The Correlation Between Consuming Vegetables,Fruits And Seafood With The Level Of Lead In The Blood Of Pregnant Women

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Abstract: Lead is heavy metal that can accumulate in the body and lead can cause anemia, fertility, miscarriage, premature birth, preeclampsia and hypertension during pregnancy used as indicators of current exposure to steady state condition with a threshold value of 5 µg / dL for the pregnant woman.he purpose of this research were to related the habit of consuming vegetables. fruits and seafood to blood lead levels in pregnant woman in the Grinting Village, Bulakamba Sub-district, Brebes District.This research used the observational analytic method with cross-sectional study design approach. The number of samples in this research were 49 pregnant mothers in the Grinting Village, Bulakamba Sub-district, Brebes District, with pregnancy . There is a correlation between lead levels with vegetable eating habits (correlation coefficient r = 0.529 and P value = 0.0001) and seafood eating (correlation coefficient r = 0.541 and P value = 0.0001 and there is a difference in the proportion between lead levels with vegetable consuming habits and seafood consumption habits.
The conclusion of this research is the average of lead level exceeds the threshold value. The habit of consuming seafood, high levels of lead in blood pregnant women in the Grinting Village, Bulakamba Sub-district, Brebes District

Keywords: Blood lead levels, pregnant mothers, Consuming Vegetables,Fruits and Seafood

Introduction

Lead is a toxic metal in which its exposure affects various organs and systems in the human body[1]. The effect of the exposure is chronic so the longer a person is exposed the progressive increase in cumulative dose will occur[i]. In women, lead can cause anemia, fertility, miscarriage, premature birth, preeclampsia and hypertension during pregnancy[2]. Lead exposure that occurs before birth and exposure to a very young fetus by can also damage brain development[3]. The metabolic process during pregnancy can cause lead to spread in the blood and then cross the placenta and then enter the circulatory system of the fetus so that the fetus is at risk and vulnerable to babies born with a low birth weight, and developmental delay may even cause perinatal death[4].

Other studies in the United States found an average blood lead level of 0.93 µg / dL of 1,009 adolescents and in adults found an average blood lead level of 1.75 µg / dL of 4,409[5]. the findings of the average level of Pb in blood in pregnant women precisely in the city of Pristina Yugoslavia amounted to 5.57 µg / dL of 147 subjects and in the city of Mitrovica of 20.00 µg / dL of 144 subjects. Research by Osmel La-Llave-León et al in Durango, Mexico in 2016, as many as 299 pregnant women found lead levels 3.82 higher than the threshold set by the CDC for pregnant women (5 µg / dl)[6].

Grinting Village, Bulakamba District, Brebes Regency is also known as one of the agricultural areas. Lead contamination of seawater in Grinting Village is also thought to originate from non-formal industrial waste water such as agriculture, ship oil residues passing in sea waters and pesticide residues flowing in rivers as a result of agricultural activities. Apart from marine pollution and pesticides, vegetables and fruit are one of the media that can cause lead poisoning in the human body[7].

The habits of eating healthy and nutritious foods are indeed common things done by pregnant women to meet their nutritional intake. Researchers suspect the presence of lead in the blood of pregnant women can be caused by the habit of consuming foods such as vegetables and fruits as well as seafood contaminated with lead from the environment as a result of community activities or activities. Therefore, researchers want to examine the relationship between the habit of consuming vegetables, fruits and seafood with blood lead levels in pregnant women, especially in Grinting Village, Bulakamba District, Brebes Regency.

Research Methods

The research design that will be used in this study is a cross sectional design. Data collected in the form of Primary data and Secondary data. Primary data consists of blood sampling, data collection characteristics and research variables through questionnaires and interviews. Secondary data collected included sub-district monographs, local health centers, the District Health Office, the Regional Development Planning Agency and the District Agriculture Office in Brebes. The sampling technique used purposive sampling / judgmental sampling with a sample of 49 pregnant women. Data analysis was performed descriptively and inferentially. Descriptive analysis is done to describe or give a description of the object being examined. Descriptive analysis consists of frequency data and central values (Central Tendency). Whereas Inferential Analysis is carried out to see the relationship between causal factors as independent variables and effect factors as dependent variables. In inferential analysis the data is processed and analyzed by the Spearman's correlation test

In addition, this study also conducted laboratory tests using the Atomic Absorption Spectofotometry (SSA) test method and the Inductively Coupled Plasma (ICP) test for examining food items commonly consumed by pregnant women. ICP examination was carried out by an analyst at the Laboratory of BBTPPI Semarang to see the presence of lead levels in the food. Collection and examination of blood samples of pregnant women are carried out by officers in the CITO Tegal laboratory.

Results and Discussion
Results

Lead is a metal that is replicated. Where the presentation involves various organs and systems in the human body. In women, lead can cause anemia, fertility, miscarriage, premature birth, preeclampsia and hypertension during pregnancy. In this study, lead levels were not only in the blood of pregnant women but also carried out checks of lead levels in vegetable foods and seafood that everyday became food that needed the intake needed by pregnant women. This is done to see how much lead content is in food.

Based on Table 1, the results of lead inspection at the Semarang BBTPPI Laboratory using the SSA test method (Atomic Absorption Spectrophotometer) show that the presence of lead levels in vegetables and fruits is still below the Threshold Value in the SNI 7387 standard 2009 regulations on safe limits of chemicals in food ingredients . Laboratory examination results related to lead levels in local fruits that are often consumed by pregnant women such as bananas and papayas also show lead levels which are still below the SNI 2009 threshold value.

Table 1. Results of examination of lead levels in vegetables and fruits with SSA method (Atomic Absorption Spectrophotometer)

No	Food Products	analysis results	Standard/ Unit	Method Test
		Vegetables and Fruits		
1	Onion	< 10 mg/kg	0,5 (mg/kg)	SSA
2	Chili	0,22 mg/kg	0,1(mg/kg)	SSA
3	Tomato	0,34 mg/kg	0,5 (mg/kg)	SSA
4	Mustard greens	0,36 mg/kg	0,3 (mg/kg)	SSA
5	Long Beans	0,28 mg/kg	0,1 (mg/kg)	SSA
6	Cabbage	0,36 mg/kg	0,3 (mg/kg)	SSA
7	Carrot	0,17 mg/kg	0,1 (mg/kg)	SSA
8	Kale	0,37 mg/kg	0,3 (mg/kg)	SSA
9	Corn	0,35 mg/kg	0,1 (mg/kg)	SSA
10	Potato	<10 mg/kg	0,1 (mg/kg)	SSA
11	Eggplant	0,25 mg/kg	0,1 (mg/kg)	SSA
12	Spinach	0,61 mg/kg	0,3 (mg/kg)	SSA
13	Papaya	0,34 mg/kg	0,1 (mg/kg)	SSA
14	Banana	0,17 mg/kg	0,1 (mg/kg)	SSA

Tabel 2 . Results of examination of lead levels in seafoods with Inductively Cloupled Plasma (ICP) method

No	Food Products	Analysisi Result	Standar/ Unit	Method Test
1	Fish	0,39 mg/kg	0,3 mg/kg	ICP
2	Shrimp	0,61 mg/kg	1,5 mg/kg	ICP
3	Crab	0,72 mg/kg	1,5 mg/kg	ICP
4	squid	0,41 mg/kg	0,5 mg/kg	ICP

Based on the laboratory examination results of the Semarang BBTPPI Laboratory using the Inductively Coupled Plasma (ICP) test method, it shows that marine fish is a type of seafood that has a magnitude of lead that exceeds the critical threshold threshold value / SNI 7387 standard in 2009, while for shrimp, shellfish and Even though squid is approaching the critical threshold, it is still below the heavy metal NAV in seafood. Based on the laboratory test results of this study as presented in the table shows the amount of lead levels in fish 0.39 mg / kg, shrimp 0.61 mg / kg, shells 0.72 mg / kg and squid 0.41 mg / kg. All types of seafood containing lead above or close to the Threshold Limit Value set in SNI 2009.

The lowest blood lead level is 6.33 µg / dl and the highest is 36.60 µg / dl. The lowest age of respondents is 19 years and the highest is 47 years. Frequency of eating vegetables at least once a day and at most 7 times a day. In the habit of eating fruit at least 1 time a day and at most 7 times a day. In the habit of consuming seafood at least once a day and at most 7 times a day(table 3)

Tabel 3. Description Data Caracteristic and Variables Research Analysis

No	Variables	Mean	SD	Min	Max	Median
1	the level of lead in the blood	19,74	9,41	6,33	36,60	19,70
2	Age	28,96	5,90	19	47	28,00
3	Frecency of Consuming Vegetables	3,55	1,91	**1**	**7**	3,00
5	Frecency of Comsuming Fruits	3,86	1,42	**1**	**6**	4,00
6	Frecency of comsuming seafoods	3,90	1,55	**1**	**7**	4,00

Tabel 4 . The Result of correlation between consuming vegetables,fruits and seafood with the level of lead in the blood of pregnant women

Research Variables	Koefisien Korelasi (r)[a]	Nilai p
1. Frecency of consuming Vegetables	0,529	0,000*
2. Frecency of consuming Fruits	0,103	0,483
3. Frecency Of consuming Seafoods	0,541	0,000*

Ket : * nilai $p<0,05$ (signifikan)　　　　[a]Uji *Spearman's rho*

The result Table 4 of Spearman's rho analysis results, it is found that significantly related variables are lead level with vegetable consumption habits (p value = 0.0001, r value = 0.529) and lead content with seafood consumption habits (p value = 0 , 0001, value r = 0.541), the value of the correlation coefficient (r) on each significant variable indicates the strength of the moderate correlation with the direction of a positive correlation, which means that the higher a variable affects the higher the other variables are affected.

Discussions
Lead levels in the blood
The blood sampling process was carried out by officers from the Tegal CITO laboratory to check blood lead levels. It is known that of the 49 respondents who were examined blood lead levels, the average lead level was above the threshold value set by the CDC (Center for Diseases Control and Prevention) in ATSDR which is 5 µg / dl for the group of pregnant women[8]. High levels of lead in the blood of pregnant women can be caused by a variety of factors including the habit of pregnant women daily in consuming foods both fruit vegetables and seafood. The more often consume food containing lead, the more likely it will be accumulated in the blood of pregnant women so that it will slowly cause adverse effects on the health of the mother and the fetus it contains.

Habits of Consuming Vegetables
Research conducted by Rosen CJ in 2002 noted that lead was very easy to accumulate in vegetables in the form of leaves and tubers and outlined that the lead threshold in soils should be less than 300 ppm. Plants that grow in soils containing more than 300 ppm are considered hazardous for consumption.28 This study is also in line with lead studies on

vegetables by Henny et al. (2013) in Bali and obtained the results of all types of vegetables above the threshold according to the Decree of the Directorate General of Drug and Food Control (POM) Ministry of Health Number: 03725 / B / SK / VII / 89 ie the maximum lead limit in fresh vegetables is 0, 2 mg / kg (0.2 ppm)[9].

High levels of lead in vegetable food are possible because of the process of using pesticides by farmers that contain lead continuously from year to year which causes some lead to stick to vegetables and fruit. The habit of pregnant women who often consume lead metal contaminated vegetables 3 times a day on an ongoing basis is also thought to be a cause of high levels of lead in the blood of pregnant women in Grinting Village, Bulakamba District, Brebes Regency. This could possibly be the cause if vegetables that have been contaminated with lead from various sources of contamination are consumed continuously. High levels of lead in the blood of pregnant women due to the accumulative nature of lead when in the body.

Habits of Consuming Fruits

The presence of lead levels in fruits even though the levels are still below the threshold it is possible that fruits commonly consumed by pregnant women because the fruits in the process of treatment do not require more care (do not have to be sprayed with pesticides) and also the location of the plant is far away from the road that is usually used by motorized vehicles so that although it remains polluted, it does not stick too much to the fruit's skin. Based on laboratory results on the examination of lead levels in fruit, papaya and banana species each had lead levels of 0.34 mg / kg and 0.17 mg / kg. This is also in line with Ani Guntarti's 2008 study in Yogyakarta which found that there were lead content in bananas and several other fruits.

The habit of consuming seafood

Lead that enters the coastal and marine ecosystems. Some are soluble in water, some sink to the bottom and are concentrated into sediments, and some enter the body tissues of marine organisms (including phytoplankton, fish, shrimp, squid, shellfish, seaweed, etc.). The lead follows the food chain from phytoplankton to predatory fish and eventually to humans.

In general, the people in Grinting Village, Bulakamba District, Brebes Regency, Central Java, consume a lot of seafood, including pregnant women with a frequency range of eating 1 to more than 3 times a day. The types of seafood consumed by fish were as much (91.8%), squid (63.3%), shrimp (57.1%), shellfish (57.1%). The high consumption of seafood from the sea which is polluted by various wastes including lead can lead to the possibility of lead contamination in seafood and for people living in coastal areas to be higher.

Conclusion

The results of the discussion above it can be concluded that the average lead level in the blood of pregnant women is 19.74 µg / dl (above the Threshold Value) determined by the CDC (Center for Diseases Control and Prevention) in ATSDR which is 5 µg / dl for the group pregnant mother. Variable consumption habits of vegetables and seafood consumption habits have a positive correlation with high levels of lead in the blood of pregnant women. Whereas the variable consuming fruit does not have a significant correlation because the fruit taken as a sample is a local fruit which in its treatment does not need to be sprayed with pesticides. The high levels of lead in the blood of pregnant women in Grinting Village, Bulakamba District, Brebes Regency must be of great concern to the local government given the impact and danger caused to the health of the mother and fetus contained.

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