

A STUDY ON SERUM IgE LEVELS, PERIPHERAL EOSINOPHILS AND INDIVIDUAL SYMPTOMS IN PATIENTS WITH NON-INFECTIVE RHINITIS AND ASTHMA AND RELATED CONDITIONS

JAGADEESHWAR. K^{1*}, VENUMADHAV. V², SANGRAM. V³, SATHAVAHANA CHOWDARY⁴. V, SUDHA RANI⁴, VINAY KUMAR. EC⁴

¹St. Mary's College of Pharmacy, Secunderabad, (A.P) – India. ²Vishnu Institute of Pharmacy Education and Research, Narsapur, Medak Dist., (A.P) – India. ³National Institute of Pharmaceutical Educational Research, Hajipur, Bihar, India. ⁴Consultant, Department of ENT, Apollo Hospitals, Hyderabad, A.P. India.

Received: 12 Feb 2011, Revised and Accepted: 18 May 2011

ABSTRACT

Performing skin prick tests or RAST, ELISA tests to determine the atopic skin status of all the individuals presenting with nasal symptoms is not possible in most of the clinics. So, an attempt is made to identify the patients who could be given treatment related to allergy based on correlation between certain symptoms with the blood markers. 258 Patients who visited the allergy clinic were asked questions covering demographic factors, allergic symptoms. Patients were characterized into 3 groups based on predominant symptoms sneezing, sneeze & wheeze and nasal obstruction. Anterior Rhinoscopy was done to verify the presence or absence of septal deviation or hypertrophy of turbinates. Total IgE levels, peripheral Eosinophil (%), Absolute Eosinophil Count (AEC) were estimated in 3 groups of patients and also in controls. Data obtained is analyzed through one sample t-test. Which were represented as Mean \pm SE (at 95% Confidence interval). There were 141 males and 119 females (mean age 33.11 \pm 12.26 years) [P<0.01]. 70.1% of individuals experienced sneezing, 18% sneezing and wheeze, 11.6 % nasal obstruction. Total serum IgE was found to be highest in cases of sneeze plus wheeze individuals (794.34 \pm 80.58) (p<0.01), followed by patients with sneeze (534.09 \pm 20.30) (p<0.01). Peripheral Eosinophil was also found to be highest in cases of sneeze and wheeze (8.14 \pm 0.47) and sneeze (7.15 \pm 0.84) (p<0.01). IgE levels and peripheral eosinophil count was found to be slightly greater in nasal obstruction (p<0.05) patients than in controls. 54.6% of the individuals with predominant symptoms experienced septal deviation, where septal deviation was higher (81.8%) in cases of individuals with symptoms of nasal obstruction with polyposis.

Keywords: Eosinophils, IgE, Absolute Eosinophil Count.

INTRODUCTION

The otolaryngologist in his out patient clinic sees significant number of patients presenting with complaints related to ear, nose and throat. Amongst these cases, the nasal symptoms related to rhinitis constitute significant number. Regarding the non-infective rhinitis group, the physician is in a dilemma, how to determine whether these cases are allergic or non-allergic rhinitis type. Performing skin prick tests or radioallergosorbent test (RAST), enzyme linked immunosorbent assay (ELISA) tests to determine the atopic skin status of all these individuals is not possible in most of the clinics. So, an attempt is made to identify the patients who could be given treatment related to allergic symptoms based on the findings obtained from correlation of certain symptoms with the blood markers (Total IgE levels and Peripheral Eosinophils).

Total IgE level estimation provides evidence in support of atopy. IgE concentration reaches the adult value at the age of 14 years and declines after 70 years due to decreased number of identifiable atopics.¹ Expected IgE concentration for healthy non-allergic adults is upto 120 IU/ml.² IgE levels may be raised in cases of parasitic infestations, Wiskott - Aldrich syndrome, alcoholism, HIV and severe burn cases. The normal Peripheral eosinophil percentage was 0-6% while the normal absolute eosinophil count is considered to be 40-440 cells/mm³.

The association between eosinophils and allergic disease has been known for many years. Nasal smear examination for eosinophils may be a potential valuable test to predict prolonged or recurrent allergic rhinitis.³

The objective of our study was to determine the predominant symptoms (Sneeze, Sneezing & wheeze, Nasal obstruction) and compare the means of Laboratory markers (Total IgE, Peripheral Eosinophil) in patients with various predominant symptoms of respiratory allergy patients and to correlate the values of laboratory markers with the symptoms for use in diagnosis and management.

METHOD

Patients visiting the allergy clinic of otolaryngology department were asked to answer a questionnaire covering demographic factors

and predominant allergic symptoms and their occurrence. Only symptoms that were definitely present or definitely absent were counted; suspected or possible were not considered. To determine the subject clinical status; allergy history was obtained from each subject by trained allergist. Each patient was examined by an ENT doctor in sitting position. Among 367 Patients visited the clinic, 258 patients presented with symptoms of non-infective rhinitis with or without wheeze. Among them, 141 were males and 119 were females with mean age group of 33.11 \pm 12.26 (S.D) [P<0.01]. Based on the predominant symptoms Observed in patients, they were categorized into 3 groups

Group I: Individuals in whom Sneezing was predominant symptom

Group II: Individuals in whom Nasal obstruction (with and without polyposis) was predominant symptom.

Group III: Individuals in whom sneezing & wheeze was predominant symptom

Patients were excluded from the study if they had history of asthma of more than 2 years duration (to avoid cases in which established inflammation might influence patient clinical status), if they have received treatment of corticosteroid or the other immunosuppressive therapy during preceding 6 months, if they had elevated IgE Level caused by another disease or if they had ever received allergen Immunotherapy.

Anterior Rhinoscopy was done with sterilized nasal speculum to verify the presence or absence of septal deviation or hypertrophy of turbinates or any other local pathology. Standard examination of throat and ear was also done. Nasal endoscopy and radiological study was done wherever it is needed.

Total IgE levels, peripheral Eosinophil (%), Absolute eosinophil count (AEC) was estimated in 3 groups of patients and also in controls (Patient without any symptoms related to respiratory problems) and their means were compared in different categories of patients.

Total Serum IgE level was estimated by Enzyme linked immunoflow assay and chemiluminescence (ELIFA) method. Peripheral

Eosinophil (%) and Absolute Eosinophil Count (AEC) was estimated by PENTRA-120 cell counter.

Age group of individuals suffering from allergic symptoms in various groups of patients was calculated through one sample t-Test. Differences in levels of IgE, Peripheral Eosinophil (%) and Absolute Eosinophil count among various groups were analyzed by one sample t-Test. The analysis was performed by using Statistical software – SPSS (17.0 Version). Total Serum IgE levels, Peripheral Eosinophil (%), Absolute Eosinophil count were obtained at 95% confidence interval with p value <0.05 considered to be significant.

RESULTS

Data obtained about patients demographic characters (Age, gender) were given in Table 1. Data about number of individuals with predominant symptoms and their demographic characters were given in Table 2. Among them 69.8% of individuals experienced sneezing, 18% of them experienced sneezing and wheeze, 8% of them experienced nasal obstruction with polyposis, and 4.2% of them experienced nasal obstruction without polyposis. Total IgE, peripheral Eosinophil (%), Absolute Eosinophil Count (AEC) were given in table 3. which were represented as Mean \pm SE (Confidence interval). Individuals with deviated septum among patients experiencing various predominant symptoms were given in table 4.

Table 1: Descriptive statistics of the patients visited the allergy clinic

	Males	Females	Total
Number of patients	139 (53.8%)	119 (46.2%)	258 (100%)
Age of Individuals (years)	34.14 \pm 12.08*	32.16 \pm 12.58*	33.11.24 \pm 12.26*

*p<0.01 is considered to be significant

Table 2: Number of Individuals with various predominant symptoms visited allergy clinic

Predominant Symptoms	Male	Females	Total (%)
Group I: Sneezing	98	83	181 (70.1%)
Mean Age (Years)	33.91	31.24	32.49 \pm 12.18 (SD)*
Group II: Sneezing + Wheeze	23	24	47 (18.2%)
Mean Age (Years)	36.17	35.04	35.46 \pm 12.96 (SD)*
Group III: Nasal Obstruction	12	9	30 (11.6%)
Mean Age (Years)	29.25	31.33**	30.14 \pm 12.63 (SD)*

*p<0.01 is considered to be significant, **p< 0.05 is considered to be significant

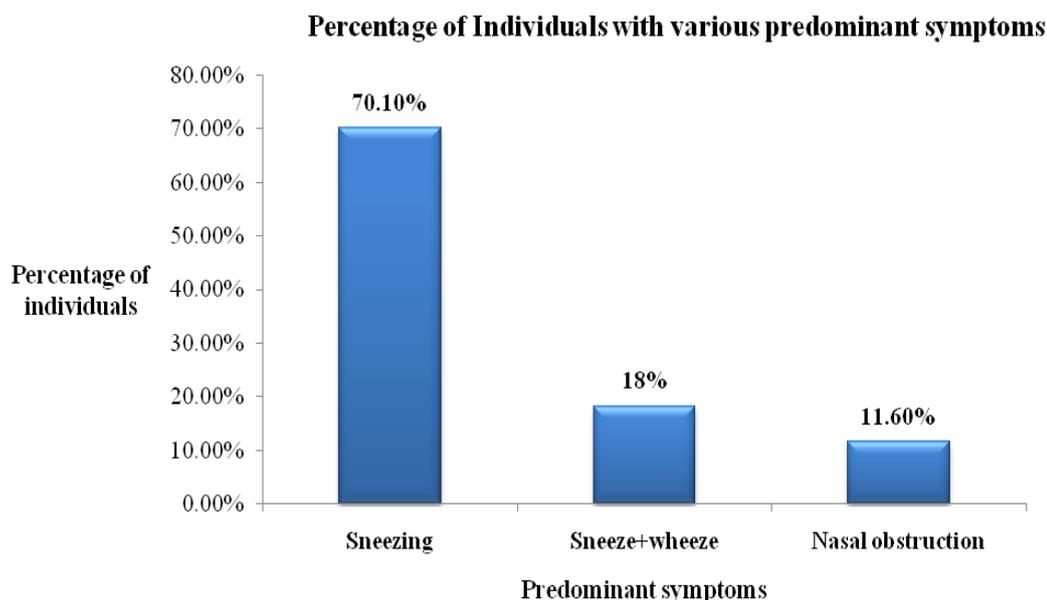


Fig. 1: Percentage of individuals with various predominant symptoms visited the allergy clinic

Table 3: Mean levels of Laboratory parameters in various predominant Symptom group of Individuals

Symptoms	Total IgE (IU/ml)	P.E (%)	A.E.C
Sneezing	534.09 \pm 20.30*	7.15 \pm 0.84*	416.26 \pm 18.85*
Sneezing + Wheeze	794.34 \pm 80.58*	8.14 \pm 0.47*	683.76 \pm 56.14*
Nasal Obstruction	118.48 \pm 8.2*	5.66 \pm 0.94*	182.04 \pm 19.3*
Control	124.34 \pm 5.55*	3.32 \pm 0.22*	150 \pm 11.24*

*p<0.01 is considered to be significant, Peripheral Eosinophil (P.E), Absolute Eosinophil Count (AEC)

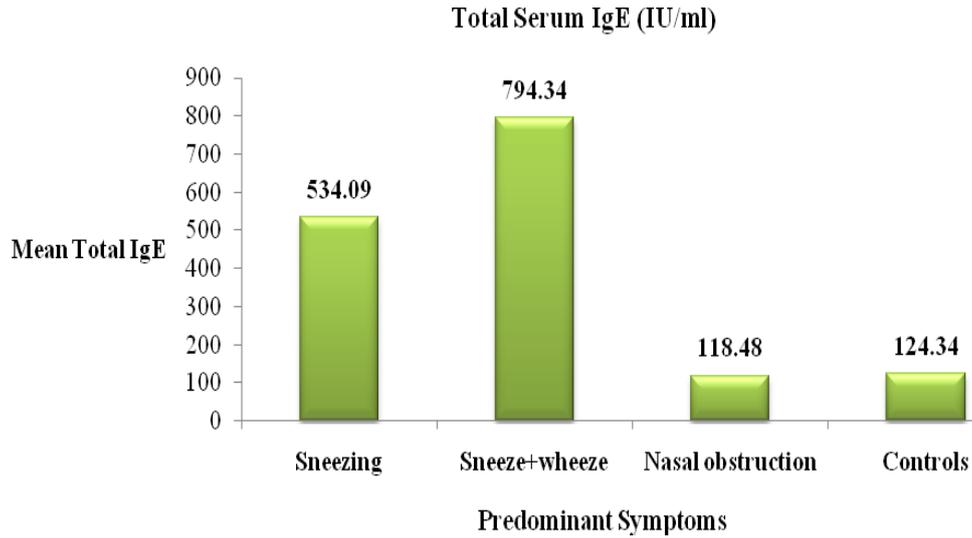


Fig. 2: Mean of Total serum IgE levels in patients with various predominant symptom

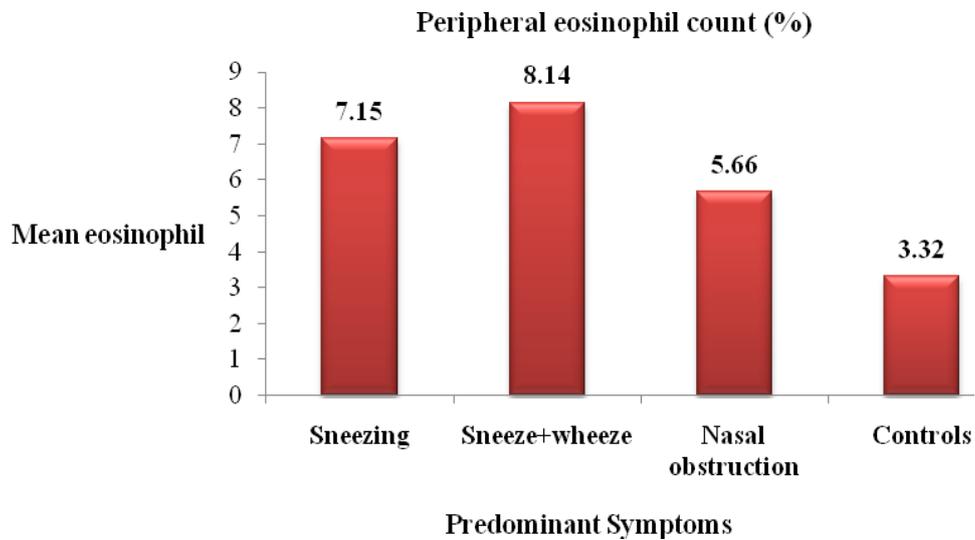


Fig. 3: Means of peripheral Eosinophil (%) with various predominant symptoms

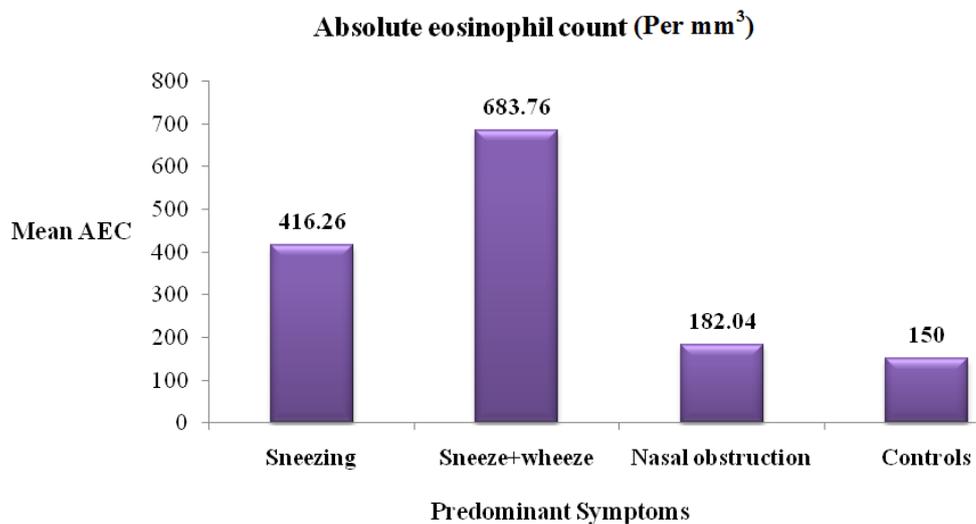


Fig. 4: Means of AEC in patients with various predominant symptoms

Table 4: Individuals with deviated septum among patients experiencing various Predominant symptoms

Predominant Symptoms	Patient with Deviated Nasal septum	Percentage
Sneezing	90	49.7%
Nasal obstruction	15	71.4%
Sneezing + Wheeze	28	59.5%
Nasal polyposis	9	81.8%

Total Number of Individuals with deviated nasal septum = 142 (54.6%)

DISCUSSION

A study was conducted in the allergy clinic of otolaryngology department to explore the clinical profile and to find out the relationship between the predominant symptoms and laboratory markers (Total IgE, Peripheral eosinophil and Absolute Eosinophil Count) so that patient would be given treatment for proper control of symptoms. In a study reported in 2008 says that the common symptoms that were reported were sneezing, Rhinnorhoea and nasal congestion which were present in more than 90% of the patients who visited the allergy clinic but other complaints like post nasal drip, ocular symptoms, itching, cough, and sore throat and even decreased sense of taste were also reported. Males (53.8%) were slightly more than females (46.1%). The mean age of individuals was 33.12 years. This is in concordance with another study that evaluated patients of allergy; mean age at diagnosis being 32 years.⁴ In a study reported in 2009 say that in more number of individuals, sneezing was the predominant symptom (69.6%), followed by sneeze plus wheeze and nasal obstruction which was in concordance with retrospective study conducted by Taimur Saleem.⁵ Several early studies evaluated the role of IgE in patients with a variety of allergic diseases. Adults and children with allergic rhinitis and asthma have higher total serum IgE concentrations as compared to non-atopic individuals. About half of atopic patients have the total IgE concentrations that are two standard deviations above the mean of a normal control group.^{6,7,8} A total serum IgE level was considered to be higher in allergic subjects than in healthy subjects. Among all age groups, difference between mean IgE levels between allergic subjects and controls was significant.⁹ Allergic sensitization mediated by IgE is the basis of allergic diseases and elevated total IgE In spite of well-known limitations is frequently included diagnostic criterion for allergic diseases.¹⁰

In a study reported in 1985 say that mean total serum IgE levels was 38±43 KU/l-180KU/l in normal subjects and 94±93 KU/l in allergic subjects and asthmatics have higher mean IgE levels than those who are suffering from rhinitis.¹¹ In a study conducted in 1980, Normal IgE levels for total sample were 32 IU/ml. Highest IgE levels was found in patients with both asthma and eczema (985 IU/ml) followed by asthma alone (305 IU/ml), eczema alone (273IU/ml) and then Allergic Rhinitis (171 IU/ml).¹²

In our present study, the IgE levels were elevated in more than 90% of patients with sneezing as the predominant symptoms. In Cases of persons with symptoms of sneezes plus wheeze, the value was found to be highest (794.34 IU/ml) followed by persons with symptom of Sneezing. In Individuals with symptoms of nasal obstruction without polyposis (118.48 IU/ml), the IgE levels were similar to the controls (124.34) in more than 90% of patients. A significant relationship exists between serum IgE levels and eosinophilia in populations presumed to be free of parasites where IgE levels presumably provide a better clue to atopy than do skin tests.¹³

In our study deviated nasal septum was found in general in 54.6% of the cases. This was in concordance with Gray and Fracs study¹⁴, where there were 79% individuals with nasal deviation. DNS was commonly associated with patients with symptoms related to nasal obstruction with polyposis (81.8%) followed by nasal obstruction (71.4%), sneezing plus wheeze and sneezing.

CONCLUSION

There is need to evolve a strategy for management of cases with allergy symptoms. The present study was held to identify the cases with predominant symptoms of allergy where they will be benefited

by appropriate pharmacological treatment as primary modality treatment and others, which need surgery. Based on our study it is recommended that total serum IgE levels and Peripheral Eosinophil Counts be done in all cases of patients with predominant allergic symptoms and investigations like CT-Scan of PNS wherever necessary for proper planning in management of such cases.

ENT surgeon/physician is in a dilemma as what to do if he sees a patient with symptoms of sneezing, sneezing with asthma, nasal obstruction or when there is an associated DNS and inferior hypertrophied inferior turbinates. Most of the patients without symptoms of Nasal obstruction also had deviated septum on clinical examination. So mere finding of deviated nasal septum in cases of Rhinitis with or without asthma is not an indication for septoplasty/turbinoplasty/ Submucous diathermy (SMD) of turbinates. Only in those cases where medical management with topical steroids sprays, antileukotrienes and local saline drops/sprays could not provide adequate relief from symptoms of nasal obstruction, then surgical correction of deviated nasal septum with or without turbinoplasty has to be done. More Multicentre studies are to be made in this regard which will help in the determination of total IgE levels and peripheral eosinophils in patients as well as in controls.

REFERENCES

- Merret TG, Burr Mh, Stleger AS, Merret J. Circulating IgE levels in the over seventies. *Clinical Allergy* 1980; 10: 433.
- Witting HJ, Belloit J, De Fillippi I, Royal G. Age related immunoglobulin E levels in healthy subjects and in patients with allergic diseases. *J Allergy Clin Immunol.* 1980; 66: 305-13.
- Okano M, Nishizaki K, Nakada M, Kawarai Y, Goto S, Satoskar AR, Satoskar AA, Takehisa T, Masuda Y. Prevalence and prediction of allergic rhinitis using questionnaire and nasal smear examination in school children. *Acta Otolaryngologica - Supplement* 1999; 540: 58-63.
- Kalpakioglu AF, Baccioglu AJ. Evaluation of quality of life: impact of allergic rhinitis on asthma. *J Invest Allergol Clin Immunol.* 2008; 18(3):168-73.
- Taimur Saleem, Umair Khalid, Rehman Sherwani. Clinical profile, outcomes and improvement in symptoms and productivity in rhinitis patients in Karachi, Pakistan. *BMC Ear, Nose and Throat Disorders* 2009; 9:12.
- Johansson SGO, Foucard T. IgE in immunity and disease. In: Middleton E, Reed CE, Ellis EJ, eds. *Allergy Principles and Practice.* St louis: CV Mosby, 1978; (1): 551.
- Johansson SGO, Mellbin T, Vahlquist G. Immunoglobulin levels in Ethiopian preschool children with special reference to high concentration of Immunoglobulin E (IgND). *Lancet* 1968; 1:1118-1121.
- Barbee RA, Holonen M, Lebowitz M, et al., Distribution of IgE in a community population sample: correlation with age, sex, allergen skin test reactivity. *J allergy Clin Immunol.* 1981; 68:106-111.
- Agha F, Sadaruddin A, Abbas S, Ali SM. Serum IgE levels in patients with allergic problems and healthy subjects. *J Pak Med Assoc.* 1997; 47(6):166-169.
- Aurelia Carosso, Massimilano Bugiani, Enrica Migilore, Josep Maria Anto, Roberto DeMarco. Reference values of Total Serum IgE and their significance in the diagnosis of allergy in young European Adults. *Int Arch Allergy Immunol.* 2007; 142: 230-238.
- Bousquet J, Coulomb Y, Arrendal H, Robinet-levy M and Michel F. B. Total Serum IgE Concentrations in adolescents and adults

- using the Phadebas IgE PRIST technique. *Allergy* 1982; 37: 397-406.
12. Heinz Wittig J, Jeery Belloit, Llda De Fillippi and Gary Royal. Age related Serum Immunoglobulin E levels in healthy subjects and in patients with allergic disease. *Journal of Allergy and Clinical Immunology* 1980; 66(4): 305-313.
 13. Halonen M, Barbee RA, Lehanitz MD, Eurrows B. An epidemiologic study of the interrelationship of total serum immunoglobulin E, Allergy skin reactivity and eosinophils. *J Allergy Clin. Immunol.* 1982; 69: 221-228.
 14. Gray LP, Fracs MB. Deviated nasal septum-Incidence and etiology. *Ann.Otol. Rhinol. Laryngol.* 1978; 87: 3-20.