COPD group, prevalence of allergy (Table-3) to house dust was highest (39%). This is followed by feathers (30.4%), whereas, straw dust,

cow hair, sheep wool and tree pollens having 21.7% each. *Aspergillus fumigatus* (17.4%) wheat grain (17.4%) and the lowest *Clad. Herbarum* (8.7%). No patient showed allergy to a single allergen.

**TABLE - 3 PREVALENCE OF POSITIVE SKIN TEST TO VARIOUS ALLERGENS IN COPD GROUP**

(n=23)

House dust	9 (39%)
Feathers	7 (30.4%)
Straw dust	5 (21.7%)
Cow hair	5 (21.7%)
Sheep wool	5 (21.7%)
Tree pollens	5 (21.7%)
Asp. fumigatus	4 (17.4%)
Wheat grains	4 (17.4%)
Clad. harbarum	2 (8.7%)
Control soln.	2 (8.7%)

## DISCUSSION

Like asthmatics, aptients with COPD have common allergic constitution. Markers of allergy like high IgE, positive skin prick test and increased eosinophil count may be found. There has been controversy whether this allergic constitution is acquired or inherent.

Epidemiological study from Tucson by Burrows et al<sup>4</sup> showed inter-relationship between atopy, eosinophilia and airflow obstruction. They found that blood eosinophilia was associated with impaired ventilatory function regardless of smoking habit.

In a study by Taylor et al<sup>2</sup> among 120 smokers, 73 ex-smokers and 44 non-smokers no difference in family history of allergy was observed among all the groups. Smokers showed higher IgE and leucocyte count than non-smokers. Hyper-reactivity oratopy may have followed onset of smoking rather than a pre-existing risk factor, as prevalence of positive skin test was more common among active smokers than ex-smokers.

In another study by Taylor et al<sup>5</sup> among 227 subjects, which included 177 smokers, 71 ex-smokers and 39 non-smokers, no significant difference was observed for TLC, eosinophil count and skin allergic test among smokers and ex-smokers. Cambell<sup>6</sup> studied 66 patients with chronic bronchitis; skin test was positive in 29% of the subjcts only.

In the present study, history of allergy was found in a small proportion among all the patients presenting with active COPD. Smokers have shown higher rate of positive skin test than ex-smokers. Control group showed positive skin test among 13%, most of

them had no history of allergy available. Eosinophil count is relatively higher for smokers than ex-smokers however eosinophilia is not significant.

These results favour the hypothesis that allergy is an acquired phenomenon and related to the activity of the disease, as prevalence is higher among active smokers when compared with ex-smokers.

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