

Association between Blood Absolute Eosinophil Count with the Degree of Controlled Asthma

Desi Maghfirah¹, T. Mamfaluti², Islamuddin³

¹Department of internal medicine, Faculty of medicine, University of Syiah Kuala, dr. Zainoel Abidin General Hospital, Daud bereuh St, Banda aceh, Indonesia

²Division of Alergy Immunology, dr. Zainoel Abidin General Hospital, Daud bereuh St, Banda aceh, Indonesia

³Division of Pulmonology, dr. Zainoel Abidin General Hospital, Daud bereuh St, Banda aceh, Indonesia

Keyword: Absolute eosinophil count, ACT, PEFR

Abstract: Controlled asthma is the goal of asthma management. Blood eosinophils are known to be an indirect marker of airway inflammation, it reflects asthmatic activity, but association with asthma control not clearly understood. This study aims to investigate the association between blood absolute eosinophil count with the degree of controlled asthma. An analysis observational cross sectional study in 49 subject obtained through out a consecutive sampling. The subject was examined physically, fill in ACT questionnaire, and followed PEFR test and blood test. The result were analysed using one way annova and unpaired T test. The 49 subjects were divided into three group based on ACT, 17 patients with uncontrolled, 16 not well controlled, 16 controlled and into two group based on PEFR, 38 with uncontrolled and 11 controlled. Mean differences absolute eosinophil count between groups based on ACT is controlled vs not well controlled 212,6 (14,2-411,1: p 0,003), controlled vs uncontrolled 373,9 (178,5-569,4: p <0,001), not well controlled vs uncontrolled 161,3 (34,2-356,8: p 0,104). Mean differences absolute eosinophil count between groups based on PEFR is controlled vs uncontrolled 419,8 (289,9-548,4: p <0,001). There were significant differences in blood absolute eosinophil count between asthma control groups, better asthma control result in lower blood absolute eosinophil count.

1 INTRODUCTION

Asthma is chronic inflammation disease that impact social life, controlled asthma is the goal of asthma management. The World Health Organization (WHO) estimates 100-150 million people is suffering from asthma, even this number is expected to continue to grow up to 180,000 people every year. Asthma prevalence increased by 50% every decade. If not prevented and handled properly, then it is expected that there will be a higher increase in prevalence and disrupt the process of child growth and quality of life of patients.

Blood eosinophils are known to be an indirect marker of airway inflammation in asthma. It has been suggested that blood eosinophil count reflects asthmatic activity, but association with asthma control not clearly understood. This study aims to investigate the association between absolute eosinophil count with the degree of controlled asthma in asthma patient.

2 METHOD

We hypothesized there is a correlation between blood absolute eosinophils count and the degree of asthma control, the better the control of asthma, the lower the number of blood absolute eosinophils.

An analysis observational cross sectional study in 49 subject obtained through out a consecutive sampling since agustus -september 2015 in dr. Zainoel Abidin Hospital Banda Aceh. Inclusion criteria are age above 18 years, have been diagnosed with asthma and willing to follow the research. Parasitic infestation and acute pulmonary infection were excluded. Patients who have been diagnosed with outpatient asthma must performed stool examination and chest radiographs. The subject was examined physically, fill in ACT questionnaire, and followed PEFR test and blood test. If the subject has value $ACT \leq 19$ then is called uncontrolled asthma, a value of 20-24 partially controlled asthma, the value of 25 is totally controlled asthma.

Researchers explain how to use the HS755 peak flow meter and the patient is shown a video recording how to use it and ensure that the patient understands how to use the device. The patient stands upright, inspire and place the mouth in the mouthpiece tightly, the patient expires by blowing strong and fast. The researcher assesses the number in the indicator's place to stop, the examination is repeated up to 3 times and the highest value is recorded. The PEFR value of the patient is compared with the predicted PEFR value. PEFR value <80% prediction shows uncontrolled asthma.

Informed consent was requested in writing from research subjects who were willing to participate in the study after getting an explanation of the purpose and objectives of this study.

The feasibility of research ethics was obtained from the Faculty Ethics Feasibility Committee Medicine Syiah Kuala University.

The analysis of the relationship of blood absolute eosinophil count with the degree of asthma control using ACT was done using one way anova, analysis of the relationship of blood absolute eosinophil count with the degree of asthma control using PEFR was done using unpaired T test.

3. RESULT

In this study the proportion of asthma patients aged at most 18-45 years (91.8%), female is 57.1%, most of the subjects the study got the first attack of asthma at the age of 0-11 years (55.1%), most patients did not smoke (83.7%), with a history of tendency most atopy (38.8%), with the most history of drug use (49%) SABA (table 1).

Characteristic	n (%)
Age	
- 18-45 years old	45 (91,8)
- ≥ 46 years old	4(8,2)
Sex	
- Man	21 (42,9)
- Women	28 (57,1)
First attack	
- 0-11 years old	27 (55,1)
- 12-65 years old	22 (44,9)
Smoking	
- Yes	8 (16,3)
- No	41(83,7)
Atopy	
- Rhinitis	19 (38,8)
- Dermatitis	3 (6,1)
- Mixed	18 (36,7)
- None	9 (18,4)
Drugs	

- SABA	24 (49)
- LABACS	15 (30,6)
- Metylxanthine	1 (2)
- SABA+ LABACS	1 (2)
- None	8 (16,3)

Characteristics of research samples when grouped by degree asthma control using ACT, it was found that the distribution of characteristics the sample is the same in three asthma degree groups, while if grouped based on the PEFR value, it was found that in the uncontrolled asthma group it was found older, had longer asthma, with an age of attack first, younger, but this difference was not statistically significant

Absolute eosinophil counts in the lower total controlled asthma group compared to the partially controlled asthma group and uncontrolled asthma (figure 1).

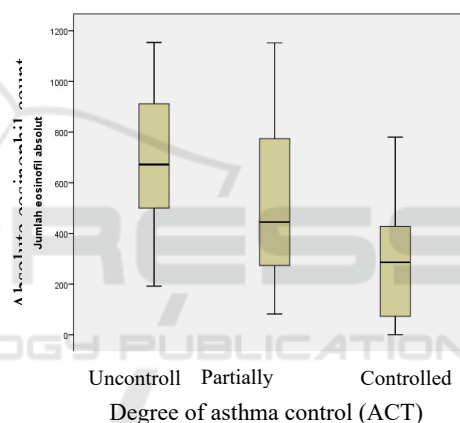


Figure 1: The Absolute eosinophil count of asthmatics grouped by asthma control degree using ACT

One way annova test to see the correlation between absolute eosinophil count and degree of asthma control based on ACT found that there were significant differences in mean eosinophil counts at least in two asthma control degree groups, the better the degree of asthma control, the lower the absolute number of eosinophils (table.2)

Table. 2 Mean Differences Absolute Eosinophil Count Between Groups Based on ACT

	N	Means ± SD	p
Controlled Asthma	16	305 ± 236,3	< 0,002
Partially controlled Asthma	16	518 ± 322	
Uncontrolled Asthma	17	679,3 ± 271,8	

There were significant differences in blood absolute eosinophil count in the total controlled and partially controlled asthma group, in the total and uncontrolled controlled group, but the mean absolute

eosinophil count in the controlled group did not have a significant difference compared to the uncontrolled asthma group (table 3).

Table 3: One way Anova after post hoc LSD test Mean Differences Absolute Eosinophil Count Between Groups Based on ACT

	Mean Differences	CI 95 %		p
		Minimum	Maximum	
Controlled Asthma vs Partially controlled Asthma	212,6	14,2	411,1	0,003
Controlled Asthma vs Uncontrolled Asthma	373,9	178,5	569,4	< 0,001
Partially controlled Asthma vs Uncontrolled Asthma	161,3	34,2	356,8	0,104

Table 4: Association Between Absolute Eosinophil Count With The Degree Of Controlled Asthma based on PEFr

	N	Means ± SD	Mean Differences (CI 95 %)	P
Uncontrolled Asthma	38	598,6 ± 285,9	419,8 (289,9-548,4)	< 0,001
Controlled Asthma	11	179,4 ± 144,2		

The blood absolute eosinophils count in the controlled asthma group was lower compared to the uncontrolled asthma group assessed according to PEFr (figure 2).

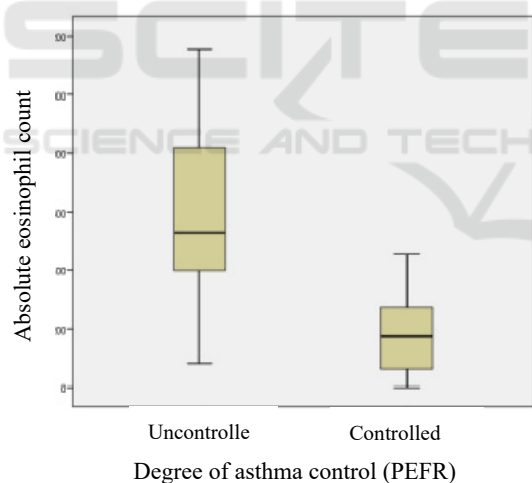


Figure 2: The Absolute eosinophil count of asthmatics grouped by asthma control degree using PEFr

In the unpaired T test to see the relationship between blood absolute eosinophil count and asthma control level based on PEFr, it was found that there was a significant difference in the mean blood absolute eosinophil count between controlled and uncontrolled asthma groups, where the mean absolute eosinophil count in the uncontrolled asthma group was significantly lower than controlled asthma group (table 4).

4. DISCUSSION

Thymus involution begins immediately after birth, thymus involution causes the thymus volume to decrease significantly after 45 years old and turn into fat tissue, it finished approaching 60 years old. As a result of this involution there is a decrease in naiv T cells gradually and more memory T cells, decreased activity T helper cell. The aging process can also reduce the proliferative response, decreased levels of CD8 + T cells, and changes in Th1 to Th2. Changes to this immune system closely resembles the effects of aging, so asthma progression in older age it stands out and is heavier. In this study the proportion of patients at 18-45 years (91.8%), and those aged ≥ 46 (8.2%), it because asthma symptoms at the age of ≥46 years heavier and the possibility of the patient going to the emergency room, temporarily the study was conducted in polyclinics.

Francisco et al's in 2010 was found that proportion female asthma patients are > 65% with aged 15-34 years. Research by Agarwal in 2006 concluded that women, old age, low socio-economic status, history Atopy tendency, history of parents with asthma, and smokers are risk factors for the occurrence of asthma. Puberty is associated with increased incidence of asthma in women while after menopause the incidence of asthma is reduced, this proves that the influence of endogenous hormones and exogenous roles in asthma. In this study the

proportion of female is 57.1% and most patients do

Most patients get the first attack before 6 years old. Boys get more asthma than girls, however at 11 years the prevalence is the same, while after 16 years of age, women (6.2%) were more likely to suffer from asthma than boys (4.3%). The main risk factors for asthma in children are, genetic predisposition, history families with asthma or allergies, history of parents with atopic disease, respiratory infections, bacterial colonization, allergic sensitization and exposure to cigarette race. Asthma with adult onset varies from 12-65 years, compared with the onset of children, adult onset still needs investigation prevalence and risk factors In this study most patients experienced the first asthma attack before 12 years of age (55.1%).

One third to half of cases of asthma are caused by atopy. Atopy can be proven by skin puncture examination or examination IgE. In this study no skin pricking tests were carried out IgE examination so that the tendency of atopy is assessed based on history history of complaints of patients associated with atopy. In this research proportion of history of atopy tendencies of 81% with most complaints of rhinitis 38.8%, followed by rhinitis accompanied by dermatitis by 36.7%, and 18.4% patients have never had atopic complaints. Charpin et al and Wieringa et al said that a history of atopy was associated with asthma.

The absolute eosinophils counts increases in circulation and is associated with asthma severity. Research conducted by Yousry et al in 2012 Lonkvist et al in 2001 showed that the absolute eosinophils counts significantly higher in the asthma group than in the group of people healthy ($p < 0.001$). A typical picture of asthma is an increase in eosinophils peripheral blood. Peripheral blood eosinophils correlate with the severity of symptoms, levels limited air flow, and airway hypereactivity. Suspected that blood eosinophils is an indirect marker for airway inflammation in asthma. In this study blood absolute eosinophil counts in the total controlled group asthma lower than in the partially controlled asthma group and are not controlled.

The results of this study are in accordance with previous studies. Sele et al in 2001 found the absolute eosinophils counts in uncontrolled asthma higher than patients with asthma controlled. Yousri et al in 2012 was found that the absolute eosinophils counts was significantly higher in patients asthma with severe attacks compared with mild attack patients. There is a relationship between the severity of the asthma attack and the high number peripheral absolute eosinophils. Fujitaka et al got that the

not smoking (83.7%).

absolute eosinophils counts is significantly higher in patients severe asthma compared to mild asthma. Anna et al stated that asthma patients with high absolute eosinophil counts have more treatment background, more frequent exacerbations and worse asthma control than patients with low blood absolute eosinophils. Trung et al got the results showed that patients who had high levels of blood absolute eosinophils experience more asthma attacks often compared to patients with absolute blood eosinophil counts low. In this study it was found that there were significant mean differences the blood absolute eosinophils in the group of asthma was totally controlled and controlled in part, in a total and uncontrolled controlled group, but the average the absolute eosinophils counts in a part of the controlled group does not have significant difference compared to uncontrolled asthma group.

There is a difference in the blood absolute eosinophils between controlled and uncontrolled asthma groups assessed using PEFr, where the mean absolute eosinophil count in the asthma group was not controlled more significantly lower than the controlled asthma group. This discovery showed that changes in blood eosinophils showed activity diseases and the number of absolute eosinophils play an important role in determine the degree of asthma control.

5. CONCLUSION

There are significant differences in the number of blood absolute eosinophils counts in asthma totally controlled group and partially controlled, and between total controlled and uncontrolled groups assessed using ACT, the better the degree of asthma control, the absolute number of eosinophils Getting lower. There are differences in the number of absolute eosinophils that are meaningful between a group of controlled and uncontrolled asthma assessed using PEFr, where the absolute number of eosinophils in the asthma group is more controlled significantly lower than uncontrolled asthma groups. Increased numbers of absolute blood eosinophils are associated with asthma not controlled.

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