

## The Relation of Allergic Rhinitis Classification with Interleukin-5 on The Allergic Rhinitis

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**Abstract.:** Interleukin-5 (IL-5) is an important role cytokine on the Allergic Rhinitis (AR). IL-5 has an important role on eosinophils. Allergic Rhinitis and Its Impact on Asthma - World Health Organization (ARIA-WHO) made classification of AR based on how long the clinical symptoms and the impact on quality of life. The aim of this study was to know the classification of AR with IL-5 on AR study. This study used a cross-sectional method with 39 samples. The examination of IL-5 used ELISA. The highest classification of AR was moderate-severe persistent of 43.58% with the mean value IL-5 was 56.25 pg/ml. Based on the test of Kruskal Wallis, it was obtained p-value = 0.664. Conclusion: There was no significant relation between classification AR and IL-5.

**Keyword:** Allergic Rhinitis, Interleukin-5, ELISA

Received 26 August 2019|Revised 30 September 2019 | Accepted 30 September 2019

### 1 Introduction

Allergic rhinitis (AR) has become a global problem since its prevalence has rapidly increased in the last decades. Hard AR has a significant impact to life quality alteration, such as sleeping problem, nasal congestion, hinorrhea, nasal itch, sneezing and another working problem. A through history, physical examination and allergen skin testing are important for the diagnosis. AR is not a fatal disease, but its symptom can affect somebody's health status and decrease patients' life. It is caused because this disease can be easily recurrent, chronic, progressive and reversible at first stage and irreversible at the further stage. This disease can decrease work productivity as well and achievement on children at school (Bakhshae et al, 2010; Small P. Keith P.K. Kim H, 2018).

AR is a chronic disease which commonly attacks upper respiratory. As an allergic response begins with sensitization to an antigen, in atopic individuals, can results in binding to Imunoglobulin-E

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(Ig-E). Prevalence of AR in epidemiologic studies, conducted in various countries, range from 3% to 19%. Studies that have included the most information would suggest that hay fever is found in approximately 10% of the general population and perennial rhinitis in 10% to 20% of the population. Overall, AR affects 20 to 40 million people in the United States. In the European countries ranges between 15% and 25%, with a tendency to rise by about 3,5% with every decade (Peric et al, 2011; Berisha et al, 2012)

The Allergic Rhinitis and its Impact on Asthma (ARIA) group has proposed the new classifications of intermittent AR, in which symptoms occur < 4 days per week or < 4 consecutive weeks per year, and persistent AR, in which symptoms are present > 4 days per week and > 4 consecutive weeks per year. Many practitioners utilize the ARIA classification because it focuses on relevant characteristics of patients' symptoms (Canonica & Compalati, 2009).

Eosinophils form in the bone marrow from myeloid precursors in response to cytokine activation and are released into the circulation they accumulate rapidly in tissue. IL-5 acts as a homodimer and essential for maturation of eosinophils in the bone marrow and their release into the blood. IL-5 plays a key role in eosinophil proliferation, differentiation, maturation, migration to tissue sites and survival, as well as prevention of eosinophil apoptosis (Greenfeeder et al, 2001; Garcia et al, 2013).

Based on its important roles in an allergic reaction, research on IL-5 has been done quite often to the other allergic disease, such as asthma and atopic dermatitis. However, the IL-5 score which is related to the degree of AR based on ARIA classification cannot be reported. Based on above background, it is necessary to elaborate the relationship between AR classifications with IL-5 levels in the AR patients in H. Adam Malik Hospital.

## **2. Method**

The aims of this cross-sectional study were, to know relationship between classification of AR with IL-5 on AR patient, with purposive sampling. This research was done in Haji Adam Malik hospital in Medan. AR diagnostic was obtained based on history, physical examination and skin prick test. IL-5 check-up was done using Enzyme-Linked Immune Sorbent Assay Method (ELISA).

Total samples in this study were 39 patients. Patients who came to T.H.T.K.L polyclinic with one of four AR cardinal symptoms, which are nasal problems like nasal congestion, rhinorrhea, nasal itch and sneezing. History about duration of symptom which was suffered as the impacts on quality of life. Skin prick test (SPT) check-up was done which consists of seven kinds of allergen; grass Bermuda, *blomia tropicalis*, Cockroach B. Germanic, D. Pterissynus, D. Fariane, Cat, Dog.

Next blood collection was done to measure IL-5 in the serum data which had been obtained. Finally, computer analysis using SPSS 17 version was done.

### 3. Result

Table 1. The frequency and distribution AR patient characteristic, main complain and AR classification and the relation to level of IL-5

	n (%)	Mean value IL-5 (mean±SD) (pg/ml)	p-value
<b>Patient characteristic</b>			
≤20 yo	3 (7,69)		
21-40 yo	29 (74,35)		
≥41 yo	7 (17,94)		
Man	12 (30,76)		
Woman	27 (69,23)		
<b>Main complain</b>			
Nasal congestion	18 (46,15)	(56,86±9,37)	p=0,427
Rhinorrea	8 (20,51)	(54,71±5,41)	
Sneezing	7 (17,94)	(54,57±8,49)	
Nasal itch	6 (15,38)	(50,61±4,12)	
<b>AR Classification</b>			
Mild Intermitten	14 (35,89)	(55,03±7,77)	p=0,664
Moderate-severe Intermitten	2 (5,12)	(56,11±7,73)	
Mild Persistent	6 (15,38)	(51,45±3,53)	
Moderate-severe Persistent	17 (43,58)	(56,25±9,27)	

From table 1 it can be seen the frequency of distribution AR patient characteristic, main complain and AR classification and the relation to the level of IL-5. The classification of AR was obtained moderate-severe persistent that was 43.58%, and there was no significant relation between classifications AR with IL-5, with p = 0,664.

### 4. Discussion

This study was conducted in ENT Polyclinic H. Adam Malik Hospital. This involved 39 AR patients who became samples of the study and had fulfilled the inclusion criteria. In this study, the classification of AR based on the most common type and the degree were moderate-severe persistent that was 43.58%, and there was no significant relation between classification AR and

IL-5. In this study, there was no statistically significant relation between AR classification and level IL-5. Nevertheless, from this result, it was obtained the decreasing of mean level IL-5 which was higher on the classification moderate –severe persistent AR compared with the mild intermitten AR, because number of patient with moderate-severe AR many more an also can cause number of proporton of level IL-5 was higher compared another AR. With normality test, it was obtained the distribution of data was not distributed normally. This thing could be suspected to be the reason the relation was not significant in this study.

Il-5 has an important role in allergic diseases that can affect various organs such as respiratory tract (AR and asthma), skin (atopic dermatitis), esophagus (esophagitis eosinophils). Allergic diseases were characterized by the involvement of IgE, Th2 cells, and eosinophils are the most striking and often to be discussed. Eosinophils were the main effector cells involved in allergic inflammation. Eosinophils performed in the bone marrow stimulated by activation of cytokines and released in the proper circulation with accepted responsive. Eosinophils are inflammatory cells which had the role in pathophysiology in the various diseases. Which have inflammation mediator release such cytokines and others? Eosinophils also produced factors fibrogenic such as transforming growth factor and platelet-derived growth factor. Proliferation fibroblast and the number will increase that in the affected area which was induced by eosinophils. IL-5 is an important cytokine in the primary function eosinophil, the produced by cell CD4 + T and cell CD8 + T cell. The role of IL-5 in some function of eosinophils, as follows: decreasing modulation Mac-1, regulating from receptors for IgA and IgG, stimulating secretion, lipid mediators (leukotriene C4 and PAF), and inducing granular release. IL-5 also affected the growth and different of eosinophils. IL-5 had along time to relate to the cause of allergic including AR and asthma (Greenfeder et al, 2001; Kouro & Takatsu, 2009)

The levels of serum IL-5 in moderate-severe persistent AR patients before and after nose steroid therapy (fluticasone furoate 110 µg / day) and antihistamine (cetirizine 10mg / day) for two weeks. A responsive level of IL-5 was obtained in this study, where the level of IL-5 after therapy found to be lower than before therapy given. In other words, there was the decreasing of level IL-5 by giving therapy at the end that could decrease the number of eosinophils in the blood which was expected to improve the clinical symptoms of RA (Greenfeder et al, 2001).

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