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TEST OF TIMBAL (Pb) CONTENT IN THE URINE OF CLEANING STAFF AT THE WASTE DISPOSAL PLACE BASED ON AGE BY METHODS OF ATOMIC ABSORPTION SPECTROFOTOMETER

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ABSTRACT

A pile of garbage produced by an increase in the needs of the community and can pollute the environment. Lead (Pb) is a heavy metal that is toxic from the air, which can have harmful effects for health. Cadmium (cd) is one of the metal contained in cigarettes tobacco that has a high toxicity properties. Lead (Pb) and Cadmium (Cd) can cause damage to the kidney system. Then the rest of the metabolism is excreted through the urine. This research is for to determine the level of lead (Pb) and cadmium (Cd) and relation between Lead (Pb) and Cadmium (Cd) in urine with the age of the janitor in the garbage dump. In this research, it uses the type of experimental research with 20 urine samples and conducted in March 2021 at the Laboratory of TLM Faculty of Health Sciences Muhhamdiyah Sidoarjo University and UIN Maulana Malik Ibrahim Malang. Data analysis methods use pearson correlation statistics. The results are measured using the AAS method for Timbal (Pb) below the limit 0.15 mg/L and Cadmium (Cd) below the limit 0.01 mg/L. The pearson correlation test of Timbal (Pb) and Cadmium (Cd)is sig. < 0.05, so Ha accepted and it said there was a relation between heavy metals in urine and age.

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INTRODUCTION

Environmental pollution is caused by changes in quality made by the actions of society. The increasing needs of society greatly affect the amount of waste generated in urban areas as well as in rural areas. Waste piles that tend to increase from day to day result in environmental pollution due to poor waste management and limited landfills. Waste can reduce the aesthetic value of the environment. The resulting negative effects such as reducing resources, can clog waterways, cause air pollution, and carry various types of diseases [1].

One type of waste that can pollute the environment is B3 (toxic and hazardous material) waste. Toxic and hazardous materials (B3) are substances or components that have properties or concentrations that can pollute and damage the environment, endanger

the environment, health, and the survival of living things in accordance with Article 1 Paragraph 1 of PP No. 101 of 2014. Types of hazardous waste generated by industry include heavy metals, paint, pesticides, cyanide, oil, and other hazardous chemicals [2]. The relationship between waste and toxic and hazardous materials (B3) is because toxic and hazardous materials (B3) are included in a type of waste that is very dangerous and in B3 it can cause heavy metal pollution.

Heavy metals have chemical elements with a density of > 5 / cm3 are at the bottom right of the periodic system of elements and have atomic numbers 22 to 92. According to Law No. 23 of 1997 Article 1 Paragraph 17 heavy metals cause human health and other living things to be disturbed, can damage and pollute the environment (Tapani, 2019). Hazardous heavy metals include arsenic (As), mercury (Hg), iron (Fe), and copper (Cu), cadmium (Cd), and lead (Pb).

Lead (Pb) is a toxic heavy metal that can come from the air, food, beverages, and through direct contact with the skin or eyes that can cause adverse health effects. These effects cause symptoms of chronic poisoning such as abdominal pain, anemia, nausea, and can even cause paralysis. Lead metal that enters the body will be excreted through urine or feces bound to proteins, some lead metals can collect in the liver, kidneys, fatty tissue, and hair [3].

Urine is formed in the kidneys and is one of the body's metabolic waste products. Urine is discharged from the body through channels formed by the formation of 98% nitrogen (urea, creatinine, acid, uric). Urine has low acidity and has a pH of 5-7. The specific gravity of normal urine is 1,010-1,030 mg/l and the amount of urine excreted in a day is 1,200-1,500 ml. Heavy metals in the body collect in several organs, namely the kidneys, nails, liver, adipose tissue, hair, and through urine heavy metals are excreted by the body by 75-80%.

Based on the description presented, the researcher will conduct a study on the levels of heavy metal lead (Pb) contained in the urine of janitors based on age at landfills in Candi and Jabon sub-districts using an atomic absorption spectrophotometer. This method is used because it has the advantages of being easy, simple operation, and relatively few samples are needed.

METHODS

The type of research used in this study is quantitative analysis using an experimental type to determine the level of lead (Pb) in the urine of janitors based on age at the landfill.

The population in this study were all cleaners at the landfill. The sample in this study was the urine of janitors at the landfill. The sampling technique in this study was purposive sampling with the following conditions: Willing to be a respondent in this study, having an age above 35 years. For the withdrawal of respondents using total sampling where all workers are sampled. This research was conducted at the UIN Maulana Malik Ibrahim campus located on Jalan Gajayana Malang City, East Java, Basic Chemistry Laboratory Medical Laboratory Technology Faculty of Health Sciences, Muhammadiyah University of Sidoarjo.

In this study using statistical analysis techniques using SPSS 16 with parametric correlation tests with á = 0.05. Data obtained in the form of quantitative data from heavy metal levels of Lead (Pb) with the relationship of length of work on janitors in landfills.

RESULT AND DISSCUSION

Tests on the standard curve were carried out by measuring the absorbance of the Lead (Pb) standard series solution. The standard series or standard solution concentrations made are 0.0; 0.2; 0.4; 0.6; and 0.8 mg/L. Then obtained the standard solution data in Tables 1 and 2 below:

Table 1. Lead (Pb) standard solution data

Sample	Concentration (mg/L) Absorbance (Abs)	Concentration (mg/L) Absorbance (Abs)
Blank	0,000	0,0003
Standard 1	0,200	0,0053
Standard 2	0,400	0,0107
Standard 3	0,600	0,0164
Standard 4	0,800	0,0213

The data obtained in Tables 1 and 2 were then used to determine the SSA concentration of Lead (Pb) metal through the following linear regression equation

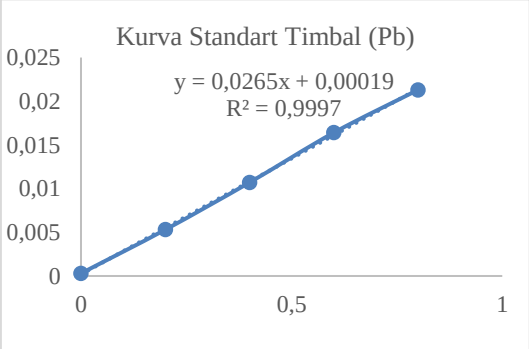

Figure 1. Lead (Pb) Standard Curve Graph

Based on the graph above, it is known that the curve of the Lead (Pb) metal standard solution shows the concentration point. There is a standard curve equation of Lead (Pb) which is y = 0.0265x + 0.00019. The value of R2 (correlation coefficient) = 0.9997. The standard curve equation is used to calculate the concentration of Lead (Pb) solution, and the R2 value on the standard curve shows linear results, the liner results are

perfect because a linearity is said to be perfect if R2 is close to 1. This standard curve is suitable to be used as a reference for measuring heavy metals in samples (Lestari, 2015).

Lead (Pb) Level

The measurement results of Lead (Pb) metal concentration in Atomic Absorption Spectrophotometer (SSA) measurements were calculated based on the standard curve equation. The results of Lead (Pb) metal concentration are shown in Table 3.

Table 3. Measurement Results of Lead Metal Concentration (Pb)

No.	Sample	Age (yr)	Pb content (mg/L)
1.	Sample A	35	0,023
2.	Sample B	46	0,049
3.	Sample C	40	0,034
4.	Sample D	42	0,038
5.	Sample E	44	0,042
6.	Sample F	45	0,046
7.	Sample G	48	0,057
8.	Sample H	50	0,061
9.	Sample I	54	0,072
10.	Sample J	51	0,064
11.	Sample K	36	0,027
12.	Sample L	46	0,053
13.	Sample M	54	0,072
14.	Sample N	59	0,087
15.	Sample O	56	0,076
16.	Sample P	52	0,068
17.	Sample Q	58	0,079
18.	Sample R	38	0,030
19.	Sample S	62	0,091
20.	Sample T	58	0,083
	Average		0,0576

The highest value was obtained from sample S, a 62-year-old respondent with a level of 0.091 mg/L, and the lowest value from sample A, a 35-year-old respondent with a level of 0.023 mg/L and the average result of lead levels was 0.6025 mg/L. Lead (Pb) levels in the urine of janitors at landfills based on age are below the threshold based on the Minister of Health Regulation Number 1406/MENKES/SK/2002 which is 0.15 ppm (0.15 mg/L) [4]. It is known that the lowest age of respondents is 35 and the highest is 62 which states that the increasing age of the level value also increases. This is because if a person gets older, the immunity in the body decreases so that it is easily exposed to heavy

metals. Therefore, the function of the immune system will decrease with age and the body's resistance to infection will also decrease, including the speed of the immune response produced [5].

Lead is toxic which means it is poisonous and its toxicity is very high. In the environment lead can come from air, water, and soil. The entry of lead in the body can be through breathing, food, drink, and through direct contact with the skin or eyes which results in adverse health effects. The entry of toxins into the body through breathing or through food cannot be neutralized properly. Therefore, the age factor affects the increase in urine lead levels although the effect is small because it is known that each person has a different immune system according to their nutritional status and the environment in which they live.

Lead (Pb) heavy metal that enters the body starts from air pollution, the air will be absorbed by the body through breathing, direct contact with the skin, and in the body excreted through urine. Continuous exposure to heavy metals will cause accumulation in the body which results in health problems such as kidney disease, anemia, nerve damage, nausea, and moreover can cause paralysis [3].

Data on lead metal (Pb) levels obtained were then tested for normality using SPSS version 16.0. The normality test used is Shapiro-Wilk because the number of research data samples is 20 samples which are less than 50 samples.

It is known that the Shapiro-Wilk normality test data has a sig. value for lead (Pb) levels of 0.497, levels and age of 0.690. So the sig value is> 0.05, it means that the normality test value is normally distributed. After that, the next test was carried out to determine the relationship between lead levels and the age of janitors using the Pearson correlation test.

The data obtained shows that the Pearson Correlation (r count) value for the relationship between lead (Pb) levels and age is 0.852. The calculated r value in this data is close to 1 and the calculated r value is positive, which means that the relationship between lead (Pb) levels and age is very strong and the relationship is positive. So the higher the level of lead (Pb) in urine, the higher the age of the janitor, and vice versa, the lower the level of lead (Pb) in urine, the lower the age of the janitor [6].

The sig value between lead (Pb) levels and age is 0.000 and <0.05. So for the correlation test on lead (Pb) levels with age, there is a relationship between lead (Pb) levels and the age of janitors at landfills in Candi sub-district and Jabon sub-district.

CONCLUSION

Based on the results and discussion of research on urine samples of cleaners in landfills, it can be concluded that the level of lead (Pb) in the urine of cleaners in landfills based on age is below the threshold based on Permenkes No. 1406/MENKES/SK/2002 in the urine of cleaners in landfills based on age is below the threshold based on SNI 19-0232-2005. In statistical tests, there is a relationship between heavy metal lead (Pb) levels and the age of janitors at landfills in Candi and Jabon sub-districts based on the Pearson correlation test with a significant value <0.05. And it is suggested to the next researcher

to be able to measure other heavy metal levels using Atomic Absorption Spectrophotometer (SSA) and can do tests on samples other than urine.

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