

Role of Bronchoprovocation (Methacholine Challenge Test) in Bronchial Asthma Patient Presenting with Chronic Cough

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Abstract

Diagnosis of bronchial asthma needs some diagnostic criteria, out of these criterion still it is little known which test will help us for correct diagnosis of bronchial asthma, specially cough variant asthma. Bronchoprovocation testing with methacholine may be useful when asthma is suspected but clinical and spirometry is not diagnostic.

A total number of 80 subjects were studied for methacholine challenge test of which 50 subjects were patients with cough variant asthma without spirometry abnormalities.

Significant fall in FEV1 by methacholine 1.6 mg/ml that is PD 20 FEV1 (1.6 mg/ml) of methacholine. Total number of patients was 50 (group B) and out of this 46 patient shows significant result. On the other hand in group A, the control group total number were 30 and none of them shows the positive result. P value was <0.001. Result was highly significant

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Introduction

Asthma is a chronic inflammatory disorder of airways affecting approximately 5% of population¹. Cough variant asthma presents with chronic cough and sputum eosinophilia without the abnormalities of airways function seen in asthma. Bronchoprovocation testing with Methacholine is useful diagnostic procedure in cough variant asthma. Methacholine is the direct stimuli agonists on receptors of smooth muscle. All people respond to them to some extent but response is greatly increased in asthmatics.

For diagnosis of bronchial asthma some diagnostic criteria was followed, these were Paroxysmal respiratory distress recurrent cough, wheezing and chest tightness; Recurrent attack due to multiple stimuli; Feature of eosinophilic inflammation; & Laboratory findings;

- PFT (pulmonary function test),

- Airway hyperresponsive testing (AHR),
- Arterial blood gas analysis,

Bronchial provocation testing with histamine or methacholine or exercise challenge testing may be useful when asthma is suspected and spirometry is not diagnostic.

Patients and Methods

This prospective case control study was carried out in the department of Institute of Diseases of the Chest & Hospital (IDCH). A total 80 subjects were studied for bronchoprovocation (Methacholine test) of which 50 subjects were patients with bronchial asthma presenting with chronic cough without spirometry abnormalities.

Inclusion Criteria of Patients was those Presenting with chronic cough, presence of eosinophils in sputum, normal spirometry, presence of family history of asthma.

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Exclusion Criteria of Patients was those with

Severe acute asthma, associated with cardiac causes of respiratory distress, sputum eosinophils absent, other causes of chronic cough such as post nasal drip syndrome, gastroesophageal reflux, Patient taking ACE inhibitor, pulmonary TB, bronchiectasis, etc.

Study Procedure

After taking a detailed history and thorough physical examination and necessary investigations selection of the patient was done. Then the bronchoprovocation (Methacholine test) was done.

Methacholine Test

The test is useful in determine the extent of airway reactivity. Base-line spirometry is performed to establish that the subjects values are at or above the 80% of FEV1. The subject then inhale

methacholine diluent of different dilution. The following methacholine dilution were used:

0.4mg/ml

0.8mg/ml

1.6mg/ml

As soon as the FEV1 fall by 20% administration of methacholine is terminated. It is called PD20 FEV1, means provoking dose of methacholine by which FEV1 fall by 20%.

Results

The controls (group A) were of different ages ranging from 9-50 yrs. With mean 27.2 yrs, and male were 66.66% and female were 33.33%, the M:F ratio being 2:1.

The patients (group B) were of different ages ranging from 9-50yrs. With mean 26.18 yrs, and male were 64% and female were 36%, the M:F ratio being 1.77:1.

Table-I
Comparisons of age distribution of group A and B

	Group A	Group B	P-value
Age (Yrs.) range	9- 50	9-50	
Age (yrs.)	27.2	26.18	
9-19 yrs.	9 (30)	17 (34%)	NS (p>0.05) Z=0.39
20-30 yrs.	10 (33.33%)	17 (34%)	NS (p>0.05) Z=0.06
31-40 yrs.	6 (20%)	9 (18%)	NS (p>0.05) Z=0.24
41-50 yrs.	5 (16.6%)	7 (14%)	NS (p>0.05) Z=0.35

Table-II
Comparison of sex distribution of group A and B

Sex	Group A	Group B	P-value
Male	20 (66.66)	32 (64)	NS (p>0.05) Z=0.17
Female	10 (33.33)	18 (36)	NS (p>0.05) Z=0.25
Ratio	2:1	1.77:1	

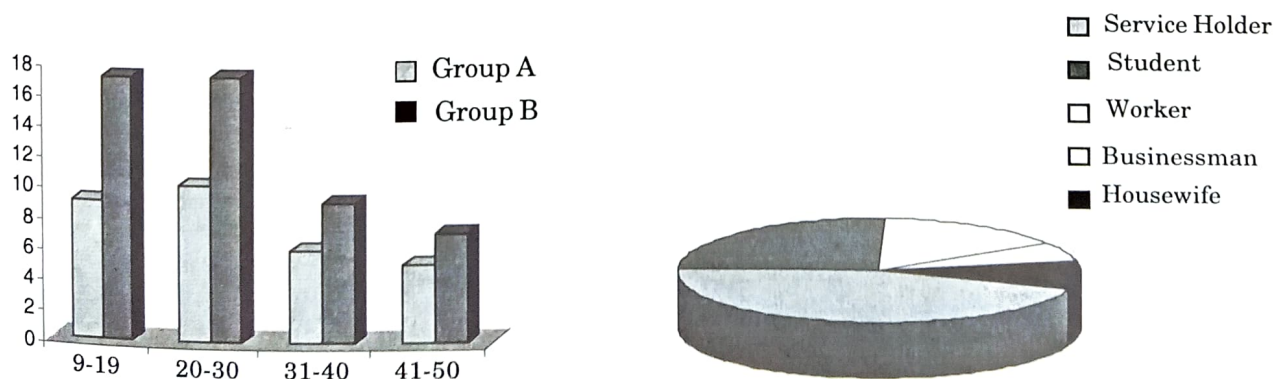


Fig.-1 : Comparison of age distribution between group A (n=30) and group B (n=50).

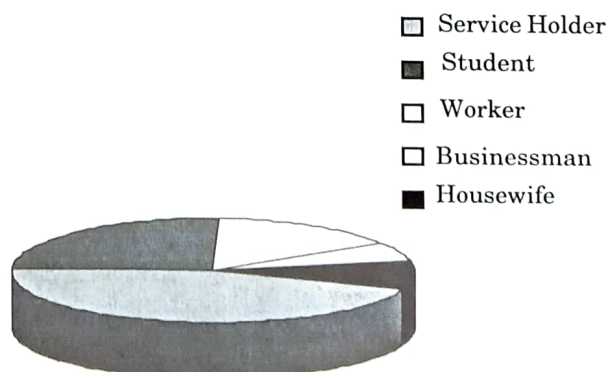


Fig.-2 : Distribution of patients subjects according to occupation group B (n=50).

Table-III

*20% fall in FEV1 by methacholine provoking dose 1.6 mg /ml in group A=30 and group B—50
(PD20 FEV1 by 1.6 mg /ml)*

	Significantly fall FEV1 by 0.8 mg/ml of Methacholine	Not Significantly fall FEV1 (20% fall FEV1 by 1.6 mg/ml of	P-value
Group A n=30	0	30	
Group B n=50	46	4	P<0.001 X ² -63.56)

(X² =63.56)

Above tables show significant fall in FEV1 by methacholine 1.6mg/ml that is PD20 FEV1 (1.6mg/ml) of methacholine. Total number patient was 50 (group B) and out of this 46 patients shows the significant result. On the other hand in group A, the control group, the total number was 30 and none of them shows the positive result. After analysis, P value was x0.001. The test is highly significant.

Discussion

Airway responsiveness provided a useful concept in understanding asthma and its measurement is valuable in asthma research of the various bronchoconstrictor stimuli used, nebulised methacholine is popularly the most popular³.

Bronchoprovocation challenge (BPC) is an important tool for the diagnosis of asthma. BPC demonstrating bronchial hyperresponsiveness (BHR) can help us to confirm the diagnosis of asthma. The absence of BHR can also be very useful clinically, as it makes a diagnosis of asthma very unlikely. Table I & II shows the controls (Group A) were of different ages ranging from 9-50 years, with mean 27.2 years and M:F ration was 2:1.

The patients (group B) were of different age ranging from 9-50 years with mean 26:18 years and the M:F ratio was 1.77:1 in previous study⁵, the age range of patient was from 18-65 years with mean 34 years and M: F ratio was 1:4.

Mean age in this study 27.2 years in (group A) and 26.18 years in (group B) which were not statistically significant $p>0.05$, the mean age 34 years which is not statistically differ from the mean age of this study ($p-X0.005$). cough variant asthma is usually started from childhood, so age range started more earlier in this study then previous study.

The sex ratio of the patients in this study also differs from that of the previous study. It is because of the fact that male patient attends hospital more commonly than the female patients in our country.

Here we observed that in previous study PD20 FEV1 was 0.335 mg/ml and in this study it is about 1.6 mg/ml. The difference is due to fact the typical asthmatic patient was included in their study and in this study atypical asthma like cough variant asthma are included.

Sensitivity and specificity of BPC test by Methacholine are 90% and 100% in this study but in previous study⁶ specificity (.94%) and in another study by Melvin R, Pratter⁷ he showed the sensitivity (90%). So the result of this study is almost same of the previous study. Bronchoprovocation challenge is very safe and simple for diagnosis of cough variant asthma. BPC has allowed diagnosis of cough variant asthma and to understand. PD20 FEV1 is 1.6 mg/ml is recognized.

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