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[Review] Analysis of Lead Levels in the Blood of Several Professions in Indonesia

Fahmi Rizal

Department of Chemistry, Faculty of Engineering, Bangka Belitung University, Bangka, Bangka Belitung, Indonesia 33172

ABSTRACT

Lead is a toxic heavy metal found in the environment. Lead is an abundant, important, and dangerous element. In addition, lead cannot be decomposed, so it easily accumulates in the environment and causes poisoning. Lead poisoning is a condition when a person experiences lead deposition in the body. Lead is a metal-shaped chemical element with a very high toxic content. Lead toxins can affect the function of human organs and systems. A person can experience serious health problems if exposed to small amounts of lead for a long time. It can even be fatal if the level of lead exposure is very high. Lead exposure is particularly dangerous for workers who are directly or indirectly related to it. Therefore, there needs to be an in-depth analysis of lead exposure among some professional workers in Indonesia. The method used in this research is an observational study using a cross-sectional approach and laboratory analysis using Atomic Absorption Spectrophotometry (AAS). Based on the research that has been done, it is found that the level of lead (Pb) in the blood of some workers in Indonesia is still below the threshold because it is in accordance with Decree of the Minister of Health of the Republic of Indonesia Number 1406/MENKES/SK/IX/2002 concerning Standards for Examination of Pb Levels in Human Biomarker Specimens that the content of lead (Pb) is 0.1–0.25 µg/ml.

KEYWORDS

Lead; Accumulation; Toxic; Biomarker

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Introduction

Plumbum (Pb), or better known as lead, is a dangerous metal. Even though the level of lead exposure is very low, it still has a harmful effect on human health. Usually, the most common biomarker of lead exposure is blood lead levels measured in micrograms (µg) per hundredth of a liter of blood (Dl) or µg/dl (Juliana *et al.*, 2017).

One of the consequences of development in the transportation sector is the rapid increase in the number of motorized vehicles, which causes an increase in pollution. Lead is one of the most dangerous air pollutants. (Hasan, 2012). Lead emissions as exhaust from motor vehicles enters the air in the form of gas. Lead emission is one of the side effects of combustion that occurs in vehicle engines from the chemical compounds tetra Ethyl Lead and tetra Methyl Lead, which are added to the fuel. Pb is a toxic heavy metal with almost no function and its presence is not required by the body (Palar, 2012).

Lead is one of the most feared metals in the environment, and people can be exposed to lead every day (Hardman, 2012). The Agency for Toxic Substances and Disease Registry (ARTS) lists lead (Pb) second after arsenic as one of the most toxic heavy metals seen from the combination of frequency of presence in the environment, toxicity, and potential for human exposure (Kim *et al.*, 2014).

Approximately 85% of air pollution in Indonesia comes from motor vehicle emissions and affects lead levels in the blood of people who are active on the streets. Group of workers who are at high risk of exposure to lead pollutants in the air, such as traffic police, street vendors, beggars, and refueling station (SPBU) officers (Gusnita, 2012). Apart from being a fuel, it turns out that gasoline is the main cause of air pollution. In addition to the combustion products in the form of CO_2, CO, NO_x, and SO_x, Fergusson in Suman R (2014) explains that the presence of heavy metals in the form of lead (Pb) is also a pollutant that can increase the amount of environmental pollution. Polluted environmental conditions cause a decrease in environmental quality, which in turn can affect human survival (Raj, 2014).

According to research by Suherni, an intern at LEAD Group (2010), people living in urban areas have blood with an average lead level of more than 10 µg/dL. The main sources of lead poisoning are gasoline (premium), vegetables (from soil or dust that adheres to vegetables when consumed), sea water, and children's toys (Suherni, 2010). Exposure to lead that enters through the air means about 30-40% will be absorbed into the blood. In the blood, lead will inhibit the synthesis of heme by binding to the thiol group on the Aminoluvucinic Acid Dehydrase enzyme. Lead will also damage antioxidant enzymes such as Superoxide Dismutase (SOD), catalase (CAT), and Glutathione Peroxidase (GPx), which results in the uncontrolled formation of free radical compounds in the form of reactive oxygen species (ROS). The imbalance between free radicals and antioxidants causes oxidative stress to occur, which is associated with damage to cell membranes, DNA, RNA, and damage to brain cells. (Stamara *et al.*, 2020). According to the Minister of Health (2002) in the Decree of the Minister of Health of the Republic of Indonesia Number

CONTACT Fahmi Rizal farizihsan89@gmail.com

1406/MENKES/SK/IX/2002 concerning standards for examining lead levels in human biomarker specimens, measurement of lead levels in the human body can be carried out through blood, urine, and hair specimens. Blood specimens the threshold for lead levels in blood specimens in normal adults is 10–25 g/dl.

Gas station operators are individuals who have the potential to be exposed to lead through gasoline fumes and emissions from motor vehicle exhaust gases. The presence of chemicals in the work environment puts an additional workload on gas station workers, which can cause health problems. Various research results show that gas station operators experience a lot of blood pressure disturbances and a decrease in Hb due to lead exposure through steam and gasoline sparks as well as emissions from motor vehicle gases (Ayu & Irwan, 2019). Motor vehicles produce poor exhaust emissions, either due to inadequate maintenance or from the use of fuel of poor quality, such as premium, which still contains heavy metals (Fitrianah, 2017). The number of vehicles crossing the terminal can have a negative impact on the surrounding environment. Motor vehicles using fuel oil (BBM) have a large enough role in environmental pollution. Incomplete combustion of the engine will produce emissions that have the potential to pollute the environment. This pollution is caused by exhaust gases from the combustion of motor vehicle fuels. Motor vehicle emissions contain heavy metals, one of which is lead (Pb).

Lead (Pb) is a metal that can cause acute and chronic poisoning in humans. The existence of the terminal is inseparable from the presence of buying and selling activities between traders and users of terminal public facilities. Lead (Pb) produced by motorized vehicles in and around the terminal will mix into the air and be inhaled by road users (Nusaibah *et al.*, 2020). One of the people who are often on the highway and are directly exposed to vehicle fumes is the traffic police. It is estimated that exhaust emissions released from motorized vehicles can cause contamination of the bodies of traffic police who regulate vehicle traffic (Santoso, 2012). From the police group that has a higher lead content, they experience health problems such as hypertension, shortness of breath, palpitations, back pain, decreased appetite, headaches, difficulty concentrating, and pain in the muscles and bones (Hasan, 2012). Purnawan (2012) explains that the pollution from this used battery recycling business includes pollution from batteries containing lead (Pb) heavy metal, a specific sulfur odor, and liquid waste containing sulfuric acid. Lead exposure (Pb) is very dangerous. One of them that is harmful to the body is lead (Pb). Pb absorption into the body can be through the respiratory tract (in the alveoli), through the skin (if fat soluble) and the digestive tract, where it is through drinks and food and is absorbed by the intestines (Nasir, 2018). Lead (Pb) also causes hypertension. According to Rosyidah and Sitti (2010), hypertension is often called the silent killer and is a heterogeneous group of diseases because it can attack anyone and all groups. Hypertension causes morbidity (illness) and mortality (death). Lead exposure that occurs in adults has a negative impact on health. Lead contamination can occur due to direct or indirect contact with sources of lead pollutants (Pb), so that people who work in a work environment near the source of pollution have a higher risk of contamination. Of course, this also depends on the profession they are in. It is suspected that a person's work environment can affect lead contamination in his body, the closer he is to the pollutant source, the higher the risk of lead contamination (Nusaibah *et al.*, 2020).

Methods

Data collection was carried out through library research by searching for the results of scientific publications in the 2010-2020 range using a Google search. The results of the analysis were then analyzed and concluded. Methods of Data Analysis and Presentation The GRID synthesis included data analysis and presentation.

Results and Discussion

The results of the research by Lian and Azizah (2014) showed that the blood lead (Pb) levels of used battery home industry workers in Talun Village, Sukodadi District, Lamongan Regency were only 30%, which was abnormal, while 70% of the lead (Pb) levels in the workers' blood were normal. The results of Surya's research (2020) showed lead (Pb) levels in the blood of motorcycle repair workers on Jalan Jamin Ginting, Medan city. obtained from 9 respondents. There were 8 respondents who had exceeded the threshold value, with the highest lead value of 7.5 (µg/dL) owned by respondent No. 9, while the respondent with the lowest score, with a lead value of 3.00 (µg/dL) was owned by respondent No. 1. This difference occurs due to the habits of the two respondents. Respondent number 9 has a habit of rarely washing hands after completing motorcycle repair services or cleaning hands from oil residue by using the remaining fuel used to clean the motorcycle engine and then wiping his hands with a piece of newspaper, and continuing with other activities such as eating, drinking, or smoking, while respondent number 1 did the same thing as respondent number 9, namely cleaning the oil stuck to his hands with the remaining fuel and then washing his hands with soap until clean before doing other activities such as eating, drinking, or smoking.

Table 1. Distribution of Respondents Based on Levels of Lead (Pb) in the Blood of Motorcycle Workshop Workers

Respondent Number	Pb (µg/dL)	Threshold Value (µg/dL)	Description
1	3.00	3	Equal to TV
2	4.00	3	Exceeding the TV
3	4.60	3	Exceeding the TV
4	4.60	3	Exceeding the TV
5	5.00	3	Exceeding the TV
6	5.20	3	Exceeding the TV
7	5.50	3	Exceeding the TV
8	5.70	3	Exceeding the TV
9	7.50	3	Exceeding the TV

The results of the analysis of the content of lead (Pb) in the blood of coal employees can be seen in Table 2. It was found that the levels of lead in the blood showed that all samples examined were still below the threshold value (TV) because it was in accordance with the Decree of the Minister of Health No. 1406/Menkes/SK/XI/2002 concerning Standards for Examination of Pb Levels in Human Biomarker Specimens that the content of lead (Pb) is 0.1– 0.25 µg/ml.

Table 2. Pb levels in blood samples

Sample	Working time	Average Working Length/Day	Pb Concentrationin Blood (mg/L)
Sample 1	5 years	8 hours	0,272
Sample 2	7 years	8 hours	0,312

The results of the study, according to Brian et al. (2017), from table 3 show that the average blood lead level in all research subjects is 62.174 µg/L with a standard deviation of 23,602. The lowest lead content was 16,707 µg/L and the highest was 118,503 µg/L.

Table 3. Analysis of Lead Levels

Variable	Mean ± SD	Min	Max
Lead Level	62,174 ± 23	16,707	118,503

The results of research by Yuvita *et al.* (2014) regarding the distribution of blood lead levels in this study are presented in the following table:

Table 4. Analysis of Lead Levels

Variable	Mean	Min	Max
Lead Level	14.1	3	26

From the data presented in the table above, it can be seen that the mean value of lead content is 14.1 µg/dL. The allowable lead level according to WHO is 10-25 µg/dL. Based on these criteria, the lead level in the blood of the traffic police is still within normal limits. Based on statistical tests from the results of Ayu and Irwan's research (2019) between gas station lead levels and blood lead levels, p>0.05 was obtained. There was no significant relationship between gas station lead levels and blood lead levels. The results of the research conducted by Ghina *et al.* (2020) by examining the identification of lead (Pb) levels in blood at gas station operator officers 34-42115 Serang City obtained a table.

Table 5. Results of the Identification of Lead (Pb) Levels in Blood at SPBU Operators 34-42115 Serang City

Respondent	Age (year)	Years of Service	Laboratory Results (µg/100 ml)	Description
A	27	2,5	15,8	nd
B	29	3,2	33,41	nd
C	32	3,5	52,93	nd
D	26	2.8	24,77	nd
E	31	3,8	34,03	nd
F	28	3	25,59	nd
G	28	2,6	27,09	nd

Based on table 5 of samples A, B, C, D, E, F, and G, no lead metal content was detected in the blood of SPBU operator officer 34-42115 Serang City. A blood lead level is the total lead level contained in the respondent's blood with a unit size of g/dL. The distribution of lead levels can be seen in Table 6.

Table 6. Distribution of blood lead levels

Blood Lead Level	Frequency	Percentage (%)	Mean	SD
≤ 10 µg/dL	12	40	22.03	20.15
> 10 µg/dL	18	60		
Total	30	100		

According to the results of research by Nusaibah et al. (2020) on street vendors at the Kampung Rambutan Terminal, analysis results showed that 60% of respondents had blood lead levels of >10 µg/dL, while 40% of other respondents had lead levels of 10 g/dL. This means that more than a few respondents have lead levels in their blood that exceed the threshold value, which can be harmful to their health.The National Toxicology Program (NTP) (2012) states that the threshold value for blood lead levels is ≤10 µg/dL for children and adults because there is sufficient evidence that lead has an adverse effect on health. The Centers for Disease Control and Prevention (CDC) (2013) has set 10 µg/dL as a reference for blood lead levels for adults. Levels above 10 µg/dL are considered to increase health risks. Based on the results of the analysis, blood lead levels in street vendors illustrate that traders should be more aware of lead exposure, because most respondents have recommended lead levels. The results of research conducted by Hendra and Jojok (2017) regarding the relationship between blood lead levels and hypertension of car painting workers in Surabaya were obtained in the painting section. There were five people who exceeded levels of > 10 µg/dL, namely, 15,839 µg/dL, 15,283 µg/dL, 12,983 µg/dL, 11.596 µg/dL, and 15,492 µg/dL. This is because the workers in the painting department are a group that is directly exposed to Pb from the painting process itself. In addition, the

condition of the closed painting room and the lack of room ventilation, as well as all workers who do not use PPE, make exposure to Pb toxicity very high (Alifiyanto, 2016).

Table 7. State of Art

Researcher, year, title	Research purposes	Data collection	Research Result
Sofyan N., et al (2020). Analysis of Blood Lead Levels Against Street Vendors at Kampung Rambutan Terminal.	To determine the level of lead (Pb) in the blood, the effect of the characteristics of respondents with blood lead levels and the role of vegetation in absorbing lead from street vendors at the terminal of Kampung Rambutan.	The research was conducted using survey methods and laboratory examinations. The population is all street vendors who are at the research location points as many as 52 traders. The respondents used in this study were 30 traders who had been determined by purposive sampling method with the criteria of being a street vendor at the Kampung Rambutan Terminal and a minimum trading period at the Kampung Rambutan Terminal for more than 1 year and had understood and agreed to the submitted informed consent. The research design or research design used is cross sectional, which emphasizes the measurement or observation of data in one time which is carried out on the independent variable and the dependent variable. The independent variable for this study is the respondent's characteristics and the dependent variable for this study is the level of lead (Pb) in the blood. Data collection in this study was obtained from primary data by means of observation and in-depth interviews and measurement of lead levels in the respondent's blood. Examination of lead levels in blood in adults is carried out in one vein because the sample used is 4 to 5 ml. A blood sample is taken through a vein using a syringe which will be inserted into a container containing an anticoagulant (Ministry of Health, 2002). In-depth interviews with respondents were conducted to obtain data on the characteristics of respondents. The tools used in this study were Atomic Absorption Spectrophotometer (AAS) with the destruction method, syringe/disposible syringe, rubber arm/tourniquet, sphygmomanometer, alcohol wipes/cotton, anticoagulant tube, stationery, camera and questionnaire.	The results of the analysis showed that 60% of the respondents had blood lead levels >10 µg/dL, while the other 40% had lead levels ≤10 µg/dL. This means that more than some respondents have lead levels in the blood that have exceeded the threshold value and can have a negative impact on health. The National Toxicology Program (NTP) (2012) states that the threshold value for blood lead levels is
Priyatni Y.D., et al (2014). Analysis of Blood Lead Levels Due to Chronic Exposure to Traffic Police in Mataram City	This study aims to determine the analysis of blood lead levels due to chronic exposure to traffic police in Mataram City	This research is a research with analytical descriptive method. Data were collected by structured interviews and laboratory analysis. Based on the time of the study, the design of this study was cross sectional. Samples were taken by purposive sampling method.	The results showed that the average blood lead level of traffic police was 14.1 µg/dL. A total of 1.67% of respondents showed high lead levels, 83.33% moderate and 15 % low. The level of lead in the blood of traffic police due to chronic exposure in Mataram City is still within the levels allowed by WHO, which is below 25 µg/dL with an average value of 14.1 µg/dL.
Fibrianti L.D. and Azizah R. (2016). Characteristics, Levels of Lead (Pb) in Blood, and Hypertension of Used Battery Home Industry Workers in Talun Village, Sukodadi District, Lamongan Regency	To find out the general description, characteristics, and levels of lead in the blood of Used Battery Home Industry workers in Talun Village, Sukodadi District, Lamongan Regency	This research is included in the type of observational research using a cross-sectional approach, namely the measurement is only done once according to the time determined by the researcher. Based on the problem analysis, this research is a descriptive research	Measurement of lead (Pb) in the blood of used battery home industry workers based on the 1999 ATSDR (Agency for Toxic Substance and Disease Registry) standard, which is < 10 µg/dL. From the results of the study, the blood lead (Pb) levels of used battery home industry workers in Talun Village, Sukodadi District, Lamongan Regency were only 30% which was abnormal, while 70% of the blood

			lead (Pb) levels in the workers' blood was normal.
Stamara G., et al. (2020). Identification of Lead (Pb) Levels in Blood at Gas Station Operator Officers 34-42115 Serang City	This study aims to determine blood lead levels in gas station workers 34-42115 Serang City	The research design that will be carried out is a descriptive method by examining the Identification of Blood Lead (Pb) Levels in the Operators of SPBU 34-42115 Serang City. The population of this research is the blood of the officers of SPBU 34- 42115 Serang Banten City, totaling 21 people. The sample was determined purposively, namely gas station officers who worked under 4 years.	The results of the analysis of blood lead levels at SPBU operators 34-42115 Serang City quantitatively using ICP-OES (Inductively Caoupled Plasma Optical Emission Spectrometry) with a wavelength of 283.3 nm resulted in data that respondent A was 15.8 µg/100 mL , respondent B was 33.41 µg/100 mL, respondent C was 52.93 µg/100 mL, respondent D was 24.77 µg/100 mL, respondent E was 34.03 µg/100 mL, respondent F was 25,59 µg/100 mL and respondent G was 27.09 µg/100 mL. Samples A, B, C, D, E, F and G did not detect the presence of lead in the blood of the SPBU operator officers 34-42115 Serang City and did not exceed the maximum threshold of normal values according to the Ministry of Health.
Klopfleisch B., et al (2016). Blood Lead Levels at Refueling Station Officers.	To determine the level of lead in the blood at a gas station attendant in Sleman	This analytic observational study used a cross-sectional design. The research population was 70 gas station officers in 3 places. The sample size of this study was 43 people who met the inclusion and exclusion criteria	The results showed that the average blood lead level in all research subjects was 62,174 µg/L with a standard deviation of 23,602. The lowest lead content was 16,707 µg/L and the highest was 118,503 µg/L
Nasir M. (2018). Comparative Analysis of Lead (Pb) and Iron (Fe) Levels in the Blood of Open Space Parking Officers with Closed Spaces	To determine the levels of Lead (Pb) and Iron (Fe) in the blood of parking attendants in an open space with a closed space.	This research uses primary research (obtains data from the first source), is descriptive comparative (compares two or more phenomena), uses a quantitative approach (theory development), and is followed up through laboratory research (laboratory examination). The sample is parking attendants who are grouped according to their working area (open space and closed room). The sample size is 12 samples consisting of 6 samples from open space parking attendants and 6 samples from closed space parking officers using the simple random sampling method (random, regardless of the sample criteria).	The results obtained for the content of Lead (Pb) in blood samples of parking attendants in open spaces, namely the average lead exposure of 17.5 µg/dl of blood, and there was 1 sample (Pb02) which had a lead exposure value below or <0,01 and was declared negative. For closed space parking attendant blood samples, the average lead exposure was 22.66666667 µg/dl blood, and there was 1 sample (Pb10) which had a lead exposure value below or <0,01 and was declared negative. There is a difference in the levels of Lead (Pb) between parking attendants and open space with a significant value (2 lanes) that is 0.587116173 (>0,05)
Rosita, B., and Sosmira, E. (2017). Verification of the Analysis of Lead (Pb)	To find out the results of the accuracy test, precision test, linearity test, limit of	This research is experimental and the method used to determine the level of Pb in the blood is by wet digestion and then the metal is analyzed by AAS, the examination is continued with	The results of the analysis of the content of lead (Pb) in the blood of Batu Bara employees, it was found

Levels in Blood and Blood Hematology Overview of Coal Mining Officers	detection (LOD) and Limit of Quantitation (LOQ) tests and hematological examination of blood containing Pb on coal mining workers	testing of blood samples containing Pb in the hematology laboratory, to determine the value contained in the blood components.	that the levels of Pb in the blood showed that all samples examined were still below the Threshold Value (NAB) because it was in accordance with the Decree of the Minister of Health No. 1406/Menkes/SK/XI/2002 concerning Standards for Examination of Pb Levels in Human Biomarker Specimens that the content of Lead (Pb) is 0.1–0.25 µg/ml.
Kabuhung A. (2013). Analysis of Lead (Pb) Levels in the Blood of Parking Retribution Officers at the National Unity Park in Manado City Center.	To determine the level of lead (Pb) in the blood of parking retribution officers at the National Unity Park in the center of Manado City	The design of this research is descriptive laboratory, the population is all retribution officers who are in the retribution post totaling 38 people and the sampling uses inclusion criteria, namely: 1) officers who are in the retribution post in front of the worang statue and in front of Bank BNI 46, 2) serve as collectors parking fees and vehicle controllers in front of the post, so that there are 24 people who meet the inclusion criteria as a sample.	Based on the analysis of blood samples, it was found that the lead (Pb) in the respondent's blood was the highest at 54.14 µg/dl and the lowest at 2.70 µg/dl. When associated with the standard value of Pb levels in the blood according to WHO is 20 µg/dl. So that from the analysis of 24 blood samples, it was found that blood lead (Pb) levels exceeded the standard value > 20 µg/dl in 19 samples (79.2%) and did not exceed the standard value 20 µg/dl in 5 samples (20, 8%)
Sebayang R. and Nadhila A. (2017). Analysis of Lead (Pb) Levels on Hemoglobin Levels in the Blood of Parking Attendants at Traditional Markets in Palembang City in 2015	The purpose of this study was to determine the level of Lead (Pb) on hemoglobin levels in the blood of parking attendants at the traditional market of Palembang City in 2015.	Sampling was carried out after the researcher gave an informed consent to people who were willing to have their blood samples taken. After they were willing and signed, the researchers proceeded to take blood specimens in accordance with the procedures stipulated by the Ministry of Health No. 1406/Menkes/SK/XI/2002.	The results of the examination of lead (Pb) levels in the blood of research subjects (parking attendants at traditional markets in Palembang) by the Central Health Laboratory of Palembang City obtained an average lead (Pb) level of 0.91 µg/dL and standard deviation of 0.384 µg/dL

Discussion

A literature study was conducted to determine the presence of lead (Pb) in the blood of several professions in Indonesia using the AAS (Atomic Adsorption Spectrophotometry) and ICP-OES (Inductively Coupled Plasma Optical Emission Spectrometry) methods. The results of the study by Nusaibah *et al.* (2020) showed that the lead levels in the blood of street vendors were mostly above the safe limit. A total of 18 respondents (60%) had blood lead levels of > 10 µg/dL. The average blood lead level of the respondents was 22.03 µg/dL. Respondents with the highest lead levels had 65 µg/dL with a working time of approximately 16 hours/day. The characteristics of respondents who have an influence on blood lead (Pb) levels are age and daily work time. Research results by Yuvita *et al.* (2014) showed that lead levels in the blood of traffic police due to chronic exposure in Mataram City showed an average value of 14.1 µg/dL. A total of 1.67% of respondents showed high lead levels, 83.33% moderate, and 15% low. These results indicate that traffic police blood lead levels are still within the normal limits allowed by WHO. Lian and Azizah (2016) characteristics of used battery home industry workers include age, gender, years of service, smoking habits, and a history of hypertension and diabetes. From the results of the study, it was found that the average age of the most workers was 31–40 years old by 50%, the most workers were men by 60%, all workers had a working period of 5 years, workers who had a smoking habit were 30%, and all workers had no history of hypertension or diabetes. Workers who have blood lead (Pb) levels above the ATSDR (1999) standard, which is < 10 µg/dL, only have 30%. Blood lead (Pb) levels of 10 g/dL were reduced by 100%.Ghina *et al.* (2020) concluded that the lead (Pb) content in blood samples was undetectable and did not exceed the maximum threshold of normal values according to the Ministry of Health. The samples tested were in accordance with the working period of operators who worked < 4 years, had a threshold level of lead in their blood of about 30 µg/100 mL, and the worker was a woman who did not smoke. Brian *et al.* (2016)

showed lead levels and malondialdehyde levels in the blood of officers at gas stations Jln. Monjali, Jln. Magelang, and Jln. Adjisucipto had exceeded the normal limit, with an average blood lead level of gas station attendants of 62.174 µg/L and an average blood MDA level of 5.86 mol/LA. There is a significant positive relationship between lead levels and MDA levels in the blood of officers at SPBU Jln. Monjali, gas station Jln. Magelang, and gas station Jln. Adjisucipto. Gas station workers should eat foods that contain vitamin E, such as nuts, to reduce the impact of lead in the body, which can cause oxidative stress, and the use of PPE during work must always be considered. Muhammad et al. (2018) analyzed the lead (Pb) content using Atomic Absorption Spectrophotometry. From the linear regression equation presented in the graph, it is obtained that the value of r = 0.9963. The linear regression equation is used as a quantitative calculation to obtain the sample concentration, and further calculations are carried out to obtain lead (Pb) levels. The results obtained for the lead content (Pb) in the blood samples of open space parking attendants, namely the average lead exposure of 17.5 µg/dL of blood, and there was 1 sample (PbO_2) which had a lead exposure value of less than 0.05.

The results of the research by Betti and Eri (2017) concluded that in 2 blood samples of coal workers, the average Pb content was still below the NAV of 0.146 µg/ml in accordance with the Decree of the Minister of Health No. 1406 of 2002, where the normal value of Pb in the blood is 0.1-0.25 µg/ml. Based on the test results, precision is 0.422%, accuracy is 104.55%, LOD is 0.00758946 ppm and LOQ is 0.0252982 ppm. The validation of the wet destruction method using HNO3 for elemental analysis of Pb with the concentration range mentioned above still meets the requirements with a precision price of ≤ 2% and an accuracy of 100% ± 15%. It can be concluded that this destruction method can be trusted and is more valid for Pb analysis in the blood using AAS.

The results of the research by Anselmus (2013) concluded that most parking retribution officers had lead (Pb) levels in their blood that had exceeded the standard value set. Most parking retribution officers who had worked for a long time tended to have lead (Pb) levels in their blood. Most parking retribution officers who work during the day have blood lead (Pb) levels exceeding the standard value set, and there has been an increase in the number of vehicles entering the City Center and piling up in the National Unity Park area.

Rosnita and Amelia's research in 2015 found that 100% of parking attendants' blood lead (Pb) levels were still within the normal threshold (10 – 25 g/dL) based on an analysis of lead (Pb) levels on hemoglobin levels in the blood of parking attendants at traditional markets.The average lead (Pb) content was 0.91 µg/dL and the standard deviation was 0.384 µg/dL. This happens because the level of exposure is not too high, considering the level of lead (Pb) in the air in Palembang City is still within the normal threshold.

From the research results obtained from existing sources, the risk of exposure to lead (Pb) can be reduced by managing the work environment of people exposed to lead. One way of managing it is by utilizing the role of vegetation in absorbing lead (Pb). According to Winata *et al.* (2016), seedlings of samama (Anthocephalus macrophyllus) or red jabon have the ability to accumulate lead (Pb) up to 359.88 mg/kg. This plant species has good growth and adaptation potential to accumulate lead (Pb). According to Aini *et al.* (2017), the Bintaro tree (Cerbera manghas) is a type of tree that has good lead (Pb) absorption. Furthermore, the use of masks by professional road workers and gas station attendants, as well as coal mining workers, parking attendants, home industry battery manufacturers, and vehicle repair shops, can reduce lead-containing air inhalation.For gasoline containing lead, this can be done by reducing or replacing TEL (Tetra Ethyl Lead) gasoline with other anti-knocking agents that do not contain lead.

Conclusion

Based on the literature study that has been carried out, it is found that the value of lead (Pb) in the blood of some workers in Indonesia is still below the threshold value (TV) because it is in accordance with Decree of the Minister of Health of the Republic of Indonesia Number 1406/Menkes/SK/XI/2002 concerning Standards for Examination of Pb Levels in Human Biomarker Specimens that the content of lead (Pb) is 0.1–0.25 µg/ml.

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