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DESCRIPTION OF COUNT OF EOSYNOPHIL CELLS IN PULMONARY TUBERCULOSIS PATIENTS BASED ON LENGTH OF TREATMENT AT JAMBI CITY HEALTH CENTER

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ABSTRACT

Background: Pulmonary Tuberculosis (TB) is an infectious disease caused by the bacteria *Mycobacterium tuberculosis*. The occurrence of infection is closely related to the immune response. increase in eosinophil cells is an active immune response, increase or decrease in the number of these cells can describe the healing process of TB disease. This research was carried out with the aim of knowing the description of the number of leukocytes based on the length of treatment undertaken in pulmonary TB patients in the Jambi City health center area
Method: This type of research is descriptive research with a cross sectional approach with a variable length of treatment. This research was conducted in February-June 2023 with sample of 40 TB patients from several Community Health Centers in Jambi City.
Result: The results of research conducted on pulmonary TB patients showed that the results of eosinophil examination based on treatment duration ≤ 2 months in pulmonary TB sufferers showed an average result of 1.8%, while the results of eosinophil examination based on treatment duration > 2 months in pulmonary TB sufferers were obtained. The average result was 3.5%.
Conclusion: Based on the results obtained, it can be concluded that there is no significant difference between the number of eosinophils in pulmonary TB sufferers based on treatment duration ≤ 2 months and > 2 months with a P-value > α (0.05).

Keywords: Pulmonary Tuberculosis (TB), Eosinophils, Duration of Treatment

INTRODUCTION

Pulmonary Tuberculosis (TB) is one of the main causes of death throughout the world. Globally, the World Health Organization states that there will be an increase in pulmonary TB in 2021 by 4.5 percent from 2020. It is estimated that 10.6 million people have been identified as suffering from pulmonary TB compared to 2020, which was only 10.1 million suffering from pulmonary TB (WHO, 2022). Currently, Indonesia is in second place with the highest number of pulmonary TB patients in the world after India. The number of pulmonary TB patients is estimated at 969,000. The incidence of pulmonary TB cases in Indonesia is 354 per 100,000 population (WHO, 2022). Jambi Province is one of the contributors to the number of pulmonary TB cases in Indonesia. The Jambi City Health Service recorded that in 2021 the number of pulmonary TB patients in Jambi City was 828 people (Dinkes, 2021). According to data from the Central Statistics Agency (BPS) in 2020, from a total of 11 sub-districts, there were 4,838 cases of pulmonary TB in Jambi Province (BPS Kota Jambi, 2020). and based on the Jambi City Health Service, the most cases of pulmonary TB were reported from the Kenali Besar health center with a total of 65 cases.

The main symptom of pulmonary TB patients is coughing up phlegm for 2-3 weeks or more. Coughing can be followed by additional symptoms, namely phlegm mixed with blood, coughing up blood, shortness of breath, weakness, decreased appetite, decreased body weight, malaise, night sweats without physical activity, fever for more than a month (Werdhani, 2014). There are special symptoms of pulmonary TB, namely if there is partial blockage of the bronchi, it can cause weak breathing sounds accompanied by shortness of breath, there is fluid in the pleural cavity accompanied by complaints of chest pain, bone infections, and in children it can affect the brain (the lining covering the brain) and is referred to as meningitis (inflammation of the lining of the brain), the symptoms are high fever, decreased consciousness and convulsions (Kemenkes RI, 2011). Pulmonary TB disease starts from the entry of bacteria into the alveoli through the airway, immune system will respond by carrying out an inflammatory reaction, namely in the form of phagocytes suppressing bacteria, and tuberculosis-specific lymphocytes destroying (lysing) bacteria and normal tissue. This reaction causes a buildup of exudate in the alveoli which can cause bronchopneumonia in someone who inhales MTB (Mycobacterium tuberculosis) (Kenedyanti & Sulistyorini, 2017).

The inflammatory response influences various things, one of which is an increase in eosinophils. Eosinophils are a pro-inflammatory mediator with considerable potential to initiate and maintain an inflammatory response. The effector function of eosinophils is associated with the capacity to release cationic proteins stored in cytoplasmic granules through degranulation. The role of eosinophils in the host immune response to MTB is not well characterized in humans. In animal models and from in vivo studies, mycobacterial lung infections are associated with chemotactic effects on eosinophils, which have been observed to phagocytose Mycobacterium in the lung. Evidence indicating that eosinophils are increased in severe mycobacterial disease is Eosinophils may contribute to severe disease by rapid accumulation and degranulation in broncheoalveolar lavage and granulomas following primary MTB infection. (D'Ávila et al., 2007).The results of research by Bohrer et al (2021) show that an eosinophil response is required for optimal host survival and survival after MTB infection in mice. where there is a decrease in the eosinophil ratio which reflects an increase in the sputum bacterial load. the number of circulating blood eosinophils increased significantly within 2 weeks of starting ATD (anti-tuberculosis drugs). Lower baseline eosinophil numbers in the blood are associated with disease severity. Furthermore, results were obtained showing that peripheral blood eosinophils decreased according to the severity of the disease.Based on a study conducted by (Priyanti, 2020) on pulmonary TB sufferers who received anti-tuberculosis drug therapy at the Nagaswidak Health Center, Palembang City in 2020, of the 8 samples tested, 5 samples (62.5%) experienced an increase in the number of eosinophils above normal (>3%). A similar thing happened in research conducted by (Rahmawati, 2019), the results showed that the number of normal eosinophils in tuberculosis sufferers was 26 respondents (64%) and the number of abnormal eosinophils was 4 respondents (36%).

The number of eosinophil in person depending on the infectious disease they were suffering from because eosinophils are responsible for fighting infectious agents in the form of bacteria, parasites, viruses, etc. Prevention and cure of pulmonary TB disease can be done by treatment with ATD, namely Isoniazid, Rifampicin, Pyrazinamide, Ethambutol, and Streptomycin (Kementerian Republik Indonesia, 2019). The effect of this treatment can be seen in the research of Haftu et al (2020), namely, after three weeks of giving ATD, all symptoms of the disease resolved (vomiting, stomach ache, and loss of appetite) with significant weight gain and

reduction in peripheral eosinophilia. During follow-up after anti-TB treatment, serial WBC and eosinophilia decreased significantly and were normal. During the treatment period, the level of bacterial killing also depends on pH, temperature and metabolic activity of the bacteria.

METHODS

This research is a study with a cross sectional design. Sampling using convenience sampling techniques was carried out on pulmonary TB patients at several community health centers in the city of Jambi. The number of samples in this study was 40 samples with the case population being pulmonary TB patients in several health centers in Jambi City processed statistically using the T test.

The patient filled out and signed the consent form as a research respondent prior to the interview. Next, take a venous blood specimen from the patient. Specimens were examined using a Hematology analyzer.

RESULTS AND DISCUSSION

In this study, observations were made on examination data from 40 pulmonary TB patient respondents. The characteristics of the respondents involved can be seen in table 1 below. The results of the analysis of the characteristics of respondents based on gender, namely, the number of male respondents was more (21 people) than female respondents (19 people). Based on age, respondents with an average age of 18-65 years were 33 people and respondents with age> 65 years were 7 people. Based on the smoking habits, most of the respondents are not smokers (32 people), and other respondents are smokers (8 people). Based on the length of treatment, there were more respondents with treatment duration > 2 months (70%) than respondents with treatment duration ≤ 2 months (30%).

Table 1. Respondent Characteristic

Charecteristic		Frequency	Percentage
Gender			
	Male	21	52,5%
	Famele	19	47,5%
Age			
	18-65 years	33	82,5%
	>65 years	7	17,5%
Smoking habits			
	Smoker	8	20%
	No smoker	32	80%
Langth of treatment			
	≤ 2 months	12	30%
	> 2 months	28	70%

Table 2. Range Of Eosinophil Values

	N	Range
Normal	4	1-5 %
Abnormal	36	6-18%

Table 3. Overview of Count Eosinofil in pulmonary TB patients based on length of treatment

Eosinophils in pulmonary tuberculosis patients (%)					
Variable	N	Mean	Std. Deviation	Std. Error Mean	P Value
≤ 2 bulan	12	1,8333	0,88967	0,25683	0,112
> 2 bulan	28	3,5107	3,40220	0,66185	

Based on the length of treatment, the results of this study, in the initial stage of treatment <2 months, the results were (30%) and in the advanced stage > 2 months, the results were (70%) with a p value>0.05. So it shows there is no significant difference between the length of treatment and the number of eosinophils. These results are in line with research conducted by Afta Andra, 2017, where in the initial stage of treatment <2 months the results were obtained at (5.4%) and at the advanced stage > 2 months the results were obtained at (10.0%).

The majority of eosinophil cell counts in pulmonary TB sufferers in Jambi City in 2023 are within the normal range. Based on the results of the examination of 40 respondents, the number of eosinophils was within the normal range with an average number of normal eosinophils of 36 people (90%) and an abnormal number of eosinophils of 4 people (10%). This is in line with research conducted by Rahmawati, B in 2019 where there were 19 respondents with normal eosinophil results (64%) and 11 respondents with abnormal eosinophils (36%). In this study, abnormal

eosinophil counts could be influenced by several things, where the majority of respondents with abnormal eosinophil counts were due to complaints of itching due to drug allergies. This event occurs characterized by the appearance of a maculopapular rash which occurs approximately 7 days after drug desensitization. Drug desensitization is a reduction in drug dosage due to the appearance of an allergic reaction to the drug in the patient. This is in line with research by Siripassorn et al., 2018 where five side effects occurred during drug desensitization. All patients who experience side effects during drug desensitization in the form of a maculopapular rash, continue desensitization by reducing the drug dose for at least 3 days or until the rash disappears and then continue the desensitization procedure. This allergic reaction can be caused by the components of isoniazide, rifampicin, pyrazinamide, or ethambutol.

CONCLUSION

The results of research conducted regarding examination of the number of eosinophils in pulmonary TB patients in Jambi City in 2023 based on length of treatment, it can be concluded that there is no significant difference between the number of eosinophils in pulmonary TB patients based on length of treatment. Future researchers are advised to continue research with samples of pulmonary TB patients before and after several months of taking ATD, in order to obtain more varied data and cover a wider research area so that they can describe the population evenly.

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CONFLICT OF INTEREST

The author declares that he has no conflict of interest.

REFERENCES

Bohrer, A.C., Castro, E., Hu, Z., Queiroz, A.T.L., Tocheny, C.E., Assmann, M., Sakai, S., Nelson, C., Baker, P.J., Ma, H., Wang.L., Zilu, W., du Bruyn, E., Riou, C., Kauffman, K.D., Program, T.I., Moore, I.N., Nonno, F.Del, Petrone, L., … Mayer-Barber, K.D. (2021). Eosinophils are part of the granulocyte response in tuberculosis and promote host resistance in mice. *Journal of Experimental Medicine*, 218 (10). https://doi.org/10.108/jem.20210469.

D'Avila, H., Almeida, P.E., Roque, N.R., Castro-Faria-Neto, H.C., & Bozza, P.T. (2007). Toll-like receptor-2-mediated C-C chemokine receptor 3 and eotaxin-driven eosinophil influx induced by Mycobacterium bovis BCG pleurisy. *Infection and Immunity,* 75 (3), 1407-1511. https://doi.org/10.1128/IAI.01326-06

Kemenkes RI. (2011). Pedoman Nasional Pengendalian Tuberkulosis-Keputusan Menteri Kesehatan Republik Indonesia Nomor 364. *Kementerian Kesehatan Republik Indonesia, Pengendalian Tuberkulosis,* 110. http://www.dokternida.rekansejawat.com/dokumen/DEPKES-Pedoman-Nasional-Penanggulangan-TBC-2011-Dokternida.com.pdf

Kementerian Kesehatan RI. (2019). Pedoman Nasional Pelayanan Kesehatan Tata Laksana Tuberkulosis. *Carbohydrate Polymers*, 6(1), 5-10.

Kenedyanti, E., & Sulistyorini, L. (2017). Analisis *Mycobacterium Tuberculosis* dan Kondisi Fisik Rumah dengan Kejadian Tuberkulosis Paru. *Jurnal Berkala Epidemiologi,* 5(2), 152-162. https://doi.org/10.20473/jbe.v5i2.2017.152-162

Priyanti, E. (2020). Tuberkulosis Paru yang Menerima Terapi Obat Anti Tuberkulosis Tahun 2013 – 2020 (Studi Literature) TUberkulosis Paru yang Menerima Terapi Obat Anti Tuberkulosis Tahun 2013 – 2020 (Studi Literature). *Karya Tulis Ilmiah*, 2020. https://repository.poltekkespalembang.ac.id/items/show/1764