Markers in Uncontrolled Asthmatic Patients Admitted to Thanjavur Medical College: A Prospective Study

Dr. Manimaran[1], Dr. Sudha[2], Swedha. A[3] and Vinothini. V[4]

[1]Department of General Medicine, Government Thanjavur Medical College, Thanjavur.
[2]Department of Physiology, Government Thanjavur Medical College, Thanjavur.
[3,4] Multidisciplinary Research Unit, Government Thanjavur Medical College, Thanjavur

Abstract—**The most prevalent respiratory condition is asthma. By assessing the unique features of inflammatory markers associated with the disease, it is possible to partially discriminate among its many phenotypes. Choosing appropriate inflammatory indicators to properly stratify patients is still difficult due to the complexity of the pathogenetic mechanisms. This became particularly crucial when biological therapy was introduced for the treatment of asthma. Endotypes are defined by the use of inflammatory markers and knowledge of the underlying pathobiological mechanisms. It is better to have more inflammatory indicators than just one. We used ELISA to evaluate the levels of IgE, IL-4, IL-10, TNFα, and IL-6 in serum and induced sputum samples from 30 controls and 31 patients with uncontrolled asthma. The levels of inflammatory markers in the patients and the control group were compared.**

Index Terms—**asthma, inflammatory markers, Prospective Study, sputum samples.**

I. INTRODUCTION

More than 300 million individuals worldwide suffer from asthma, a condition that has a significant influence on healthcare resources and quality of life [1]. The severe uncontrolled asthma (SUCA) in particular has far-reaching socioeconomic reper cussion [2]. Wheezing, shortness of breath, coughing, chest tightness, and decreased forced expiratory volume are the initial signs of asthma, a chronic illness of the airways. The foundation for diagnosing asthma is the pulmonary function test (PFT) [3]. Active smoking among individuals with asthma is seen in 20% to 35% of cases worldwide. When compared to individuals with non-severe asthma, patients with severe asthma typically never smoke, have prolonged symptoms, poor lung function, and seek health care more frequently. The foundation for diagnosing asthma is the pulmonary function test [4]. The management of asthma, explain the reasons and effects of insufficient management, and assess novel approaches to enhancing asthma control [5]. Several major epidemiologic studies of older persons have firmly shown the involvement of inflammation in the aging process and age-related illness. Age-related chronic diseases and disability are most reliably linked to inflammatory indicators such as interleukin-6 (IL-6), C-reactive protein (CRP), and tumor necrosis factor alpha (TNF-alpha) [6]. Prior research on childhood asthma has mostly focused on local or carefully chosen population samples [7]. One of the fundamental objectives of asthma treatment is to attain and preserve ideal asthma control [8].

AIM: A comparative study of the inflammatory marker profiles in patients with uncontrolled asthma at Thanjavur Medical College.

II. MATERIALS AND METHODS

A comparative-descriptive cross-sectional study was conducted on 31 asthmatic patients admitted as in patients in Thoracic Medicine ward, Government Thanjavur Medical College &Hospital, Thanjavur, with uncontrolled asthma (Gina Classifications).

Subjects suffering from heart disease, diabetes mellitus, cancer, obesity (body mass index [BMI] $\geq$ 30kg/m2) or systemic inflammatory disorders and atopic asthmatic patients were excluded from the study. Subjects were pre medicated with inhaled salbutamol and inhaled hypertonic (5%) saline solution was administered to them for 10–20 min by an ultrasonic nebulizer (NE-C28.) for collection of induced sputum, Thereafter, healthy subjects (N=30) were selected as control group. 5cc of blood was separated by centrifugation and stored at -20°C. After collecting samples, ELISA test was performed. This kit showed high level as a quantitative measure and its sensitivity was 10 ng/mL. Data were analyzed by descriptive statistics (percentage, mean, and standard deviation) and comprehensive statistics (analysis of variance (ANOVA) and t test, Kruskal- Walli's test, and Mann-Whitney test) using Additionally, correlation of the IL-4 blood and IL-4 sputum levels in patients was assessed by Pearson's correlation. *P*>0.5 was considered statistically significant.

III. RESULTS

This study was conducted on 31 asthmatic patients (15females/16 males) and 30 controls (15 females/15 males). Their mean age was 40.4±9.37 and 37.5±8.87 years, respectively. Thirty healthy controls subjects in case groups were matched in terms of age, sex, and BMI. The pattern distribution of IL4, IL10, TNα, IL6 are 61%,3%,13% and23% and mean serum IgE, IL4, IL10, TNα, IL6 concentration was 362.95 IU/ml, 2.6 µg/mL, 2.3 µg/mL, 3.32 µg/mL,2.9 µg/mL, 2,8 µg/mL in asthmatic patients, and control, respectively. The difference was statistically significant between asthmatic patients and control (P=0.369). The IL4 in sputum and peripheral blood significantly increased in the asthmatic compared and healthy controls. [Table 1, Figure 1]. Atopy, age, and sex indices did not affect inflammatory marker levels in asthmatic patients.

Table 1: Characteristics and outcomes of asthmatic and control subjects

	Asthmatic Patients	Controls
Number	31	30
Age (year)	40.4±9.37	37.5±8.87
Sex	15/16	15/15
BMI (Kg/m^2)	37.5±8.87	24.17±2.44
IgE	P<0.27	P>0.03
IL4	P<0.15	P>0.4
IL10	P<0.04	P>0.4
TNFα	P>0.5	P<0.1
IL6	P<0.13	P>0.4

Figure 1: Pattern of Inflammatory markers in uncontrollable Asthmatic patients
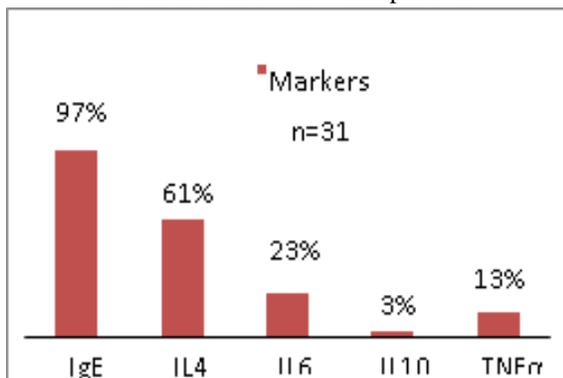

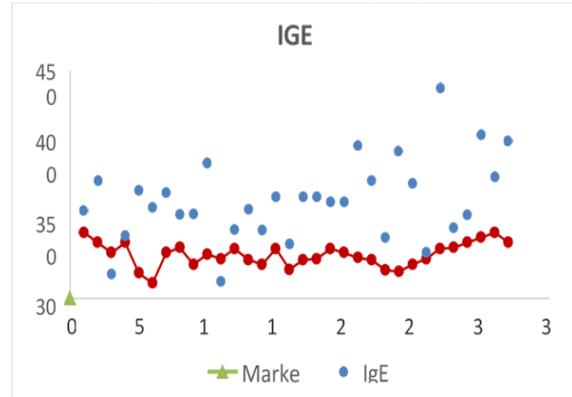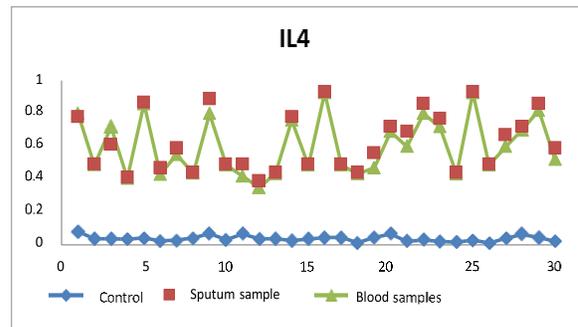Figure 2: IgE levels of uncontrolled asthmatic patients and control group

Figure 3: IL-4 levels between sputum and blood samples of uncontrolled asthmatic patients and control group

IV. DISCUSSION AND CONCLUSION

Inflammation is the pathophysiological underpinning for reversible airway obstruction in bronchial asthma. Numerous research has indicated a correlation between the level of inflammation and the severity of asthma. Human clinical research and animal models have demonstrated that the cells that produce IL-4, IL-5, and IL-13 play a significant role in the pathophysiology of allergic asthma by inducing a Th1 response that appears to exacerbate an inflammatory process [9]. The patient with uncontrolled asthma admitted frequently may need multiple biological According to our findings, the patients admitted in Thanjavur Medical College with uncontrolled asthma exhibited mixture of inflammatory markers and majority of IL4. The serum IL-4 level was higher in asthmatic patients than in controls. There are multiple components to the epidemiological relationship between IgE production and asthma. The relationship between IgE

responses and clinical manifestation of asthma incorporates a number of cofactors affecting airway reactivity and disease persistence, even though allergen-specific IgE may surely mediate asthmatic responses in allergic individuals [10]. However, mean blood and sputum sample, IL-4 level had a positive correlation with sputum and blood and, which was significant statistically. There were strong correlations of IL-4 levels and ratio between serum and saliva from patients. In general, our current study, identified indicated that IL-4 level might be in association with severity in major phenotypes of asthma agents.

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REFERENCES

[1] Allegra, L., Cremonesi, G., Girbino, G., Ingrassia, E., Marsico, S., Nicolini, G., ... & PRISMA (PRospectIve Study on asthMA control) Study Group. (2012). Real-life prospective study on asthma control in Italy: cross-sectional phase results. Respiratory medicine, 106(2), 205-214.

[2] Shahid, S., Alqahtani, S. S., Bajwa, M., Rashid, M., Sana, A., Bajwa, A., ... & Mustafa, M. A. (2024). The Effect of Obesity on Severity of Asthma: An Observational Prospective Study from Pakistan. Journal of Pharmacy and Bioallied Sciences, 16(1), 38-43.

[3] Serrano, C. C., Moreno, C. M., Sánchez, C. A., Tordera, M. P., Valles, C. P., Moragón, E. M., ... & Hernández, G. G. (2015). Guidelines for severe uncontrolled asthma. Archivos de Bronconeumología (English Edition), 51(5), 235-246.

[4] Thomson, N. C., Chaudhuri, R., Heanry medicine, 100(7), 1139-1151.

[5] Peters, S. P., Ferguson, G., Deniz, Y., & Reisner, C. (2006). Uncontrolled asthma: a review of the prevalence, disease burden and options for treatment. Respiratory medicine, 100(7), 1139-1151.

[6] Singh, T., & Newman, A. B. (2011). Inflammatory markers in population studies of aging. Ageing research reviews, 10(3), 319-329.

[7] Peckham, C., & Butler, N. (1978). A national study of asthma in childhood. Journal of Epidemiology & Community Health, 32(2), 79-85.

[8] Siroux, V., Boudier, A., Bousquet, J., Bresson, J. L., Cracowski, J. L., Ferran, J., ... & of Asthma, E. (2009). Phenotypic determinants of uncontrolled asthma. Journal of Allergy and Clinical Immunology, 124(4), 681-687.

[9] Wong, C. K., Ho, C. Y., Ko, F. W. S., Chan, C. H. S., Ho, A. S. S., Hui, D. S. C., & Lam, C. W. K. (2001). Proinflammatory cytokines (IL-17, IL-6, IL-18 and IL-12) and Th cytokines (IFN-γ, IL-4, IL-10 and IL-13) in patients with allergic asthma. Clinical & Experimental Immunology, 125(2), 177-183.

[10] Froidure, A., Mouthuy, J., Durham, S. R., Chanez, P., Sibille, Y., & Pilette, C. (2015). Asthma phenotypes and IgE responses. European Respiratory Journal, 47(1), 304-319.