

CIRCULATING CHEMOKINE EOTAXIN AND CHEMOKINE RECEPTOR CCR3 IN ALLERGIC PATIENTS

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By

AMAL ABD ALMONEM IBRAHIM

Assistant Lecturer of Microbiology and Immunology
Faculty of Medicine-Fayom University

Under supervision of

Prof.

ENSAF ABD ALGAWAD AZAZI

Prof. and Head of Microbiology
and Immunology Department,
Faculty of Medicine-Zagazig University

Dr.

SUZAN MOHAMED HAMDY BAKIR

Assis.Prof. of Microbiology and Immunology
Faculty of Medicine-Zagazig University

Dr.

HEBA ALI MOHTADY

**Assis.Prof. of Microbiology and Immunology
Faculty of Medicine-Zagazig University**

**Faculty of Medicine
Zagazig University**

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SUMMARY AND CONCLUSIONS

During the last decade, chemokines; in particular, the eotaxin, have emerged as cytokines likely to be important in the regulation of allergic inflammation.

Eotaxin was first described in 1994, many cell types including lymphocytes, macrophages, bronchial smooth muscle cells, endothelial cells and eosinophils are able to produce this chemokine, and measurement of eotaxin in biologic fluids such as plasma would provide a new insight into its place among other markers of allergic inflammation.

The chemokine receptor CCR3 is the receptor that mediates the majority of the eosinophil chemotactic effect of eotaxin. It is expressed on eosinophil, mast cells, Th2 lymphocytes and even on keratinocytes the sharing of chemokine receptors by Th2 cells and effectors cells involved in allergic reactions is likely to represent a key mechanism in the generation of allergic response.

The aim of this work is evaluation of circulating level of chemokine eotaxin and chemokine receptor CCR3 expression in allergic patients.

This study included 60 patients referred to Allergy and Immunology Unit, Microbiology and Immunology Department, Faculty of Medicine, Zagazig University during the time interval from July 2005 to April 2007.

Studied subjects included 60 patients (34 males and 26 females, their age range was 7 – 66 years) and 12 controls (6 males and 6 females, their age range was 10 – 65 years).

All patients in the present study were subjected to history taking, skin testing, total and differential leukocyte count including determination of absolute eosinophil count, measuring level of total serum IgE by ELISA, measuring level of plasma eotaxin by ELISA and determination of CCR3 expression on CD4⁺ T cells by flow cytometry. Studied patients included 23(38.3%) patients with asthma, 20 (33.4%) patients with allergic rhinitis and 17 (28.3%) patients with skin allergy.

The study revealed the following results:-

- There was no statistical significant difference regarding age and sex distribution between patients and controls and also between patients in different types of allergy.
- Only 38.3% (23/60) of patients had positive family history of allergic diseases compared to 61.7% (37/60) with no family history. Positive family history was also statistically not significant between different types of allergy.
- Regarding seasonal variation, prevalence in asthmatic patients was higher during spring season 30.4% (7/23) while in rhinitis patients it was higher during summer season 30% (6/20) compared to skin allergy

patients as it was equally increased during both autumn 29.4% (5/17) and winter 29.4% (5/17).

- Pollen allergen showed the highest positive skin test frequency (71.7%) followed by hay dust allergen (48.3%) while cotton gave no positive skin test in any of the studied patients (0%).
- Smoke was the most common predisposing factor in asthmatic patients (85.6%) while odors were the most common predisposing factor in rhinitis patients (55%) compared to skin allergy patients as foods were the most common predisposing factors (64.7%).
- Mean total leukocytic count was higher in patients ($7.1 \pm 2.18 \times 10^3$ c/mm) than controls ($6.7 \pm 2.2 \times 10^3$ c/mm³) and these data showed no statistical significance ($t= 0.57$, $p= 0.57$). Also the mean total leukocytic count between different types of allergy showed no statistical significance ($F= 0.53$, $P= 0.59$).
- Mean absolute eosinophil count was higher in patients (613.7 ± 266.2 c/mm³) than in controls (185 ± 128.4 c/mm³) which was statistically highly significant ($t=5.4$, $p= 0.001$). Rhinitis patients showed higher mean absolute eosinophil count (709.5 ± 343.6 c/mm³) compared to asthmatic patients (576 ± 198 c/mm³) and skin allergy patients (551.7 ± 222 c/mm³) but these data showed no statistical significance ($F= 2.05$, $P= 0.13$).
- Mean total serum IgE level was higher in patients (244.98 ± 53.2 Iu/ml) than controls (91.3 ± 29.3 Iu/ml) and this difference was statistically highly significant ($t= 1.68$, $p= 0.001$). Mean total serum IgE level was slightly higher in rhinitis patients (258.9 ± 57.6 Iu/ml) followed by skin

allergy patients (245.9 ± 53.4 Iu/ml) and asthmatic patients (232.2 ± 47.4 Iu/ml) but these data showed no statistical significance ($F= 1.37$, $p= 0.26$)

- There was a statistically highly significant positive correlation between mean total serum IgE level and mean absolute eosinophil count in both patients ($r = 0.78$, $p = 0.001$) and controls ($r = 0.61$, $p = 0.001$).
- There was a statistically highly significant positive correlation between mean total serum IgE level and mean absolute eosinophil count both in asthmatic patients ($r = 0.62$, $p<0.001$), rhinitis patients ($r = 0.87$, $p<0.001$) and skin allergy patients ($r = 0.83$, $p< 0.001$).
- Mean plasma eotaxin level was higher in patients (205.7 ± 85.9 pg/ml) than in controls (43.2 ± 21.7 pg/ml) and these data were statistically highly significant ($t = 6.47$, $p = 0.001$).
- Mean plasma eotaxin levels in different types of allergy were comparable (asthmatic patient 204.7 ± 94.9 pg/ml, rhinitis patients 218.3 ± 88.6 pg/ml and skin allergy patients 191.9 ± 715 pg/ml) and showed no statistically significant difference ($F = 0.42$, $p = 0.66$).
- There was no statistically significant difference in the mean plasma eotaxin level regarding both age ($F= 0.42$, $p= 0.66$) and sex ($t= 0.23$, $p= 0.8$) of patients.
- Mean plasma eotaxin level was slightly higher during spring season (237.3 ± 113.7 pg/ml), followed by winter season (224.5 ± 83.7 pg/ml) then autumn season (190.7 ± 63.8 pg/ml) and summer season (170.1 ± 63.7) but these data showed no statistical significance ($F= 2.02$, $p = 0.11$)

- There was a highly statistically significant positive correlation between mean plasma eotaxin level and mean absolute eosinophil count both in patients ($r = 0.44$, $p < 0.001$) and controls ($r = 0.61$, $p < 0.001$).
- There was a statistically significant positive correlation between mean plasma eotaxin level and mean absolute eosinophil count both in rhinitis patients ($r = 0.64$, $p < 0.001$) and skin allergy patients ($r = 0.51$, $p < 0.05$) while in asthmatic patients this correlation was statistically not significant ($r = 0.13$, $p > 0.05$).
- There was a highly statistically significant positive correlation between mean plasma eotaxin level and mean total serum IgE level both in patients ($r = 0.53$, $P < 0.001$) and in controls ($r = 0.861$, $p = 0.001$).
- There was a statistically significant positive correlation between mean plasma eotaxin level and mean total serum IgE level in asthmatic patients ($r = 0.42$, $P < 0.05$) and this correlation showed higher significance and positivity in rhinitis patients ($r = 0.73$, $p < 0.001$) while in skin allergy patients this correlation was positive but with no statistical significance ($r = 0.45$, $p > 0.05$).
- The mean percentage of CCR3 expression on CD4⁺ T cells was significantly higher in patients ($1.43 \pm 0.44\%$) than controls ($0.53 \pm 0.22\%$) ($t = 6.82$, $p = 0.001$).
- There was no statistically significant difference in mean percentage of CCR3 expression CD4⁺ T cells between asthmatic patients, ($1.4 \pm 0.47\%$), rhinitis patients ($1.55 \pm 0.45\%$) and skin allergy patients ($1.33 \pm 0.39\%$), ($F = 1.22$, $p = 0.3$).

- There was no statistically significant difference in mean percentage of CCR3 expression on CD4⁺ T cells in patients regarding both sex ($t = 1.0$, $p = 0.32$) and age ($F = 1.19$, $p = 0.3$).
- The mean percentage of CCR3 expression on CD4⁺ T cells was higher during spring season ($1.75 \pm 0.52\%$) followed by winter season (1.41 ± 0.36), autumn season ($1.39 \pm 0.37\%$) and lastly summer season ($1.17 \pm 0.35\%$) and these data were statistically significant ($t = 5.23$, $p = 0.003$).
- There was a highly statistically significant positive correlation between mean plasma eotaxin level and mean percentage of CCR3 expression on CD4⁺ T cells both in patients ($r = 0.78$, $p < 0.001$) and controls ($r = 0.78$, $p < 0.001$).
- There was a highly statistically significant positive correlation between mean plasma eotaxin level and mean percentage of CCR3 expression on CD4⁺ T cells both in asthmatic patients ($r = 0.85$, $p < 0.001$) rhinitis patients ($r = 0.76$, $p = 0.001$) and skin allergy patients ($r = 0.65$, $p < 0.001$).

FROM THESE RESULTS WE CONCLUDE THAT:-

1. Prevalence of asthma is higher during spring season; prevalence of rhinitis is higher during summer season while prevalence of skin allergy is higher during autumn and winter seasons.
2. Pollen allergen is the most frequent allergen which gives positive skin test.

3. Smoke is the most common predisposing factor of asthma, odors are the most common predisposing factor of rhinitis and foods are the most common predisposing factor of skin allergy.
4. Total leukocyte count is higher in allergic patients than controls.
5. Absolute eosinophil count is higher in allergic patients than controls and it is higher in rhinitis patients than asthmatics and skin allergy patients.
6. Total serum IgE level is higher in allergic patients than controls and it is higher in rhinitis patients than asthmatics and skin allergy patients.
7. There is a positive correlation between total serum IgE level and absolute eosinophil count.
8. Plasma eotaxin level is higher in allergic patients than controls in different types of allergy.
9. There is a positive correlation between plasma eotaxin level and both of total serum IgE level and absolute eosinophil count.
10. The expression of CCR3 on CD4⁺ T cells is higher in allergic patients than controls in different types of allergy.
11. Both age and sex have no effect on plasma eotaxin level or expression of CCR3 on CD4⁺ T cells.
12. Both plasma eotaxin level and expression of CCR3 on CD4⁺ T cells are higher during spring and winter seasons compared to autumn and summer seasons.
13. There is a positive correlation between plasma eotaxin level and CCR3 expression on CD4⁺ T cell.