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RESEARCH ARTICLE

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Differences in Erythrocyte Sedimentation Rate (ESR) of Silver Humans Based on Their Working Hours in Semarang City

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ABSTRACT

Erythrocyte Sedimentation Rate (ESR) is the rate of deposition of erythrocytes in the a tube filled with blood that has been anticoagulated vertical and left for a certain time. Based on the use of materials that silver humans use screen printing paint as a dye and thinner as a paint solvent, The main chemical component of thinner is toluene. Toluene have a high severity of health impacts and if inhaled in the long term will cause an impact serious health problems and can affect erythrocyte sedimentation rate values and sunshine at 12:00 to the afternoon can increases the risk of skin cancer and causes inflammation thus affecting the value of the erythrocyte sedimentation rate. The purpose of this research to measure and analyze differences in sedimentation rate values blood on silver humans based on hours worked in the city Semarang. This type of research was descriptive with a cross-sectional design. Samples were taken as many as 20 silver human samples during working hours at 07:00-12:00 and silver man at hours work at 12:00-17:00 in Semarang City then checked the value of the erythrocyte sedimentation rate using the ESR examination method westergreen. The results showed the average value of erythrocyte sedimentation rate silver man working hours 07:00-12:00 was 11.4 mm/hour, while the average value of the silver human erythrocyte sedimentation rate in hours working hours 12:00-17:00 was 19 mm/hour. Data obtained then analyzed by statistical test Independent Sample T-Test. The results of statistical tests show that there was a difference with p-value of 0.028. The conclusions of this research are: the difference in the value of the erythrocyte sedimentation rate in silver humans in hours working hours 07:00-12:00 and silver man working hours 12:00-17:00 in the city of Semarang.

Keywords: erythrocyte sedimentation rate; value; silver man

INTRODUCTION

Silver people generally use screen printing paint mixed with kerosene or cooking oil to color their bodies. Paints generally contain chemicals such as vinyl chloride, plastisol, formaldehyde, heavy metals such as lead, titanium, chromium, hydrocarbons, and solvents (thinner) ⁽¹⁾. The main chemical component in thinner is toluene. manSilver uses the paint to spread evenly and looks shiny. Toluene content in thinner harmful to health. The impact of inhaling or drinking accidentally or intentionally can cause damage to the body and can also cause death ⁽²⁾.

Toluene has a high level of health effects and if inhaled in the long term can cause serious health effects. Toluene hazard identification according to WHMIS (Workplace Hazardous Material Information System) can cause toxic effects and even be very toxic ⁽³⁾. The use of toluene can affect ESR levels, due to an inflammatory process and can increase ESR values. ESR examination in lung diagnosis shows that in lung infection an inflammatory process occurs, where in the inflammatory process, there is an increase in fibrinogen and plasma globulin levels associated with the acute phase reaction, causing the ESR value to increase ⁽⁴⁾.

Toluene that enters the blood then attaches to erythrocytes, toluene is destructive so that it causes erythrocyte lysis before it is time to regenerate. The nature of toluene damage is fluctuating according to the

intensity of long exposure and erythrocyte regeneration time, although on the other hand, continuous exposure will cause toluene to continue to enter the blood following blood circulation throughout the body and settle in organs and increase inflammation, can affect the ESR value⁽⁵⁾.

This study aims to analyze differences in the value of silver human blood sedimentation rate during working hours at 07.00 to 12.00 and 12.00 to 17.00. It is hoped that the research can be used as reference material in further research and can add information to the public about the effects of chemical paints that can cause health problems in the body.

METHODS

The tools and materials used in the Westergreen method of checking the erythrocyte sedimentation rate values were Westergreen Pipette, Westergreen Rack, Push ball, Vial, Tourniquet, Tissue, 3cc syringe, Label paper, Timer, Venous blood, NaCl 0.85%, Sodium Citrate 3.8%, Alcohol swabs, Aquades and EDTA Tubes.

This research was conducted in May 2022 in the Semarang City area which was taken by a total sampling of 20 samples, then examined using the Westergreen method. The results of the measurement of the erythrocyte sedimentation rate value before statistical analysis were carried out by analyzing the data, testing the normality of the data using the Shapiro-Wilk test. The data from the normality test were found to be normally distributed and continued with the Independent Sample T-Test.

RESULTS

Table 1. Distribution of measurement values of erythrocyte sedimentation rate using method Westergreen

Variable	Median	Mean	± SD	Min	Max
Silver man working hours 07:00- 12:00	10.00	11.40	5.985	5	25
silver clock man work o'clock 12:00-17:00	15.20	19.00	8.042	10	31

Based on table 1, it was obtained that the average value for silver human ESR during working hours from 12:00 to 17:00 was higher than that of silver humans at working hours from 07:00 to 12:00.

Table 2. Normality test results for sedimentation rate values blood using method Westergreen

Variable	p-value
Silver man working hours at 07:00-12:00	0.129
Silver man working hours at 12:00-17:00	0.051

Based on the output of the normality test using Shapiro Wilk, it is known that silver human variables during working hours at 07:00-12:00 ($p=0.129$) and silver humans at working hours at 12:00-17:00 ($p=0.051$) which meet the assumptions that is normally distributed because the p value > 0.05 .

Table 3. The results of Independent Sample T-Test

Variable	p-value
Erythrocyte sedimentation rate man silver based on working hours 07:00-12:00 and 12:00-17:00	0.028

Table 3 shows that there was differences between silver people based on working hours at 07:00-12:00 and 12:00-17.00 (p value = 0.028).

DISCUSSION

Based on the results of the research that has been done, the researchers found the average value of silver human erythrocyte sedimentation rate during working hours at 07:00-12:00 is 11.4 mm/hour and silver human working hours at 12:00-17:00 is 19.0 mm. /o'clock. These results show that the erythrocyte sedimentation rate value is above the normal value in silver humans with working hours from 12:00 to 17:00. Score normal erythrocyte sedimentation rate is male <10 mm/hr and women <15 mm/hour⁽⁶⁾. Based on Figure 4. The graph of the distribution of erythrocyte sedimentation rate values, the highest erythrocyte sedimentation rate value is 31 mm/hour and the lowest is 5 mm/hour.hours. Factors that increase the ESR include the number of erythrocytes less than normal, the size of the erythrocytes that are larger than their normal size, making it easier or faster to form rouleaux, increased levels of fibrinogen in the blood will accelerate formationrouleaux, vibrating examination tube will speed up formation precipitation, the temperature at the time of examination is higher than the ideal temperature ($> 20^{\circ}\text{C}$) so that speed updeposition⁽⁷⁾. Factors that Lower erythrocyte sedimentation

rate. Leucocytosis heavy, polycythemia, abnormalities protein (hyperviscosity), technical factors such as: retailing problems, frozen blood samples, short erythrocyte sedimentation rate tubes, and vibration during examination⁽⁷⁾.

Toluene contained in dyes in humans silver does not cause the haematopoietic effects associated with chronic toluene exposure. Previous studies have shown that the hematopoietic effect with increase in toluene in the blood. Toluene in peckeria is associated with hematological effects due to the presence of benzene as the main contaminant in toluene. Workers who have been exposed to toluene with benzene levels for years <0.01% shows a decrease in the number of leukocytes in the blood⁽⁸⁾.

Toluene chemicals at concentrations above 100 ppm can cause vertigo and headaches. At higher concentrations, it causes coma. However, it does not cause bone marrow damage, is not hepatotoxic, and has no effect on the nervous system. Normal concentrations do not cause brain damage. Other chemicals, such as xylene, have the same acute symptoms as toluene, but xylene is more irritant and causes an unpleasant odor. Harmful to eyes and upper respiratory tract, but not cause hematotoxic and neurotoxic⁽⁹⁾.

Benzene and toluene are organic solvents that are often used in industry which are volatile and toxic⁽¹⁰⁻¹²⁾. Almost all organic solvents are toxic if inhaled or ingested in amounts exceeding threshold and may cause skin irritation in case of skin contact. Exposure that occurs continuously can cause health problems, where its damaging effects depend on solvent concentration, duration of exposure, and solvent toxicity. The health impacts that arise are in the form of damage to the function of the central nervous system (CNS). CNS symptoms are characterized by headaches, fatigue, dizziness, unconsciousness, to death^(11,13).

The effect of exposure to toluene paint can affect the health of the body, especially the skin, the short-term effect can cause itching, the skin pores will be closed, so the skin becomes unhealthy. Chemical substances in silver paint when absorbed by the body have an impact on body health, cancer is a possible long-term effect that will arise from continuous exposure to chemical compounds in silver paint⁽¹⁴⁾.

Erythrocytes with abnormal shapes such as sickle cells, schistocytes, acanthocytes, elliptocytes, etc., have a relatively large surface area compared to the cell weight so that the sedimentation rate of these cells is also low. In addition to cellular factors and factors found in plasma, ESR is also influenced by other factors including determination techniques, temperature, anemia, drugs, heavy metals. Certain drugs or chemicals, such as toluene, arsenic, can suppress bone marrow activity at critical doses. Cytostatic drugs used to inhibit the growth of malignant cells can suppress the bone marrow. Radiation and drugs used for radiological examinations, folic acid antagonists, antibiotics, cytotoxics, can also damage every type of fast-growing cell⁽¹⁵⁾.

The erythrocyte sedimentation rate is a relatively non-specific examination because it is influenced by many technical and physiological factors that cause inaccurate findings. The results of the erythrocyte sedimentation rate have little diagnostic significance, but can be useful for monitoring the course of the disease. An abnormal erythrocyte sedimentation rate requires other investigations that are more sensitive as a diagnosis and should not be used as a screening test in asymptomatic conditions⁽¹⁵⁾. The hypothesis is proven that there is an effect of toluene on the body that affects the ESR value. Other supporting examinations are needed that can assist in making a diagnosis of the effect of toluene exposure on body health.

CONCLUSION

Based on the results of the study, it can be concluded that there is a difference in the value of the silver human erythrocyte sedimentation rate who works at 07.00 - 12.00 and those who work from 12.00-17.00 in Semarang City. To overcome the possible long-term adverse effects of using toluene paint, it is better to replace the toluene paint which was originally used as a paint solvent to be replaced with a material that is safe for the body.

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