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Original Research Article

Association of induced sputum eosinophil, absolute eosinophil count and serum immunoglobulin E level in assessment of the clinical severity in bronchial asthma

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ABSTRACT

Aim: The study was done with the aim to determine the relationship between the severity of asthma in patient and the level of serum immunoglobulin E, peripheral eosinophil count and nature of sputum.
Materials and Methods: Current research was conducted at the Department of Respiratory Medicine, GAIMS, Bhuj, India over one year. All subjects of Bronchial asthma distinct by Genetic Information Nondiscrimination Act (GINA) guidelines of age 17-61 year were registered. Severity of asthma was assessed by clinical features and by Forced expiratory volume in the first second (FEV1) in spirometry. Following evaluating the sternness of bronchial asthma all subjects undergo sputum examination for sputum eosinophil counts, blood sampling for absolute eosinophil counts and serum IgE levels.
Results: Elevated sputum eosinophil count (>3) was significantly elevated in additional subjects with severe persistent asthma even though extra than half of them had normal sputum eosinophil. An important association amid peripheral eosinophil count, sputum eosinophil count, and serum IgE with severe persistent asthma. Mean sputum eosinophil% augments considerably according to severity, demonstrates though affirmative association which was statistically important.
Conclusions: The use of inexpensive and easy method with evaluation of AEC, sputum eosinophil count and evaluation of serum IgE level showed a straight measurement of inflammation of airway and allergic etiology of illness.

1. Introduction

The chronic respiratory disease of airway that characterize the bronchial hyper responsiveness, structural remodeling, respiratory indications and variable airflow control is defined as asthma.[1–3] The various sign and symptoms of asthma includes shortness of breath, chest tightness, wheeze and cough. The sign and symptoms differs over various occasion and changes as per the respiratory airflow restraint. Airflow restriction may afterward turn into constant.[4]

The sign and symptoms of asthma may determine the severity of the disease and in response to medication the severity of the asthma may lower for weeks or months. On the other hand, subjects can practice episodic detonates of asthma that may be somber and take a significant weight to subjects and the community.[1] There is no document of the relationship between the clinical, dissimilar biological markers and functional markers of airway inflammation in asthmatic diseases. For the screening of asthma in group of patients over the periods of time there has been use of non-invasive markers of airway inflammation such as serum protein levels, sputum discrepancy cytology and exhaled nitric oxide.[2]

Based on the clinical evaluation and evaluation of pulmonary function test the management of asthma is planned. The present current guideline assess the severity of

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asthma based on severity of symptoms, airflow obstructions, asthma exacerbation and use of medications.[3–8]

There is not great amount of data on the relationship amid clinical symptoms and functional strictures to biomarkers of airway inflammation. Hence keeping the above points in relation the present study was done with the aim to determine the relationship between the noninvasive markers and the severity of the asthma.

2. Material and Methods

Current research was executed at the Department of Respiratory Medicine, GAIMS, Bhuj, Kutch, Gujarat over one year following agreement by ethical committee and after obtaining volunteer written consent. All subjects of bronchial asthma defined by GINA guidelines of age 17-61 year were enrolled. Clinical features and spirometry suggestive of chronic obstructive pulmonary disease, not keen to offer consent, significant to perform spirometry correctly, the history of present myocardial infarction, on chronic corticosteroid treatment were disqualified from research. Following application of exclusion and inclusion criteria total 100 subjects were registered in the research.

2.1. Diagnosis and evaluation of severity of asthma Spirometry

All distinct bronchial asthma subjects undergo spirometry for verification of analysis and assessment of severity of bronchial asthma by Forced expiratory volume in the first second by flow sensing spirometer. Subjects were inquired to grasp the mouth piece among the lips to get a superior seal, breathe in and out for 2-3 tidal breaths then expire as rapid and as solid as possible for given that probable until no breathe is left then inspire rapidly to a greatest aptitude Spirometry was returning over 15-30 minutes subsequent management of short acting beta agonist, 200-400mcg of salbutamol, to make certain for bronchodilator reversibility. The extent of reversibility in forced expiratory volume 1 s (FEV1) of 12% and 200 ml from the pre-bronchodilator value was measured as logical for asthma as per GINA process. The severity of asthma was evaluated as per GINA criteria.

2.2. Sputum examination for induced sputum eosinophil count

Each of the research competitors was instructed to intake nebulizer with 3% hypertonic saline and to cough sputum in the sterile plastic containers. The collected sputum was homogenized with the addition of phosphate buffered saline (PBS) and the added mixture was centrifuged for 10 min. To break the disulfide bonds and scatter the cells 0.1% dithiothreitol was added to the solution with the ratio of 4:1. haematoxylin and eosin stain. The microscopic method was utilized for the count for eosinophil eosinophil count >3% were considered as abnormal.

2.3. Blood investigation for absolute eosinophil count and serum IgE

Following the aseptic precautions from the included subjects; 5 ml of the intravenous blood was withdrawn from the medial cubital vein. The blood was collected into the vacutainers. The collected sample was subjected to calculate the peripheral eosinophil count and serum IgE levels. The automatic analyzer was used to evaluate the eosinophil percentage. Blood eosinophil counts more than 300 were measured abnormal. Total IgE levels further than 100 IU/mL was in use as irregular.[2]

3. Results

Table 1: Distribution according to severity of bronchial asthma

Severity	Number	Percentage (%)	Mean FEV1
Mild	23	23	81.45
Moderate	50	50	66.48
Severe	27	27	37.06

Table 2: Mean absolute eosinophil counts according to severity of asthma

	AEC (/cu.mm)	
	Mean	**SD**
Mild (n=23)	j 166.87	47.2
Moderate(n=50)	365.48	77.90
Severe(n=27)	485.2	66.02
P value	0.002*	

* indicates statistically significance at p≤0.05 /

Table 3: Mean serumIgE according to severity of asthma

	Serum IgE (IU/ml) S	
	Mean	**SD**
Mild (n=23)	246.24	215.1
Moderate (n=50)	991.54	501.23
Severe (n=27)	1724.47	610.65
P value	0.005*	

* indicates statistically significance at p≤0.05

4. Discussion

Numerous techniques of evaluating airway inflammation has been intended in text. Noninvasive techniques of evaluation of airway inflammation are much safer and easier for monitoring in subjects, particularly those with more severe asthma.

In our study, mean age of subjects was 31.6 years. Kumar et al.,[9] in their research establish mean age was 37.42 years.

Table 4: Mean sputum eosinophil% according to severity of asthma

	Sputum Eosinophil %	
	Mean	**SD**
Mild (n=23)	0.42	0.2
Moderate (n=50)	1.12	0.7
Severe (n=27)	2.56	1.2
P value	0.0001*	

* indicates statistically significance at p≤0.05

Merghani et al.,[10] accounted age sort from 16 to 86 years. In the present research, 54% subjects of asthma were females. Raji and Moosavi[11] observed mean age of 36.4 years with 55.6% males and 44.4% females.

Superior sputum eosinophil count was considerably observed in added subjects with severe importunate asthma though around 50% of them had normal sputum eosinophil. Comparable findings were observed in different studies.[12–16] Alternatively, Gibson et al.,[17] and Palomino et al.,[18] have reported contradictory findings. In the present research, there was no noteworthy variation in sputum eosinophil level in intermittent and moderate persistent asthma, and we did not examine a dose–response relationship amid asthma severity and total of subjects with greater sputum eosinophilia, evocative of an asthma phenotype with sputum eosinophilia which may be pragmatic in some asthma severity. Different authors to have accounted comparable findings.[14,19]

Eosinophilia were not connected to age but demonstrated a significant, though not elevated, association with each other (p<0.05). Trivedi and Patel[20] observed that AEC was elevated in 61(56%) subjects. Mean AEC augmented with increasing severity of asthma and this was significant statistically (p<0.05) Chaudhary et al.,[21] have reported similar findings.

Significant relationship was observed among peripheral eosinophil count, sputum eosinophil count, and serum IgE with severe persistent asthma. Khadadah et al.,[22] reported similar findings. Kartasamita et al.,[23] also reported parallel findings. Trivedi and Patel[20] establish that Serum IgE levels were superior over the normal limits for age in 94. The rising level of serum IgE was originate to be statistically remarkable when assessed amid each of the groups (p <0.001) amongst intermittent and mild persistent cases and too amongst mild persistent and moderate persistent cases and p<0.05among moderate persistent and severe persistent cases. Similar observations made by Kovac et al.,[24] and Sciuca et al.,[25]

Mean sputum eosinophil % found in severe asthmatic subjects was 2.6%, followed by 1.12% was in moderate and 0.42% in mild asthmatic subjects. Mean sputum eosinophil % increases considerably as per severity; demonstrate strong positive correlation. In agreement with current findings Kumar et al.,[9] found that 26.3% subjects had abnormal sputum eosinophil count.

Few limitations are there in the present research. Asthmatic subjects other than eosinophilic phenotype were not evaluated. Subjects with augmented level of eosinophilia were not assessed for parasitic infestation and Normal age-matched controls from the general populace were not incorporated in the research.

5. Conclusions

Evaluation of sputum eosinophil count, AEC and serum IgE are simple and inexpensive method that can reveal a directly dimension of airway inflammation and can suggest sternness of illness and allergic etiology of disease. Therefore, it can help to distinguish accurate phenotypes in asthmatic subjects, who are more accessible to a steroid, which necessities to be documented in prospect researches. Eosinophilic inflammation is a quality characteristic of asthma.

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7. Conflict of Interest

None.

8. Source of Funding

None.

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