



TO STUDY THE CORRELATION OF INDUCED SPUTUM EOSINOPHIL AND ABSOLUTE EOSINOPHIL COUNT IN ASSESSING THE CLINICAL SEVERITY OF BRONCHIAL ASTHMA.

Dr. Mobeen Quadri

Postgraduate, Department of Respiratory Medicine, Alluri Sitarama Raju Academy of Medical Sciences, Eluru, Andhra Pradesh 534005.

Dr. G. Gopi Krishna*

Associate Professor, Department of Respiratory Medicine, Alluri Sitarama Raju Academy of Medical Sciences, Eluru, Andhra Pradesh 534005.*Corresponding Author

ABSTRACT

INTRODUCTION: Asthma is not an uncommon disease, affecting 1–18% of the population in different countries. In the last two decades, its prevalence has increased worldwide. Asthma is a chronic inflammatory disorder of the airways due to involvement of many cells and cellular elements, resulting in hyper responsiveness of the airway which explains most of the symptoms of asthma.

AIM & OBJECTIVES: To study the correlation of sputum eosinophil count and absolute eosinophil count in assessing the clinical severity of Asthma

MATERIALS & METHODS: Prospective study, Patients were selected from outpatient and inpatient departments of Respiratory medicine, The study is carried out in 101 Bronchial Asthma patients between December 2018 to December 2019, Sputum collected and Absolute eosinophil count & sputum eosinophil count is known, The data were collected and statistical analysis was done using SPSS software Version 21.0.

RESULTS: Total number of cases showing sputum eosinophils more than 3% was 20, out of them 16 were present in severe asthmatics (27.6%). Total number of cases showing absolute eosinophils more than 350 was 31, out of them 22 were present in severe asthmatics (30.5%).

CONCLUSION: Assessment of eosinophil count in sputum and blood are simple and inexpensive method that can show a direct measurement of airway inflammation. Thus it can help to identify specific phenotypes in asthmatic patients. It could be the preferred method in routine practice in monitoring airway inflammation and guiding management.

KEYWORDS : Asthma, Eosinophil count.

INTRODUCTION:

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary in intensity over time and variable expiratory airflow limitation. Asthma is not an uncommon disease, affecting 1–18% of the population in different countries. In the last two decades, its prevalence has increased worldwide. Asthma is a chronic inflammatory disorder of the airways due to involvement of many cells and cellular elements, resulting in hyper responsiveness of the airway which explains most of the symptoms of asthma. Criteria for the diagnosis of asthma include history of variable respiratory symptoms and variable expiratory airflow limitations in spirometry. The asthma control and severity are usually assessed by subjective measures such as clinical assessment and quality of life questionnaires and objective measure including spirometry, peak expiratory flow rate and bronchoprovocation testing.

But according to current GINA guidelines severity of asthma is assessed by the level of treatment required to control symptoms and exacerbations. Over the last decade, various non-invasive markers for measurement of airways inflammation have been used in monitoring asthma severity, such as exhaled nitric oxide, sputum differential cytology and serum eosinophilic cationic protein. But regarding the use of biological markers for assessing the severity of asthma, only limited studies are available and the relation is not well established.

Eosinophils as proinflammatory agents are thought to have an important role in the pathogenesis of asthma. In asthmatics, eosinophils and their mediators are consistently identified. Sputum and blood eosinophilia are the biomarkers indicating an eosinophilic airway inflammation. Not much data is available regarding the relation of clinical symptoms and functional parameters to these biomarkers of airway inflammation. Therefore, this study was done with the intention to find the correlation between sputum and absolute eosinophil count with severity of asthma.

AIM AND OBJECTIVES:

AIM:

To study the correlation of sputum eosinophil count and absolute eosinophil count in assessing the clinical severity of Asthma.

OBJECTIVES:

1. To assess the relation between clinical symptoms, functional parameters and biomarkers of airway inflammation.
2. To assess the correlation between the sputum eosinophil and absolute eosinophil count.

MATERIALS AND METHODS:

The present study “Correlation of induced sputum eosinophil and absolute eosinophil count in assessing the clinical severity of bronchial asthma” was conducted in Department of Respiratory Medicine, Alluri Sitarama Raju Academy of Medical Sciences, Eluru.

STUDY DESIGN:

Prospective study

STUDY POPULATION: Patients were selected from outpatient and inpatient departments of Respiratory Medicine, Alluri Sitarama Raju Academy of Medical Sciences.

STUDY DURATION: The study was carried out between December 2018 to December 2019.

INCLUSION CRITERIA:

All stable asthmatic patients of 18–60 years of age.

EXCLUSION CRITERIA:

1. Acute exacerbation.
2. Clinical features and spirometry suggestive of chronic obstructive pulmonary disease.
3. Not willing to give consent.
4. Patients not able to perform spirometry correctly.
5. Patients with history of recent myocardial infarction.
6. Patients on chronic corticosteroid therapy.

After obtaining informed written consent, demography, history, radiological findings of the patients and relevant investigations were recorded.

- Demography of the patient includes age, sex, BMI, occupation.
- History of smoking, clinical symptoms and signs, co morbid conditions were obtained.

Assessment of severity of asthma

The severity of asthma was assessed according to the GINA criteria. This includes

1. Asthma control questionnaire consists of frequency of diurnal and

nocturnal symptoms, frequency of short acting beta 2-agonist used, interference with daily activity in past 4 weeks

2. Number exacerbation per year and
3. Spirometry.

PROCEDURES AND COLLECTION OF SPECIMENS

According to the inclusion criteria patients were selected. Participants were categorized according to the GINA criteria based on clinical symptoms and pulmonary function test. Blood samples were collected for absolute eosinophil count and induced sputum samples for eosinophil count.

INDUCED SPUTUM COLLECTION

SPUTUM PROCESSING AND ANALYSIS

STEPS IN PERFORMING AN ABSOLUTE EOSINOPHIL COUNT

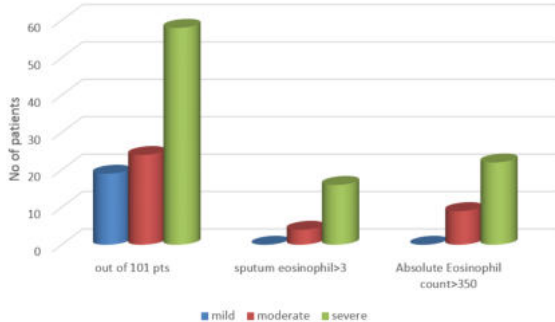
DATA ANALYSIS:

The data were collected and statistical analysis was done using SPSS software Version 21.0. The correlation of sputum eosinophil count, peripheral eosinophil count with severity of asthma was analyzed by Pearson's Chi-square test, Fisher's exact test, and the correlation coefficient was reported together with standard error of the estimate.

RESULTS:

SEVERITY OF ASTHMA AND EOSINOPHIL COUNT

SEVERITY	OUT OF 101 CASES	SPUTUM EOSINOPHIL > 3%	ABSOLUTE EOSINOPHIL COUNT > 350
Mild	19	0	0
Moderate	24	4	9
Severe	58	16(27.6%)	22(30.5%)



Total number of cases showing sputum eosinophils more than 3% was 20, out of them 16 were present in severe asthmatics (27.6%). Total number of cases showing absolute eosinophils more than 350 was 31, out of them 22 were present in severe asthmatics (30.5%).

DISCUSSION:

In our study, total 101 cases were selected, out of them 52% (n=53) were male and 48% (n=48) were female. According to 2012 census (INSEARCH), in India prevalence of asthma is 2.05% with almost equal sex proportion of male 1.09% and female 0.96%. In United States of America, asthma prevalence was higher among children (9.3%) than adults (8.0%). Overall, females (9.5%) were more than males (7.0%). Although the female-to-male balance changes over development, with asthma less common in females than males during childhood, but more common in females than males during adulthood because of hormonal factors. Gender were compared with severity of bronchial asthma and found that most of the females were presented with severe asthma when compared to males showing significant correlation (p value 0.008). In various literatures, asthma in women was reported to be more severe and associated with higher health care use. After puberty, a gender switch occurs, and asthma becomes more prevalent and severe in women. Girls who mature early, and pregnant women are likely to be exposed to higher estrogen levels, and greater cumulative hormonal exposure of sex hormones, which place them at higher risk for asthma development later in life. In contrast, oral contraceptive may be protective and decrease the risk of exacerbation in asthmatic women

Correlation of sputum eosinophil count and severity of asthma:

In our study, we found higher percentage of sputum eosinophil count in 20% cases of the study population that included predominantly moderate and severe persistent asthma. We observed most of the studies reported almost similar distribution. We observed high sputum

eosinophil count (>3%) was significantly seen in more patients with severe persistent asthma (27.6%) though more than half of them had normal sputum eosinophils. Similar results were observed in various studies. In our study, there was no significant difference in sputum eosinophil level in mild and moderate persistent asthma, and we did not observe a dose-response relationship between asthma severity and proportion of patients with higher sputum eosinophilia, suggesting an asthma phenotype with sputum eosinophilia which may be seen in any asthma severity. Various authors also have reported similar findings. The importance of identifying this phenotype of asthma with elevated sputum eosinophilia could be related to steroid responsiveness and future studies may demonstrate in the Indian population. In our present study, though there was a significant inverse correlation between sputum eosinophil count and predicted forced expiratory volume in 1 s (P = 0.000) and predicted FVC (P = 0.001), the correlation has been weak. Various studies have also reported significant correlation between sputum eosinophil count and predicted FEV1 (P < 0.05).

Correlation of absolute eosinophil count and severity of asthma:

In our study, we observed increased absolute eosinophil count in 30.5% of the study population that included predominantly moderate and severe persistent asthma similar to sputum eosinophil. We observed high absolute eosinophil count (>350) was significantly seen in more patients with severe persistent asthma (39.9%) though more than half of them had normal absolute eosinophils. Similar results were observed in various studies. The results were contradictory with the observation made by Palomino et al. We observed no correlation between absolute eosinophil levels in mild and moderate persistent asthma, there was a significant inverse correlation between FEV1 and absolute eosinophil.

Correlation of sputum eosinophil count and absolute eosinophil count:

We found a significant association between absolute eosinophil count and sputum eosinophil count. Only limited studies available between correlation of sputum and absolute eosinophil among them khadadah et al study reported positive correlation between total blood eosinophil counts and eosinophilic cationic protein.

Summary:

Present study was done to correlate induced sputum eosinophil and absolute eosinophil counts in assessing the clinical severity of bronchial asthma. In our study of 101 asthmatics were selected, out of them 58% patients had severe asthma, 24% patients had moderate asthma, and 19% patients had mild asthma. There was a significant correlation of induced sputum eosinophil and absolute eosinophil count with severe persistent asthma.

CONCLUSION:

Assessment of eosinophil count in sputum and blood are simple and inexpensive method that can show a direct measurement of airway inflammation. Thus it can help to identify specific phenotypes in asthmatic patients who are more responsive to steroids, which needs to be demonstrated in future studies. It could be the preferred method in routine practice in monitoring airway inflammation and guiding management.

REFERENCES

1. Global Initiative for Asthma (GINA), National Heart, Lung and Blood Institute (NHLBI) Global Strategy for Asthma Management and Prevention. Bethesda (MD): Global Initiative for Asthma (GINA), National Heart, Lung and Blood Institute (NHLBI); 2006. p. 339. Available from: <http://www.ginasthma.com>.
2. World Health Organization. Global Surveillance, Prevention and Control of Chronic Respiratory Diseases: A Comprehensive Approach. World Health Organization; 2007. Available from: <http://www.who.int/gard/publications/GARD%20Book%202007.pdf>.
3. Jash, D., Bandyopadhyay, A., Roy, P., Saha, K. and Jash, D. (2013). Usefulness of induced sputum eosinophil count to assess severity and treatment outcome in asthma patients. [online] European Respiratory Society. Available at: http://erj.ersjournals.com/content/42/Suppl_57/P833 [Accessed 4 Jul. 2018].
4. From the Global Strategy for Asthma Management and Prevention, Global Initiative for Asthma (GINA); 2015. Available from: <http://www.ginasthma.org>.
5. Cianchetti S, Bacci E, Ruocco L, Bartoli ML, Ricci M, Pavia T, et al. Granulocyte markers in hypertonic and isotonic saline-induced sputum of asthmatic subjects. Eur Respir J 2004;24:1018-24.
6. Green, R., Brightling, C., McKenna, S., Hargadon, B., Parker, D., Bradding, P., Wardlaw, A. and Pavord, I. (n.d.). Asthma exacerbations and sputum eosinophil counts: a randomised controlled trial. Lancet. 2002 Nov 30;360(9347):1715-21.
7. Kraft M. The role of bacterial infections in asthma. Clin Chest Med. 2000; 21(2): 301-13.
8. Palomino AL, Bussamra MH, Saraiva-Romanholo BM, Martins MA, Nunes Mdo P, Rodrigues JC. Induced sputum in children and adolescents with asthma: Safety, clinical applicability and inflammatory cells aspects in stable patients and during exacerbation. J Pediatr (Rio J) 2005;81:216-24.