DESCRIPTION OF LEAD LEVELS IN THE HAIR ONLINE MOTORBIKE DRIVERS BASED ON YEARS OF SERVICE

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ABSTRACT

Air pollution by motor vehicle exhaust emissions can release lead into the air. Online motorbike drivers are people at risk of being exposed to lead metal. Exposure to lead metal can accumulate in hair and cause toxic effects. The purpose of this study was to determine the level of lead in online motorbike drivers based on years of service.This type of research is descriptive project. Primary data is data obtained from the results of measuring lead levels in the hair of online motorbike drivers. The population of this research is online motorbike drivers in Solo area. Sampling technique used in this research was quota sampling, where 10 samples of online motorbike drivers were taken who met the researchers' criteria. Data was analyzed descriptively to determine lead levels in the hair of online motorbike drivers. The results of questionaires and direct interviews is taken. All samples identification of lead level using by Atomic Absorption Spectrophotometer. The results for each of the 10 respondents were SP01 (0,7817 ug/gr), SP02 (2,0917 ug/gr), SP03 (0,6045 ug/gr), SP04 (0,6210 ug/gr), SP05 (0,3191 ug/gr), SP06 (2,4239 ug/gr), SP07 (1,1067 ug/gr), SP08 (4,5903 ug/gr), SP09 (0,8983 ug/gr), SP10 (0,4668 ug/gr). Based on research conducted at the Yogyakarta Health and Calibration Laboratory. It can be concluded that lead levels of online motorbike drivers do not exceed the threshold set by the Ministry of Health, (<10 µg/gr). This study found the lowest level at SP 05 (0,3191 ug/gr) with a working period of 1 year and the highest level was at SP 08 (4,5903 ug/gr) with a working period of 5 years as an Online motorbike drivers.

Keywords: descriptive; driver; lead; motorbike; quota sampling

INTRODUCTION

Air pollution can come from industry, vehicle fuel combustion fumes, combustion, etc. Transportation produces emissions which can contribute to air pollution levels of up to around 85% (Handari, 2017). Lead is a heavy metal and is included in the group B transition metal which is toxic. This metal can be found in vehicle emissions and can be absorbed into the human body through the air. Vehicle emissions containing lead can be found at bus terminals and on vehicle roads. In these places there are many vehicles such as buses, urban transport and motorized vehicles. Indonesia is a country with quite high levels of air pollution and is in 3rd place in the world. Lead is a naturally occurring heavy metal. The amount of lead in nature increases with increasing human activity in several fields such as mining, quarrying, smelting, fuel use and other fields of use (Sari & Lubis, 2017). Lead is a toxic compound that accumulates in the body, where it is strong, with some of the most dangerous parts that accumulate most of the lead being bones, namely 90%. Lead can be reactivated in the circulatory system when it binds to chemical compounds, such as hemoglobin, and

enzymes, thereby causing disturbances in the body's metabolic system and other disorders, such as blood synthesis, hypertension, and brain damage (Rustanti, 2011).

Hair analysis is a good way to estimate the content of heavy metal elements in the body. By using an analytical technique developed to detect the Pb2+ ion element in hair, the Atomic Absorption Spectrophotometer (AAS) method is used which is capable of accurately detecting the element lead. Lead accumulation in the body can be detected from blood, bones and hair. In hair, lead is bound to sulphihydryl groups so that the lead content in hair can be used as an indicator of lead pollution (Marianti, 2013). Hair is a material that can be easily collected and preserved as samples, in an effort to diagnose disease and a sign of pollutants in the environment. Based on Novdian's research, all the bus drivers' hair that was tested contained lead with the highest levels of lead when they worked > 20 years (Novdian, 2016).

According to research by Rahmawati, (2020), regarding exposure to lead in the hair of bus drivers on the Tanggerang-Surabaya route, the lowest lead level was 0,17 mg and the highest level was 2,28 mg. Apart from that, the length of time a bus driver works also affects the level of lead metal that is exposed to the bus driver's hair. This can be seen in the sample which had the lowest lead levels, had a relatively short work period, namely 3 years and the highest level had a work period of 25 years. The aim of this research is to determine the description of lead levels in the hair of online motorbike drivers in the Solo Baru area based on years of service. The results of this research will provide an overview levels of lead in the hair of online motorbike drivers because they often do outdoor activities, namely along the Solo Baru highway and are exposed to air pollution which is very dangerous for health.

METHOD
The data source used in this research is primary data. Data obtained from the results of measuring lead levels in the hair of online motorbike drivers in the Solo Baru area, the results of questionnaires and direct interviews. Pre Analytical steps are interviews were conducted with respondents by filling in informed consent, followed by filling in a questionnaire. Prepare to take hair samples. Sample handling and labeling to the sample container containing: name, age, date, birth, address, gender. Hair samples are cut to approximately 0,5-1,0 cm. Hair sample is placed in a plastic clip bag that has been labeled and sample coded (Ajang, 2015). Analytics steps including sample preparation technique. Hair samples that have been collected according to the collection requirements are washed. Sample was put into a 100 mL beaker, soaked with 10 mL of technical acetone for 15 minutes while stirring with a glass stirrer. Then rinse 3 times with distilled water. Then wash again with 10 mL of acetone for 15 minutes while stirring, then drain. Next, the sample is dried at room temperature for 3 or 4 days in a vacuum desiccator so that the hair is completely dry and ready to be destroyed (Wiratama, 2018). The digestion and reading process uses AAS. Each hair sample was weighed 5 grams in a clean porcelain crucible cup. Add 5 ml of concentrated HN03 and leave for 1 hour. The sample was digested, cooled and 0.4 ml of concentrated H2SO4 was added and heated again. A mixture of concentrated HNO3 and HClO4 (5:1) is then added, heated until complete evaporation to obtain a clear solution. Each sample that is digested is transferred to a 50 ml measuring flask, then placed in deionized water until the test mark is homogeneous.

Preparation of a standard lead solution. Pb(NO₃)2 powder was weighed 0.16 g and put into a 1000 mL volumetric flask. Then add 10 mL of concentrated HNO₃ and mineral-free water until it reaches the indicated mark and then homogenize. Next pipet 10 mL of 100 mg/L Pb stock solution into a 100 mL volumetric flask, then dilute with distilled water to the limit

mark and homogenize. Then a series of standard solutions is made with 1 blank, and a minimum of 5 levels, namely 1,000, 0.800, 0.600, 0.400, 0.200 (ppm) (SNI, 2009). Preparation of a series of standard solutions of lead metal. Standard series solution was made with a concentration of 0,0; 0,2; 0,4; 0,8; 1,0; 1,2 and 1,4 ppm were then put into a 100 ml measuring flask. Then add distilled water up to the tera mark, homogenize. Determining linearity by measuring this standard series uses AAS at a wavelength of 283,2 nm.

RESULTS

This research was taken from respondents from online motorbike drivers in the Solo Baru area. Research respondent data was collected using a survey, then interviews and providing informed consent. Measurement of lead levels in hair was carried out at the Yogyakarta Health and Calibration Laboratory Center. The results of lead level and years of service can be seen from table 1.

Table 1.
Results of Lead Levels and Years of Service

Sample Code	Lead Level(ug/gr)	Years of Service
SP 01	0,7817	2
SP 02	2,0917	5
SP 03	0,6045	2
SP 04	0,6210	2
SP 05	0,3191	1
SP 06	2,4239	3
SP 07	1,1067	3
SP 08	4,5903	5
SP 09	0,8983	2
SP 10	0,4668	1

Based on data from Table 1, it shows that the lead levels in the hair of online motorbike drivers are said to be still within the normal threshold. It is viewed from the standards issued by the Decree of the Minister of Health of the Republic of Indonesia Number 1406 / MENKES / SK / IX / 2002 which explains that the standards for lead levels in biomarker samples human from hair amounting to < 10 ug/gr.

Table 2.
Basic characteristics of research

Number of sample years of service	f	%
1 year	2	20
2 years	4	40
3 years	2	20
5 years	2	20

Table 2, it shows that there were two respondents (20%) with a working period of 1 year, four respondents (40%) with a working period of 2 years, two respondents (20%) and two respondents (20%) with a working period of 3 years, also two respondents (20%) with 5 years of service.

DISCUSSION

The research began with determining respondents through questionnaires and providing informed consent. Then after agreeing to the informed consent that has been given, samples are taken. The samples obtained were then destroyed. The digestion used in this research was wet digestion using nitric acid (Utami, 2022). The samples of respondents obtained were examined for lead levels in their hair using a Graphite Furnace Atomic Absorption Spectrophotometer. Sample preparation was carried out first to obtain lead levels in the hair.

Sample preparation was carried out using the wet digestion method. Wet digestion is heating a sample with a strong oxidizer by heating at a high temperature and a long time so that the sample will be completely oxidized leaving various elements in the acid solution in the form of inorganic compounds suitable for analysis. The addition of HNO3 functions to break the bonds of complex organometallic compounds because it has strong oxidizing properties. HNO3 has a boiling point of 121°C so use a temperature of 100°C to prevent the HNO3 from running out quickly before the destruction process is complete. High temperature heating is carried out to accelerate the breaking of organometallic bonds into inorganic ones (Wulandari, 2013).

Lead is a poison that is cumulative. About 90% of the lead accumulated in the body enters the bones. From bone lead can be remobilized again and enter the blood circulation. Lead is strongly bound to many types of compounds, such as amino acids, hemoglobin, many types of enzymes, RNA and DNA so that it can interfere with many metabolic pathways. Therefore, the impact of Pb is very diverse, including: blood synthesis, hypertension and brain damage. In children, Pb inhibits the development of IQ (intelligence) (Rusanti, 2011). Lead will enter the body, one of the ways is through the respiratory tract. Therefore, levels of lead metal can be identified in the hair of online motorcycle taxi workers in line with the work they undertake and exposure to the work environment. Lead in the blood will cause toxic and accumulative effects on the body. Even though the amount of lead absorbed by the body is very small, the impact is very dangerous (Prihatiningsih, 2022).

Years of service including working period is one of the factors that influence high levels of lead in the body. It is because working period can influence performance both positively and negatively and has a positive influence on performance if the longer years of service. The more experienced a person is in carrying out their duties. Years of service for online motorbike drivers can describes exposure to lead in workers' blood due to the accumulative nature of lead. The longer a person's working period related with the greater lead level in their blood. The daily activities of online motorbike drivers are on the streets for quite a long time, which causes workers to have a very high risk of exposure. Judging from the daily behavior of these old online motorcycle taxi workers, the exposure of workers to lead is greater and the risk of exposure to lead is also greater. Therefore, apart from a long period of work, length of work is also one of the factors that causes lead levels in hair to increase (Pusparini et al., 2016).

Lead can enter the human body through the digestive tract (digestion) or through breathing (inhalation). Elimination of metal elements in the body by accumulating them in the hair. Lead levels enter the body in various ways and will accumulate in the body's organs. Air Pb absorption in the respiratory tract is ±40% and in the digestive tract ±5-10%, then Pb is distributed into the blood ±95% is bound to red blood cells, and the remainder is bound to plasma. (Rosita et al., 2018). The body can accumulate lead, but this is not proportional, so it can cause negative effects both acute and chronic (Ajang et al., 2015).

CONCLUSION
The results of calculating lead levels in the hair of online motorbike drivers showed that the lowest level was 0,3191 ug/gr with a working period of 1 year and the highest level was 4,5903 ug/gr with a working period of 5 years as an online motorbike drivers. Based on research on lead levels in the hair of online motorbike drivers, it shows that a long period of work can increase the accumulation of lead in the hair. It is breathing air that has been contaminated by vehicle exhaust emissions, which will increase lead levels in the hair.

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