European Journal of Molecular & Clinical Medicine

ISSN: 2515-8260, Volume 09, Issue 08, 2022

ORIGINAL RESEARCH

Serum total IgE levels in Smokers, Non- Smokers and Ex- Smokers and its Relation to Lung Function

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ABSTRACT

Background: To assess serum total IgE levels in smokers, non- smokers and ex- smokers and its relation to lung function.

Materials and Methods: One hundred twenty subjects of either gender were divided into three groups. Group I comprised of smokers, group II non- smokers and group III ex- smokers. Weight and height was recorded followed by BMI. Symptoms and signs of cough, wheezing, dyspnoea were recorded. Alcohol history was also recorded. 5 ml of venous blood was taken for assessment of haemoglobin, ESR and absolute haemoglobin count. IgE level was assessed**.**

Results: There were 30 males and 10 females in group I, 22 males and 18 females in group II and 32 males and 8 females in group III. The mean weight was 70.2 kgs, 68.2 kgs and 65.4 kgs, mean height was 172.2 cm, 171.6 cm and 168.2 cm, mean BMI was 24.4 Kg/cm2, 23.8 Kg/cm2 and 23.6 Kg/cm2 and alcohol intake (>once /month) was seen among 32, 10 and 24 in group I, group II and group III respectively. A significant difference was observed (P< 0.05). The mean FVC was 85.1% in group I, 92.2% in group II and 72.6% in group III, FEV1 was 72.4%, 95.2% and 53.2%, FEV1/ FVC was 85.3%, 99.4% and 68.5%, FEF25-75 was 57.3%, 95.2% and 39.6% and FEF max was 76.4%, 102.3% and 48.9% in group I, group II and group III respectively. A significant difference was observed (P< 0.05). The mean IgE level was 358.2 IU/ml in group I, 38.4 IU/ml in group II and 206.4 IU/ml in group III. Breath CO level was 16.4 ppm in group I, 5.3 ppm in group II and 4.8 ppm in group III. The absolute eosinophil count/mm3 was 324.2 in group I, 190.4 in group II and 286.2 in group III. A significant difference was observed (P< 0.05).

Conclusion: There was altered pulmonary function tests and high level of IgE in smokers and ex- smokers as compared to non- smokers.

Keywords: Smoking, Alcohol, IgE, Lung function.

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INTRODUCTION

Smoking is the leading cause of oral cancer worldwide. 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. Increase levels of IgE are found in these people, particularly in relation to allergic diseases.[1,2]

Studies show that immunoglobulin E (IgE) is related with allergy such as allergic rhinitis, atopy, asthma, atopic dermatitis.[3] 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.[4] The increase in immunoglobulin E level is due to rise in Th2 immune response. These antibodies, which are specific to foreign substances are produced by B cells, during the process of sensitization. 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.[5,6] Considering this, we performed present study to assess serum total IgE levels in smokers, non- smokers and ex- smokers and its relation to lung function.

MATERIALS & METHODS

A sum total of one hundred twenty subjects of either gender were selected in the study. All voluntarily gave their written consent for the participation in the study. Ethical clearance was also obtained from institutional committee.

Demographic data such as name, age, gender etc. was recorded. A thorough oral examination was carried out. Subjects were divided into three groups. Group I comprised of smokers, group II non- smokers and group III ex- smokers.

Weight and height was recorded followed by BMI. Symptoms and signs of cough, wheezing, dyspnoea were recorded. Alcohol history 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, animal such as dogs, insects and fungi. The results of present study were compiled and statistically analyzed using Mann Whitney U test. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of subjects

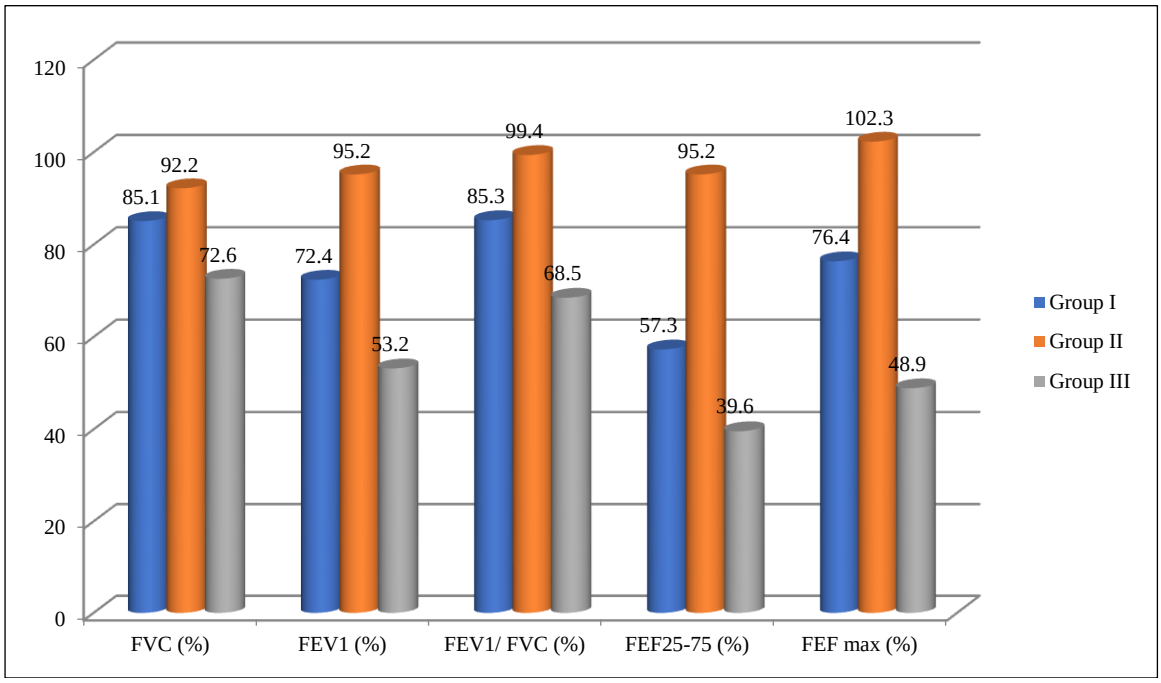
Groups	Group I	Group II	Group III
Status	Smokers	Non- smokers	Ex- smokers
M:F	30:10	22:18	32:8

There were 30 males and 10 females in group I, 22 males and 18 females in group II and 32 males and 8 females in group III (Table I).

Table II Baseline characteristics

Parameters	Group I	Group II	Group III	P value
Weight (kg)	70.2	68.2	65.4	0.92
Height (cm)	172.2	171.6	168.2	0.81
BMI (Kg/cm^2)	24.4	23.8	23.6	0.75
Alcohol (>once /month)	32	10	24	0.02

The mean weight was 70.2 Kgs, 68.2 kgs and 65.4 kgs, mean height was 172.2 cm, 171.6 cm and 168.2 cm, mean BMI was 24.4 Kg/cm2, 23.8 Kg/cm2 and 23.6 Kg/cm2 and alcohol intake (>once /month) was seen among 32, 10 and 24 in group I, group II and group III respectively. A significant difference was observed ($P< 0.05$) (Table II).



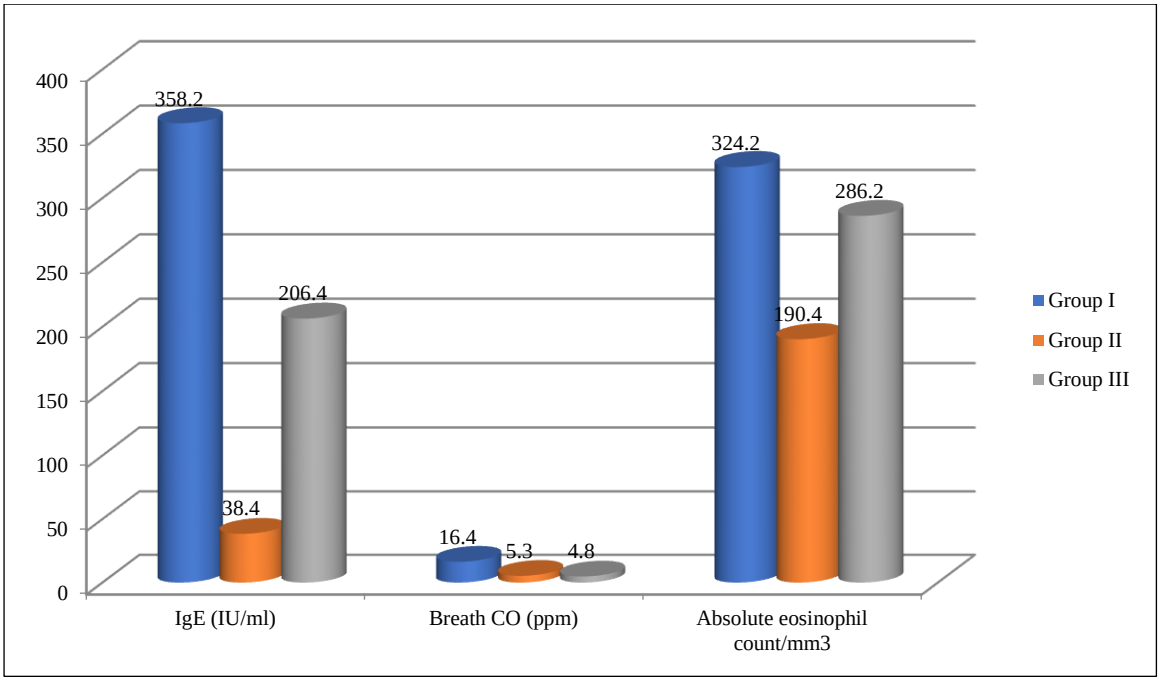
Graph I Pulmonary function test

The mean FVC was 85.1% in group I, 92.2% in group II and 72.6% in group III, FEV1 was 72.4%, 95.2% and 53.2%, FEV1/ FVC was 85.3%, 99.4% and 68.5%, FEF25-75 was 57.3%, 95.2% and 39.6% and FEF max was 76.4%, 102.3% and 48.9% in group I, group II and group III respectively. A significant difference was observed (P< 0.05) (Graph I).

Table III Measurement of laboratory parameters

Parameters	Group I	Group II	Group III	P value
IgE (IU/ml)	358.2	38.4	206.4	0.03
Breath CO (ppm)	16.4	5.3	4.8	0.01
Absolute eosinophil count/mm3	324.2	190.4	286.2	0.05

The mean IgE level was 358.2 IU/ml in group I, 38.4 IU/ml in group II and 206.4 IU/ml in group III. Breath CO level was 16.4 ppm in group I, 5.3 ppm in group II and 4.8 ppm in group III. The absolute eosinophil count/mm3 was 324.2 in group I, 190.4 in group II and 286.2 in group III. A significant difference was observed (P< 0.05) (Table III, graph II).



Graph II Measurement of laboratory parameters

DISCUSSION

Smoking is leading deleterious habits among youth. There are more than 1 billion tobacco consumers either in smoking form or non- smoking form worldwide. Approximately 1/3rd of people are using tobacco universally.[7] 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.[8] 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 performed 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 30 males and 10 females in group I, 22 males and 18 females in group II and 32 males and 8 females in group III. Sherrill et al[14] results showed no significant gender differences between nonatopic non-smoking 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.

The mean weight was 70.2 Kgs, 68.2 kgs and 65.4 kgs , mean height was 172.2 cm, 171.6 cm and 168.2 cm, mean BMI was 24.4 Kg/cm2, 23.8 Kg/cm2 and 23.6 Kg/cm2 and alcohol intake (>once /month) was seen among 32, 10 and 24 in group I, group II and group III respectively. A study by Kim et al[15] reported that the current smoking status was an independent factor for the increased IgE levels especially to those specific to cockroach, which increased with the increase in number of cigarettes smoked per day.

The mean FVC was 85.1% in group I, 92.2% in group II and 72.6% in group III, FEV1 was 72.4%, 95.2% and 53.2%, FEV1/ FVC was 85.3%, 99.4% and 68.5%, FEF25-75 was 57.3%, 95.2% and 39.6% and FEF max was 76.4%, 102.3% and 48.9% in group I, group II and group III respectively. A study by Jarvis et al[16] showed a higher sensitivity of the smokers to the house dust mites than the non- smokers. Miyae et al[17] assessed 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.
We observed that the mean IgE level was 358.2 IU/ml in group I, 38.4 IU/ml in group II and 206.4 IU/ml in group III. Breath CO level was 16.4 ppm in group I, 5.3 ppm in group II and 4.8 ppm in group III. The absolute eosinophil count/mm3 was 324.2 in group I, 190.4 in group II and 286.2 in group III. Madas et al[18] 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 ± 23.64IU/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.

CONCLUSION

There was altered pulmonary function tests and high level of IgE in smokers and ex- smokers as compared to non- smokers.

REFERENCES

1. Burrows B, Halonen M, Berbee RA, Lebowitz MD. The relationship of serum immunoglobulin E to cigarette smoking. Am Rev Respir Dis. 1981;124:523–525.
2. Goel N, Singh BP, Arora N, Kumar R. Effect o smoking on atopic predisposition and sensitization to allergens. Ind J Chest Dis Allied Sci. 2008;50:329–362.
3. Vollmer WM, Buist AS, Johnson LR, Mccamant LE, Halonen M. Relationship between serum IgE and cross sectional and longitudinal FEV1 in two cohort studies. Chest. 1986;90:416–423.
4. Bahna SL, Heiner DC, Myhre BA. Immunoglobulin E pattern in cigarette smokers. Allergy. 1983;38(1):57–64.
5. Gulsvik A, Fagerhoi MK. Smoking and immunoglobulin levels. Lancet. 1979;1:449.
6. Mili F, Flanders WD, Boring JR, Annest JL, Destefano F. The association of race, cigarette smoking, and smoking cessation to measures of the immune system in middle-aged men. Clin Immunol Immunopathol. 1991;59:187–200.
7. Wolfe WH, Miner JC, Michalek JE. Immunological parameters in current and former US Air Force personnel. Vaccine. 1993;11:545– 547.
8. Mcmillan A, Douglas JP, Archbold GP, Mccrum EE, Evans AE. Effect of low to moderate levels of smoking and alcohol consumption on serum immunoglobulin concentrations. J Clin Pathol. 1997;50:819– 822.
9. Schneider M, Hilgers RH, Allergy SJ. total IgE and eosinophils in East and West: serious effects of different degrees of helminthiasis and smoking. Eur J Med Res. 2002;21:763–771.

10. Chhabra SK, Rajpal S, Gupta R. Patterns of smoking in Delhi and comparison of chronic respiratory morbidity among bidi and cigarrete smokers. Indian J Chest Dis Allied Sci. 2001;43:19–26.
11. Shadick NA, Sparrow D, O'Connor GT, DeMolles D, Weiss ST. Relationship of serum IgE concentration to level and rate of decline of pulmonary function: the normative ageing study. Thorax. 1996;51:787–792.
12. Lai HK. Secondhand smoke and respiratory symptoms among adolescent current smokers. Pediatr. 2009;124(5):1306–1310.
13. Wang C. Effects of in utero and childhood tobacco smoke exposure and 2-adrenergic receptor geno-type on childhood asthma and wheezing. Pediatr. 2008;122(1):107–114.
14. Sherrill DL, Halonen M, Burrows B. Relationships between total serum IgE, atopy, and smoking: a twenty-year follow-up analysis. J Allergy Clin Immunol. 1994;94(6):954–962.
15. Kim YS, Kim HY, Ahn HS. The Association between Tobacco Smoke and Serum Immunoglobulin E Levels in Korean Adults. Intern Med. 2017;56:2571–2577.
16. Jarvis D, Chinn S, Luczynska C, Burney P. The association of smoking with sensitization to common environmental allergens: results from European Community Respiratory Health Survey. J Allergy Clin Immunol. 1999;104:934–940.
17. Miyake Y, Miyamoto S, Ohya Y, Sasaki S, Matsunaga I, Yoshida T, Hirota Y, Oda H. Relationship between active and passive smoking and total serum IgE levels in Japanese women: baseline data from the Osaka Maternal and Child Health Study. International archives of allergy and immunology. 2004;135(3):221-8.
18. Madas S, Reddy CM, Bindu MH. Assessment of serum total IGE levels in smokers, non-smokers and ex- smokers and its relation to lung function, airway symptoms and atopic predisposition. Indian Journal of Immunology and Respiratory Medicine 2019;4(4):210–213.