# Correlation of Total Serum Immunoglobulin Level, Sputum and Peripheral Eosinophil Count in Assessing the Clinical Severity in Bronchial Asthma

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| Abstract | Original Research Article |
|---|---|

Correlation of total serum immunoglobulin E level, sputum and peripheral eosinophil count in assessing the clinical severity in bronchial asthma. Higher percentage of sputum Eosinophil count is present in moderate and severe persistent asthma. Higher percentage of absolute eosinophil count is present inmoderate and severe persistent asthma.
**Keywords:** Asthma, Sputum, IgE, Eosinophils.

## SUMMARY

The present study was conducted in the Department of Pulmonary Medicine, Bhaskar medical college, Hyderabad from January 2020 to June 2021. Based on our present study it was concluded that, Absolute eosinophil count has a definite positive correlation with asthma severity in the severe persistent asthma group. Mean serum Ig E in mild, moderate and severe persistent cases was 269.50 ,919.45,1770.48 IU/mL respectively with a positive correlation. Our present study advocates the possible supplementation of absolute eosinophil count and serum immunoglobulin E levels as another objective parameter that can help in selecting the appropriate severity level in asthmatics. Estimation of serum Ig E in diagnosed case of asthma gains importance with increasing severity based on clinical grading. 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.

## AIM:

To establish the Correlation of total serum immunoglobulin E level, sputum and peripheral eosinophil count in assessing the clinical severity in bronchial 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 peripheral eosinophil count in assessing the clinical severity in bronchial asthma

## METHODS:

Informed and written consent will be taken from patient or guardian. Correlation of serum IgE, sputum eosinophil count, and peripheral eosinophil count will be done in assessing the clinical severity of asthma.

## STUDY POPULATION:

All Asthma patients who come to Department of Pulmonary Medicine, Bhaskar Medical College and General Hospital.

**SAMPLE SIZE:** 50 cases shall be taken up for study.

**INCLUSION CRITERIA:**
All Diagnosed Asthma Patients

**EXCLUSION CRITERIA:**
Patients who are not willing to be part of the study, Pregnant Women, Patients with consolidation, Cystic Fibrosis, Tuberculosis, Emphysema and Chronic Bronchitis

**STUDY PERIOD:** Over a period of 18 months from January 2020 to June 2021.

**STUDY DESIGN:** Cross-sectional study

**DATA ANALYSIS (EXPECTED OUTCOME):** Data will be subjected to ANOVA statistical method using SPSS software 2010

**ETHICAL IMPLICATIONS:**
- The study subjects will be selected following inclusion and exclusion criteria.
- Written and informed consent will be taken.
- Every patient will be completely explained about the study and related procedures and their importance and complications in their own understandable language.

**FINANCIAL IMPLICATIONS:**
- Funding - None
- Expenses if any will be incurred by me if patients are not affordable.

**INVESTIGATIONS:**
1. Chest X-ray
2. Blood Tests: Peripheral Blood Eosinophils Sputum Eosinophils Serum IgE
3. Pulmonary Function Test: Spirometry

**STATISTICAL ANALYSIS**
All the information obtained from our study population was collected and recorded in master chart. Statistical significance was analysed by Chi square test and logistic regression analysis was performed with SPSS software to assess independent association of variables found to be significant in univariate analysis.
- If the P value is between 0.000 to 0.010, it is considered to be significant at level1- Highly Significant
- If the P value is between 0.011 to 0.050, it is considered to be significant at level 5- Significant
- If the P value is between 0.051-1.000, it is considered insignificant At level5- Not Significant

# RESULTS:

**Table 1: Sex Distribution Of The Study Population**

| SEX | PERCENT |
|---|---|
| MALE | 50 |
| FEMALE | 50 |
| TOTAL | 100 |



SEX DISTRIBUTION

MALE FEMALE

**Table 2: Age Distribution Of The Study**

| AGE | NUMBER OF PATIENTS |
|---|---|
| 20-30 | 16 |
| 30-40 | 17 |
| 40-50 | 8 |
| >50 | 9 |
| TOTAL | 50 |
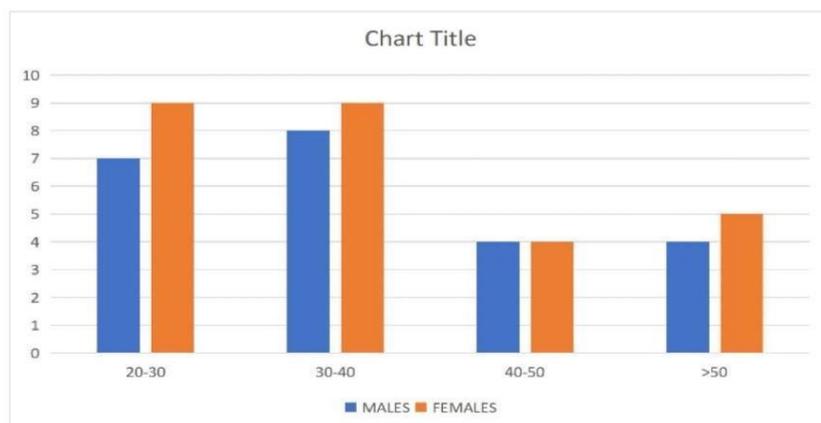


**Table 3: Severity Assessed by Lung Spirometry**

| SEVERITY | PERCENTAGE |
|---|---|
| PARTIALLY CONTROLLED | 29 |
| UNCONTROLLED | 71 |
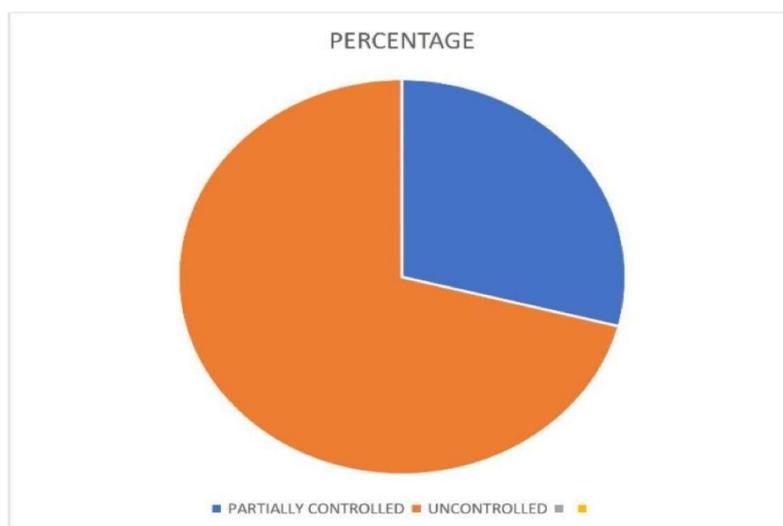


**Table 4: Asthma Control Questionnaire**

| ACQ SCORE | MALES % | FEMALES% |
|---|---|---|
| < 4 | 28 | 24 |
| >4 | 22 | 26 |

**Table 5: Severity According To New Gina Guidelines**

| SEVERITY | FREQUENCY | PERCENTAGE |
|----------|-----------|------------|
| MILD | 10 | 20 |
| MODERATE | 26 | 52 |
| SEVERE | 14 | 28 |
| TOTAL | 50 | 100 |

**Table 6:**
**ABSOLUTE EOSINOPHIL COUNT AND SEVERITY**

| ABSOLUTE EOSINOPHIL COUNT | MILD | MODERATE | SEVERE | P |
|---------------------------|------|----------|--------|---|
| UPTO 440 | 10 | 23 | 4 | VAL UE |
| GREATER THAN 440 | 0 | 3 | 10 | 0.00 1 |
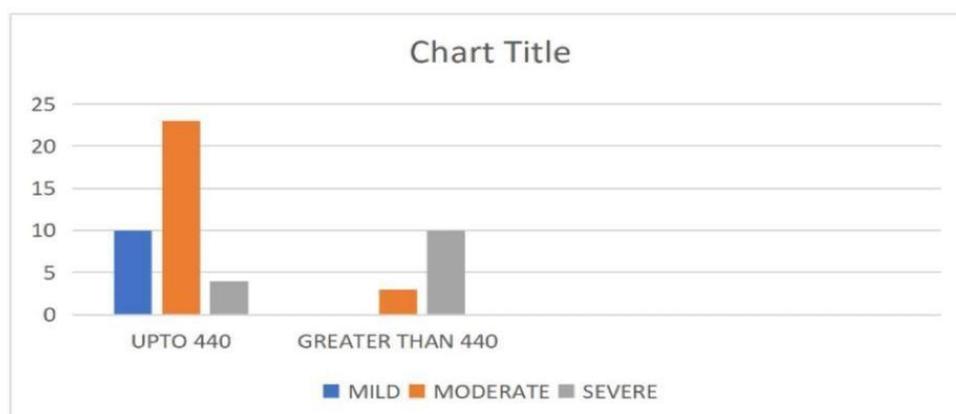


**Table 7:**
**SPUTUM EOSINOPHIL COUNT AND SEVERITY**

| SEVERITY | FREQUENCY | SPUTUM EOSINOPHILS > 3% |
|----------|-----------|-------------------------|
| MILD | 10 | 0 |
| MODERATE | 25 | 3 |
| SEVERE | 15 | 7 |
| TOTAL | 50 | 10 |
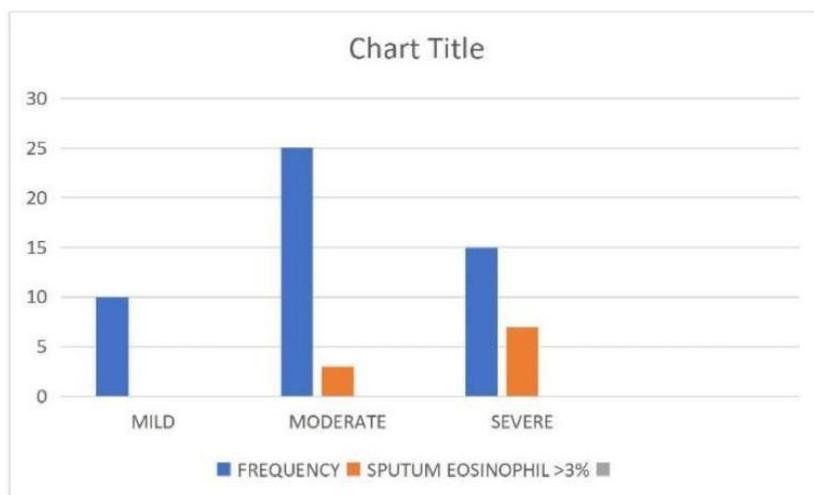
**Table 8: Mean Serum IgE and Severity of Asthma**

| SEVERITY | MEAN IGE (IU/ML) |
|----------|------------------|
| MILD | 269.5 |
| MODERATE | 919.45 |
| SEVERE | 1770.48 |

# DISCUSSION

This present study is an observational clinical study which analysed the correlation of serum immunoglobulin E levels and absolute eosinophil count with the severity of bronchial asthma. Study was conducted during a period of one year from January 2020 to June 202. It involved 50 patients which were randomly selected from among outpatients and inpatients presenting to Bhaskar medical college hospital. Relevant history and physical findings including symptoms were recorded. Routine haematological, biochemical investigations, Chest X ray were done. Spirometry was done in all patients and FEV1 and PEF was measured both before and 20 minutes after giving nebulised salbutamol. Post bronchodilator reversibility of 12% or more was taken as criteria for diagnosis of asthma. Severity of asthma was assessed by both history and pre-bronchodilator FEV1% Predicted values. Absolute eosinophil count and serum IgE was assessed in all patients of each severity group. Among 50 patients, 25 were females and 25 were males. Most common age group in our study population was 26-32years, Range 20-60 years. Most common risk factor in the study population was atopy and the most common associated comorbid condition was allergic rhinitis. Positive correlation between absolute eosinophil count and severity of asthma was statistically significant (P Value <0.01). Serum immunoglobulin E levels also had positive correlation with severity of asthma which was statistically significant.(P value<0.01). GhPresent study

was done to correlate induced sputum eosinophil and absolute eosinophil counts in assessing the clinical severity of bronchial asthma. In our study of 50 asthmatics were selected, out of them 52% patients had severe asthma, 28% patients had moderate asthma, and 20% patients had mild asthma. In our study, prevalence of asthma is more in middle age group with equal sex ratio. Dust and seasonal allergens are the most common triggering factors. In our study, risk factors for severe asthma was female sex, environment dust exposure, smoking.

# CONCLUSION

Based on our present study we found, Absolute eosinophil count has a definite positive correlation with asthma severity in the severe persistent asthma group.

Mean serum Ig E in mild, moderate and severe persistent cases was 269.50 ,919.45,1770.48 IU/mL with positive correlation.

Our present study advocates the possible supplementation of absolute eosinophil count and serum immunoglobulin E levels as another objective parameter that can help in selecting the appropriate severity level in asthmatics.

Estimation of serum Ig E in diagnosed case of asthma gains importance with increasing severity based on clinical grading.

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

- 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.
- Grossman, J. (1997). One airway, one disease. *Chest*, *111*(2), 11S-16S.
- Philip, G., Malmstrom, K., Hampel Jr, F. C., Weinstein, S. F., LaForce, C. F., Ratner, P. H., ... & Montelukast Spring Rhinitis Study Group. (2002). Montelukast for treating seasonal allergic rhinitis: a randomized, double-blind, placebo-controlled trial performed in the spring. *Clinical & Experimental Allergy*, *32*(7), 1020-1028.
- Marketos, S. G., & Ballas, C. N. (1982). Bronchial asthma in the medical literature of Greek antiquity. *Journal of Asthma*, *19*(4), 263-269.
- Bousquet, J., Khaltaev, N., & Cruz, A. A. (2007). World Health Organization. Global Surveillance, Prevention and Control of Chronic Respiratory Diseases: A Comprehensive Approach. WF 140, 15-16.
- Van Eerdewegh, P., Little, R. D., Dupuis, J., Del Mastro, R. G., Falls, K., Simon, J., ... & Keith, T. P. (2002). Association of the ADAM33 gene with asthma and bronchial hyperresponsiveness. *Nature*, *418*(6896), 426-430.
- Subbarao, P., Mandhane, P. J., & Sears, M. R. (2009). Asthma: epidemiology, etiology and risk factors. *Cmaj*, *181*(9), E181-E190.
- Holgate, S. T. (2008). Pathogenesis of asthma. *Clinical & Experimental Allergy*, *38*(6), 872-897.
- Singh, V. Interactive Asthma Timeline — Ancient Period. wwtv.meicLasthAncient period.htnil&amp;
- Robert, F., & William, W. (2003). Asthma. *J Allergy and Clinical Immunology*, 111(1), S49-S61.
- Vignola, A. M., Kips, J., & Bousquet, J. (2000). Tissue remodeling as a feature of persistent asthma. *Journal of Allergy and Clinical Immunology*, *105*(6), 1041-1053.
- Knox, A. J. (2002). How prevalent is aspirin induced asthma?. *Thorax*, *57*(7), 565-566.
- Corren, J. (1997). Allergic rhinitis and asthma: how important is the link?. *Journal of allergy and clinical immunology*, *99*(2), S781-S786.
- Bergeron, C., & Hamid, Q. (2005). Relationship between asthma and rhinitis: epidemiologic, pathophysiologic, and therapeutic aspects. *Allergy, Asthma & Clinical Immunology*, *1*(2), 1-7.
- Wenzel, S. (2003). Severe/fatal asthma. *Chest*, *123*(3), 405S-410S.
- Sears, M. R. (2008). Epidemiology of asthma exacerbations. *Journal of Allergy and Clinical Immunology*, *122*(4), 662-668.
- This Joint Statement of American Thoracic Society and European Respiratory Society. American Journal of Respiratory and Critical Care Medicine, 2009, 180, 60-61.
- Ulrik, C. S. (1995). Peripheral eosinophil counts as a marker of disease activity in intrinsic and extrinsic asthma. *Clinical & Experimental Allergy*, *25*(9), 820-827.
- Horn, B. R., Robin, E. D., Theodore, J., & Van Kessel, A. (1975). Total eosinophil counts in the management of bronchial asthma. *New England Journal of Medicine*, *292*(22), 1152-1155.
- Meijer, R. J., Postma, D. S., Kauffman, H. F., Arends, L. R., Koeter, G. H., & Kerstjens, H. A. M. (2002). Accuracy of eosinophils and eosinophil cationic protein to predict steroid improvement in asthma. *Clinical & Experimental Allergy*, *32*(7), 1096-1103.