ORIGINAL ARTICLE

SEASONAL VARIATION IN EOSINOPHIL COUNT IN NORMAL HEALTHY ADULT FEMALES

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ABSTRACT

Background: Eosinophil count is influenced by variations in climate, culture, diet and life style. Moreover it fluctuates in a person with exercise and environmental stimuli, mainly seasonal allergen exposure. This study was conducted to know the effect of pollen peaks on eosinophil count in normal, non-allergic adult women.

Material & Methods: This experimental study was carried out in Women Medical College, Abbottabad, Pakistan. Forty-five teen age girls, newly admitted in medical college, normal on medical examination, chest radiograms and stool examination, free from any allergic disorder, were enrolled. Samples of blood were taken for eosinophil count in the morning in May when pollen concentrations are on peak in Abbottabad. EDTA was used as anticoagulant and modified Dungar solution to make a dilution of 1:20. Eosinophil count was performed with Neubauer's chamber using Dacie JV method. The results recorded were compared with counts noted one month before and after.

Results: Mean eosinophil counts were higher in peak pollen month i.e. May (Mean$\pm$SD=156.88$\pm$55.17) as compared to the counts taken one month earlier (Mean$\pm$SD=148$\pm$48.92). Forty subjects out of 45 (88.88%) showed increase in their basal eosinophil count carried out a month earlier in April but the results were not statistically significant. The study conducted after one month revealed a decrease in eosinophil count in 38 (84.44%) subjects. Mean eosinophil count turned out to be (Mean$\pm$SD=140$\pm$50.69). but when statistically checked it also turned out to be insignificant.

Conclusion: Small insignificant variation in blood eosinophil count occurs in relation to changes of natural pollen exposure in healthy adult females.

Key words: Eosinophil count, Pollen, Allergy.

INTRODUCTION

Northern Pakistan is full of some attractive mountain ranges with lot of forest. There are seasonal changes, not only in the temperature but also in atmospheric pressure, thickness of atmosphere and the length of the day time.[1] The city of Abbottabad in general and Women Medical College in particular have thick population of poplar and pine trees which fill the environment with pollens during the spring season. The pollen season usually starts in late April, peaks in May and gradually subsides in late June. These changes may affect the blood picture. Seasonal variations in blood picture depend upon the physiological adaptation of the body to the new set of environmental situation.[2] Meteorologically induced variations in the blood picture have been reported.[3] There is also circadian rhythm of blood eosinophil count which is mediated by suprachiasmatic nuclei of hypothalamus via retino-hypothalamic fibers.[4] Disorders which can cause increased eosinophil count range from simple hay fever to a malignant tumor.

The human eosinophil is a polymorphous bilobed granulocyte that exists in blood from 6 to 12 hours before moving to the tissues.[5] The eosinophil count varies with age of the patient, time of the day, exercise and environmental stimuli, mainly seasonal allergen exposure.[6] Diurnal variation in blood eosinophil number (lowest in the morning) may be as wide as 40% and is attributed to the circadian rhythm in cortisol release.[7]

Refined hematological equipment, which present computerized five fraction white blood cell differential counts, are spotting a lot of new, repeatedly unanticipated cases of eosinophilia.[8] It is advantageous to document the eosinophil count as an absolute count rather than the percentage, as the number depends on the total leucocyte count. The upper normal limit of absolute eosinophil count possibly approaches $0.65x10^9$/L and an abnormal count is frequently labeled as $0.70x10^9$/L or more.[7, 9]

The most prevalent causes of eosinophilia are seasonal and perennial rhinitis, hay fever,

asthma and allergic drug reactions.[10-12] Allergic ailments characteristically bring about only a mild to moderate rise in eosinophil count.[11] Patients are generally well aware of the seasonal nature of symptoms and the eosinophil count often alters with the severity of symptoms. Throughout the active stage, testing of nasal secretions and biopsy of nasal tissues, including polyps often disclose great number of eosinophils. Natural contact to pollen allergens leads to symptoms of allergic rhinitis, conjunctivitis and asthma in susceptible individuals.[6]

We conducted this study to find out variations in the blood eosinophil counts during and after the pollen season.

PATIENTS AND METHODS

This experimental study was carried out in Women Medical College, Abbottabad, Pakistan. Forty-eight newly admitted girls to Women Medical College, Abbottabad, Pakistan, ages between 18 to 19 years, were selected for the study. All of them had thorough medical examination including chest x-ray and blood complete picture. Stool examination was carried out to exclude intestinal worm infestation. Subjects having fever, any infection or history of season associated allergy or drug intake, were not included in the study. Three subjects developed the symptoms of allergic rhinitis during the study period and were excluded from the study. The remaining forty-five girls were found free from any allergic disorder.

As the pollen season peaks in May, so the study was carried out in around the seed season i.e. April, May and June. The first study was undertaken on 7th April. Using EDTA as anticoagulant, the samples were collected between 10 am to noon as lowest eosinophil count is present during these hours.

Modified Dungar solution (10ml of aqueous eosin, 10ml of acetone acid and 80ml of water) was used as diluting fluid making a dilution 1:20 with WBC pipette. Eosinophil count was done with Neubauer's counting chamber method as suggested by Dacie JV. The results were recorded as per cubic milliliter.

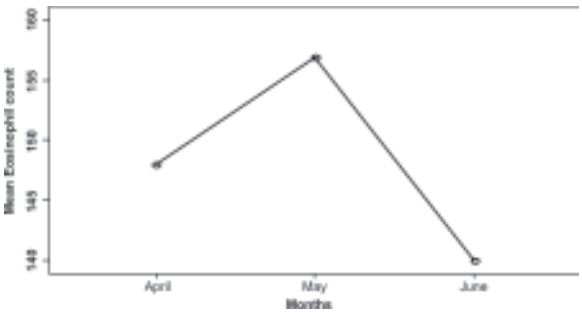
The second part of the study was carried out on 7th May when spring season had set in. The same protocol and methods were carried out as in the first part of the study. The eosinophil counts were compared with those obtained on 7th April.

Observing the same protocol, the third part of the study was carried out on 7th June when summer is at its peak, and results were compared with the previous observations.

SPSS version 15 was used for statistical analysis. INOVA test was applied to see the significance in the three months' groups.

RESULTS

The experimental study carried out on 7th May showed 40 subjects out of 45 (88.88%) with increase in the eosinophil count as compared to basal eosinophil count carried out on 7th April. Mean eosinophil count was 148±48.92 in April, which rose to 156.88±55.17 in May. The study of 7th June revealed 38 subjects out of 45 (84.44%) with decrease in eosinophil count as compared to that of 7th May. Mean eosinophil count now reduced to 140±50.81. (Figure below)



DISCUSSION

In our study we tried to find out any variation in eosinophil count among healthy adult females in the pollen season. For that purpose we selected newly admitted female students. Subjects with history of atopy, bronchial asthma or seasonal rhinitis were not enrolled in the study. On the basis of the results, there was no statistically significant change in the eosinophil count in normal healthy adult females during and after pollen season. Our null hypothesis that the degree of pollens in the atmosphere can alter the blood eosinophil profile in the healthy normal subjects in the same way as it can in persons with history of atopy was not supported.

Evolution of eosinophilia during pollen season has been much studied in the past but all the times the subjects were either suffering from bronchial asthma or seasonal allergic rhinitis. Kristal demonstrated the rise in eosinophil activity as a marker of the degree of natural allergen exposure in the blood of patients with mild asthma.[3] Similarly Kurt was consistent with the observation that there is an inter relationship of allergens, eosinophils, serum IgE and airway hyper responsiveness which suggests their involvement in the development of bronchial asthma.[13] Elevated eosinophil count was observed in babies of atopic mothers born in spring as compared to other seasons.[14]

Further long-term studies could answer the question whether these changes represent or identify individuals who could be potential asthmatics or at high risk of developing seasonal allergic rhinitis in future.

CONCLUSION

Statistically insignificant changes in the eosinophil count occur in normal healthy adult females in relation to changes in the natural pollen exposure.

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