

Assessment of Serum Total IgE Levels in Smokers, Non- Smokers and Ex-Smokers and its Relation to Lung Function

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Abstract

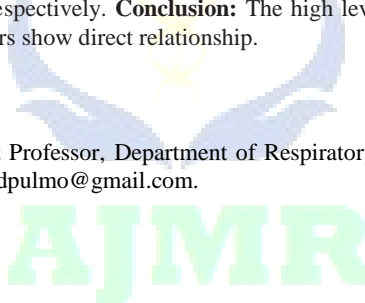
Background: The aim is to assess serum total IgE levels in smokers, non- smokers and ex- smokers and its relation to lung function. **Subjects and Methods:** One hundred forty subjects of either gender was included and they were divided into three groups such as group I comprised of smokers, group II non- smokers and group III ex- smokers. Weight and high was recorded followed by BMI. History of alcohol intake was also recorded. 5 ml of venous blood was taken for assessment of haemoglobin, ESR and absolute haemoglobin count. IgE level was assessed using ELISA. **Results:** There were 52 males and 18 females in group I, 14 males and 16 females in group II and 25 males and 15 females in group III. The mean weight (kg) in group I, group II and group III were 68.2, 65.4 and 64.7, mean height (cm) was 170.2, 171.4 and 169.4, mean BMI (Kg/cm²) was 24.6, 23.2 and 23.7 and alcohol (>once /month) was seen among 42, 8 and 23 respectively. The mean IgE (IU/ml) level was 346.8 in group I, 32.4 in group II and 204.6 in group III. The absolute eosinophil count/mm³ was 310.2 in group I, 192.6 in group I and 284.5 in group III. Breath CO (ppm) level was 15.4 in group I, 4.3 in group II and 5.2 in group III. The mean FVC (%) was 84.1, 94.2 and 74.7, FEV1 (%) was 71.4, 94.2 and 52.2, FEV1/ FVC was (%) 84.3, 98.4 and 67.5, FEF25-75 (%) was 56.3, 94.2 and 38.6 and FEF max (%) was 75.4, 104.3 and 47.9 in group I, group II and group III respectively. **Conclusion:** The high level of IgE and altered pulmonary function tests in smokers and ex- smokers as compared to non- smokers show direct relationship.

Keywords: Smoking, Alcohol, IgE, Lung function.

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Introduction

Smoking is leading deleterious habits among youth. It is observed that worldwide, there are more than 1 billion tobacco consumers either in smoking form or non- smoking form. Approximately 1/3rd of people are using tobacco universally. Smoking has impact in every part of the body such as lungs, oral cavity, heart, oesophagus etc. It leads to cardiovascular diseases (CVDs), chronic respiratory diseases such as chronic obstructive pulmonary disease (COPD) and bronchiectasis, asthma, carcinoma lung, cardiovascular accident (CVA) and impaired pulmonary function.^[1]

Research shows that immunoglobulin E (IgE) is related with allergy such as allergic rhinitis, atopy, asthma, atopic dermatitis. The increase in immunoglobulin E level is due to rise in Th2 immune response.^[2] These antibodies, which are specific to foreign substances are produced by B cells, during the process of sensitization.^[3] IgE is supposed to sensitise the mast cells and basophil by its binding activity towards the high affinity receptors for the IgE. When these receptors are cross linked by the allergens, they granulate and vasoactive amines chemokines, lipid mediators are liberated.^[4] Male shows higher IgE level as compared to females.

Literature reveals a strong linked between serum total IgE and male gender, airway hyper-responsiveness, early life wheezing bronchitis, parenteral allergic predisposition, positive skin prick test, atopic dermatitis and hay fever. These are considered to be the predictors of elevated IgE.^[5,6] Smoking cause high mortality and morbidity among all age groups. The presence of nitrogen oxide, carbon monoxide (CO) and other harmful carcinogens have harmful effects on general body.^[7] Increased levels of IgE is found in these people, particularly in relation to allergic diseases.^[8] Considering this, we attempted present study to assess serum total IgE levels in smokers, non- smokers and ex- smokers and its relation to lung function.

Subjects and Methods

A sum total of one hundred forty subjects of either gender was included for this prospective, observational study. The written consent for the participation in the study was obtained from all enrolled subjects. Ethical consideration was taken into account before starting the study.

All underwent careful general and oral examination. Based on history of smoking, they were divided into three groups

such as group I comprised of smokers, group II non-smokers and group III ex-smokers. Subjects selected for ex-smokers were those who gave history of quitting the habit of tobacco usage at least 1 year ago. Symptoms and signs of cough, wheezing, dyspnoea was recorded. Weight and height was recorded followed by BMI. History of alcohol intake was also recorded. 5 ml of venous blood was taken for assessment of haemoglobin, ESR and absolute haemoglobin count. IgE level was assessed using ELISA. The IgE detected was against pollen, weeds, animals such as dogs, insects and fungi. The results of present study was compiled and entered in MS excel sheet for correct inference using SPSS version 21.0. Mann Whitney U test was used for the analysis where value of p less than 0.05 was considered significant.

Results

There were 52 males and 18 females in group I, 14 males and 16 females in group II and 25 males and 15 females in group III [Table 1].

Table 1: Distribution of subjects

Groups	Group I	Group II	Group III
Status	Smokers	Non-smokers	Ex-smokers
M:F	52:18	14:16	25:15

Table 2: Demographic profile

Parameters	Group I	Group II	Group III	P value
Weight (kg)	68.2	65.4	64.7	>0.05
Height (cm)	170.2	171.4	169.4	>0.05
BMI (Kg/cm ²)	24.6	23.2	23.7	>0.05
Alcohol (>once /month)	42	8	23	<0.05

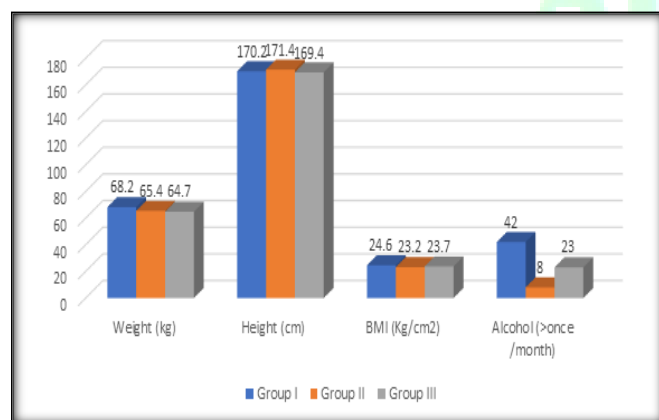


Figure 1: Demographic profile

Table 3: Assessment of laboratory parameters

Parameters	Group I	Group II	Group III	P value
IgE (IU/ml)	346.8	32.4	204.6	<0.05
Absolute eosinophil count/mm ³	310.2	192.6	284.5	<0.05
Breath CO (ppm)	15.4	4.3	5.2	<0.05

The mean weight (kg) in group I, group II and group III was 68.2, 65.4 and 64.7, mean height (cm) was 170.2, 171.4 and

169.4, mean BMI (Kg/cm²) was 24.6, 23.2 and 23.7 and alcohol (>once /month) was seen among 42, 8 and 23 respectively. A significant difference was observed (P<0.05) [Table 2, Figure 1].

The mean IgE (IU/ml) level was 346.8 in group I, 32.4 in group II and 204.6 in group III. The absolute eosinophil count/mm³ was 310.2 in group I, 192.6 in group II and 284.5 in group III. Breath CO (ppm) level was 15.4 in group I, 4.3 in group II and 5.2 in group III. A significant difference was observed (P<0.05) [Table 3, Figure 2].

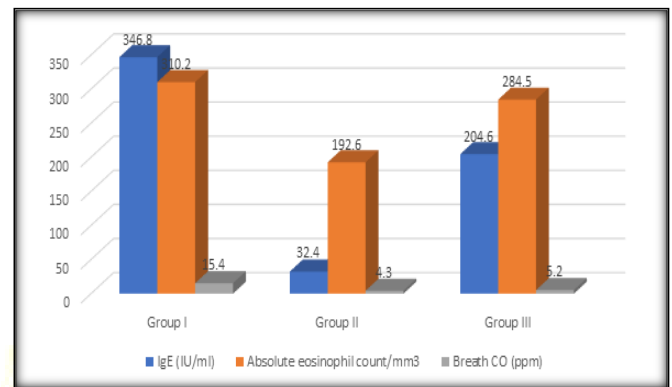


Figure 2: Assessment of laboratory parameters

Table 4: Evaluation of pulmonary function test

Pulmonary function test	Group I	Group II	Group III	P value
FVC (%)	84.1	94.2	74.7	<0.05
FEV1 (%)	71.4	94.2	52.2	<0.05
FEV1/ FVC (%)	84.3	98.4	67.5	<0.05
FEF25-75 (%)	56.3	94.2	38.6	<0.05
FEF max (%)	75.4	10.4.3	47.9	<0.05

The mean FVC (%) was 84.1, 94.2 and 74.7, FEV1 (%) was 71.4, 94.2 and 52.2, FEV1/ FVC (%) was 84.3, 98.4 and 67.5, FEF25-75 (%) was 56.3, 94.2 and 38.6 and FEF max (%) was 75.4, 10.4.3 and 47.9 in group I, group II and group III respectively. A significant difference was observed (P<0.05) [Table 4].

Discussion

The higher levels of IgE in subjects who currently smoke cigarettes and/or who are atopic and that IgE levels change with age, with peak levels occurring in the first or second decades of life followed by decreasing levels thereafter is reported.^[9,10] Also, sex differences for smoking effects on IgE have been reported, with few researches reporting increased IgE levels in both sexes and others finding differences only in male subjects.^[11] The mechanisms responsible for these elevated IgE levels in smokers are not well understood.^[12,13] We attempted present study to assess serum total IgE levels in smokers, non-smokers and ex-smokers and its relation to lung function.

Our results showed that there were 52 males and 18 females in group I, 14 males and 16 females in group II and 25 males and 15 females in group III. Madas et al,^[14] included 310 patients, both men and women > age of 18 years. It was found

that 22.3% were male smokers and 5.2% were female smokers. The difference in the total serum IgE count was highly significant in the smokers, with the mean being 329.23 ± 71.3 IU/ml, 28.94 ± 9.2 IU/ml in non-smokers, 194.3 ± 23.55 in ex-smokers and 199.3 ± 23.64 IU/ml in passive smokers. The eosinophil count was also significantly high in the smokers, followed by ex-smokers, passive smokers in comparison to the non-smokers. The FVC was the lowest in the smokers and in the normal range in the non-smokers.

We observed that the mean weight (kg) in group I, group II and group III was 68.2, 65.4 and 64.7, mean height (cm) was 170.2, 171.4 and 169.4, mean BMI (Kg/cm²) was 24.6, 23.2 and 23.7 and alcohol (>once /month) was seen among 42, 8 and 23 respectively. Sherrill et al,^[15] in their study, a total serum IgE measures and allergen skin test result were obtained during three surveys spanning a period of up to 20 years. The results showed no significant gender differences between nonatopic nonsmoking subjects, who were considered the reference group. Nonatopic current smokers had IgE levels similar to those of the reference subjects initially, but IgE levels did not decline with age at the same rate as in the reference subjects, causing significant differences at older ages. There was a significant relationship between number of cigarettes smoked and IgE level.

Our results showed that the mean IgE (IU/ml) level was 346.8 in group I, 32.4 in group II and 204.6 in group III. The absolute eosinophil count/mm³ was 310.2 in group I, 192.6 in group II and 284.5 in group III. Breath CO (ppm) level was 15.4 in group I, 4.3 in group II and 5.2 in group III. A study by Jarvis et al^[16] showed a higher sensitivity of the smokers to the house dust mites than the non-smokers.

Our results showed that the mean FVC (%) was 84.1, 94.2 and 74.7, FEV₁ (%) was 71.4, 94.2 and 52.2, FEV₁/FVC was (%) 84.3, 98.4 and 67.5, FEF₂₅₋₇₅ (%) was 56.3, 94.2 and 38.6 and FEF max (%) was 75.4, 104.3 and 47.9 in group I, group II and group III respectively. Miyae et al,^[17] investigated the association of active and passive smoking exposure with levels of total serum IgE. Results demonstrated that current smoking of at least 15 cigarettes a day and 8.0 or more pack-years of smoking were independently related to an increased prevalence of elevated total serum IgE and both cigarette smoking status and pack-years of smoking were significantly positively associated with total serum IgE levels, especially in subjects with a positive familial allergic history. There was no measurable association of exposure to environmental tobacco smoke (ETS) at home or at work with total serum IgE concentrations among those who had never smoked.

Conclusion

The high level of IgE and altered pulmonary function tests in smokers and ex-smokers as compared to non-smokers show direct relationship.

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